

Ontario's Chief Energy Conservation Officer
Annual Report 2008



Conservation
Bureau
The power of conservation ON



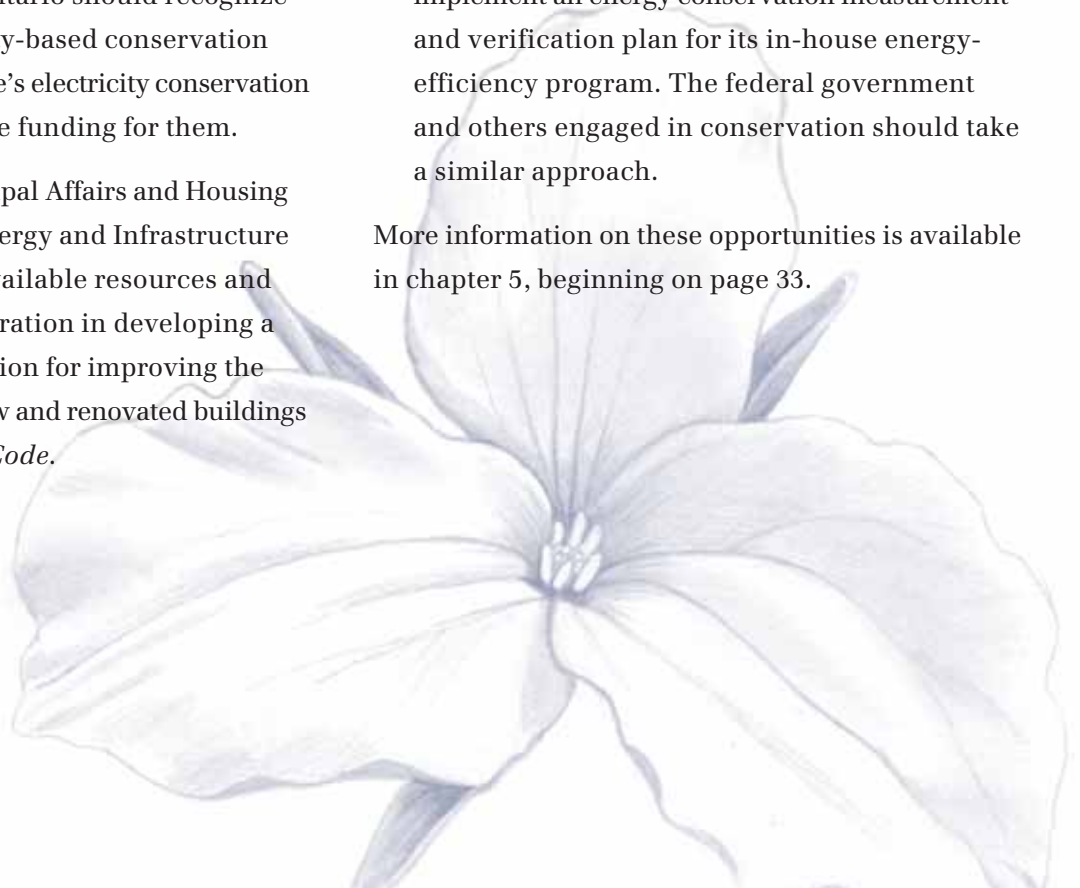
Be the change to a
culture of conservation

Opportunities to Enhance Conservation

The Chief Energy Conservation Officer has identified the following opportunities that can help resolve barriers and promote conservation, energy efficiency and demand management.

1. The Chief Energy Conservation Officer is issuing a call to action to every Ontarian to become involved in conservation and participate in the conservation programs and initiatives offered by the Ontario Power Authority and others.
2. The Government of Ontario should ensure that building-related projects supported through provincial funding or provincial organizations, including Infrastructure Ontario, are built to the minimum energy-efficiency standards that will be required for all buildings in 2012.
3. Leading institutions and businesses should appoint an in-house energy conservation champion to motivate change by all employees as well as the organization.
4. The Government of Ontario should recognize the value of community-based conservation activities to the province's electricity conservation efforts and increase the funding for them.
5. The Ministry of Municipal Affairs and Housing and the Ministry of Energy and Infrastructure should increase the available resources and their degree of collaboration in developing a long-term strategic vision for improving the energy efficiency of new and renovated buildings in Ontario's *Building Code*.
6. The Ministry of Energy and Infrastructure should dedicate additional human resources to develop and update energy-efficiency standards for energy-consuming products.
7. The Ministry of Energy and Infrastructure and the Ministry of Municipal Affairs and Housing should collaborate to develop rules and guidelines to ensure the fair implementation of in-suite metering in multi-unit residential buildings.
8. Leading commercial tenants and landlords are encouraged to plan for and install sub-meters in rented spaces in order to transfer to tenants the responsibility for the costs of electricity under their direct control.
9. The Government of Ontario should develop and implement an energy conservation measurement and verification plan for its in-house energy-efficiency program. The federal government and others engaged in conservation should take a similar approach.

More information on these opportunities is available in chapter 5, beginning on page 33.





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a division of the Ontario Power Authority

November 1, 2008

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John Beck
Chair, Board of Directors
Ontario Power Authority
120 Adelaide Street West, Ste. 1600
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Dear Minister and Board members:

In accordance with the requirements under the *Electricity Act, 1998*, amended in 2004, I am pleased to present the 2008 annual report of the Chief Energy Conservation Officer.

As required under the Act, this report includes:

- a description of the steps taken to implement the current year's proposals and information on the results achieved (chapter 3)
- a review of the Ontario government's progress in meeting its goals relating to the development and implementation of electricity conservation and load demand management measures (chapter 3)
- the Ontario Power Authority's proposals for the following year for steps to be taken to (chapter 4):
 - promote electricity conservation and load management
 - procure reductions in electricity demand and promote management of electricity demand to assist the government in achieving electricity conservation goals
 - facilitate the provision of services relating to energy conservation and load management
- findings, opportunities and recommendations on government policy or legislation identified by the Conservation Bureau that result in a barrier to the development or implementation of electricity conservation measures (chapter 5).

The report also includes background on several key conservation concepts (chapter 1), an overview of conservation leadership and awareness in Ontario (chapter 2), a description of the conservation activities in both the public and private sectors (chapter 3) and a summary of the government's actions taken in response to the recommendations made in the 2007 annual report (chapter 6).

It is a great honour for me to work with so many Ontarians in building a culture of conservation in our province.

Sincerely,

Peter Love
Chief Energy Conservation Officer

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(available on the Conservation Bureau website, www.conservationbureau.on.ca)

Appendix 1: Ontario Power Authority Conservation Programs

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A Message from the Chief Energy Conservation Officer

You must be the change you wish to see in the world.

Mahatma Gandhi, former political and spiritual leader of India

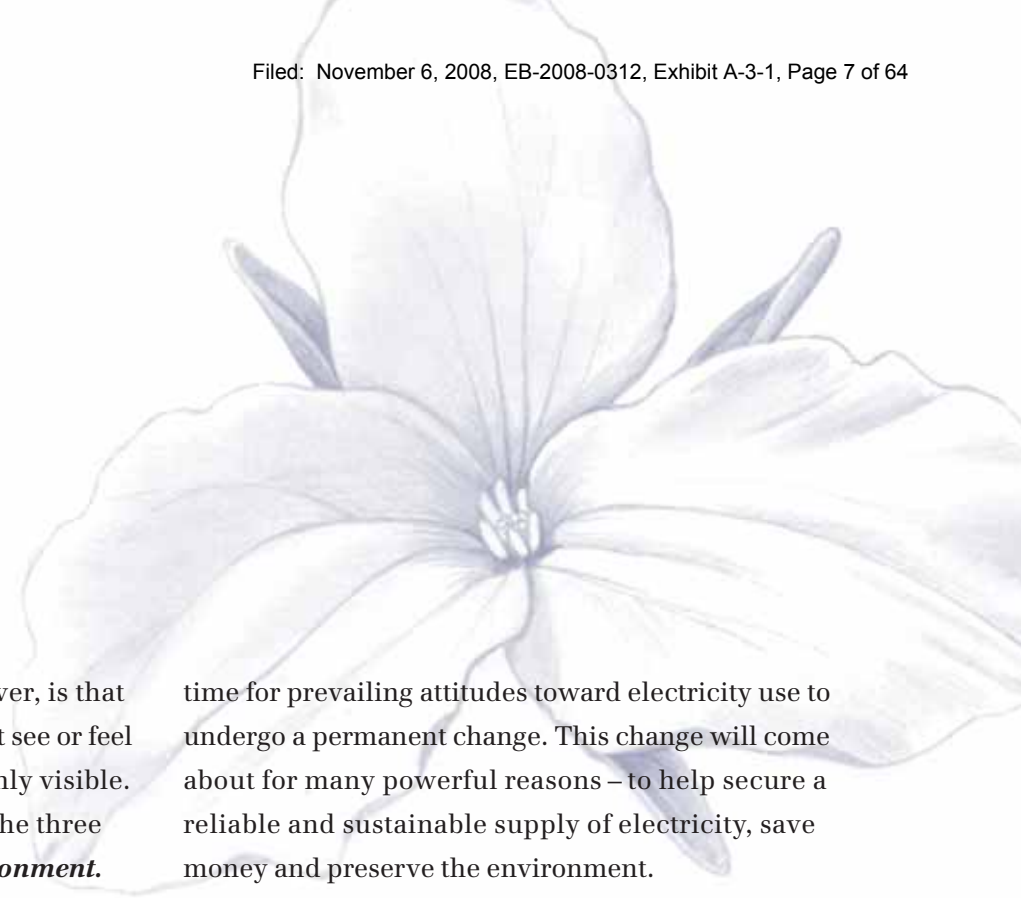
The key element in creating a conservation culture is individuals taking action. This means embracing the values of the culture and incorporating them into our lifestyles each day. And in so doing—leading by example—others will follow and, collectively, we will “be the change.”



I believe that all Ontarians have a role to play in meeting one of the most aggressive conservation targets in North America: a 6,300-megawatt reduction of peak demand by the end of 2025. Progress to date has been solid – the province met its first interim reduction target of five percent, or 1,350 megawatts, by the end of 2007. The next interim target is a further 1,350-megawatt reduction by the end of 2010.

In addition, in September, the Minister of Energy and Infrastructure issued a directive to the Ontario Power Authority to review a portion of its proposed Integrated Power System Plan, focusing on conservation and renewable energy. Among other things, the Ontario Power Authority is to review the viability of accelerating the achievement of the stated conservation targets.

A top priority for my office is to champion continually the importance of energy efficiency and conservation, as well as speak to the need for leadership in all parts of society, including households, businesses, farms, industries, governments, Aboriginal communities, universities, schools and hospitals.



One of the key challenges we face, however, is that conservation is largely invisible – you can’t see or feel it. But the effects of conservation are highly visible. I refer to the benefits of conservation as the three “Es” – ***employment, economy and environment.***

Conservation products and services contribute to local and regional employment, creating jobs and new businesses in technology and product development, manufacturing, distribution, marketing, sales, installation and maintenance, as well as in a variety of service areas such as energy management and consulting – “green collar” jobs. Conservation saves money by reducing electricity costs, and there is a clear benefit to the environment through reduced use of fossil fuels.

Building a culture of conservation will require a disciplined and sustained effort over a number of years. Although accomplishing this will be a challenge, it is certainly achievable. Consider examples from our own recent history that illustrate how our attitudes have changed in response to new knowledge about the world and the way we live: recycling, seatbelts, non-smokers’ rights and designated drivers. It is now

time for prevailing attitudes toward electricity use to undergo a permanent change. This change will come about for many powerful reasons – to help secure a reliable and sustainable supply of electricity, save money and preserve the environment.

Much has been accomplished, but much more remains to be done. I encourage you to send me your feedback on this report, as well as share your conservation successes and challenges with me and others across Ontario. Most importantly, I encourage you to “be the change.”

Peter Love

Chief Energy Conservation Officer
November 2008

Chapter 1: Conservation Background and Concepts

The great thing in this world is not so much where we stand, as in what direction we are moving.

Oliver Wendell Holmes, physician and writer

This is the Chief Energy Conservation Officer's fourth annual report on electricity conservation progress in Ontario. The report provides a summary of electricity conservation and demand management leadership and coordination in Ontario, as well as current year conservation activities, and proposals for the coming year. Conservation activities of the Ontario Power Authority and others throughout Ontario are covered. The report also identifies barriers to conservation action and opportunities for increasing energy efficiency in Ontario. Further details about electricity conservation programs in Ontario are provided in the appendices.¹

Convincing Ontarians of the need to conserve electricity and use energy more efficiently is challenging because conservation and electricity are often invisible or overlooked. The impacts of conservation, however, are quite tangible. Conservation resources can cost less than electricity supply and provide a valuable opportunity to reduce electricity bills for individuals and organizations. Investments in energy efficiency often make sense once their cost-effectiveness is evaluated over the operating life cycle of the equipment or building.² The resulting economic benefits can continue to pay off over time and help make businesses more competitive. Furthermore, energy prices are expected to rise in the future, and success in conservation can help moderate these uncertain cost increases.

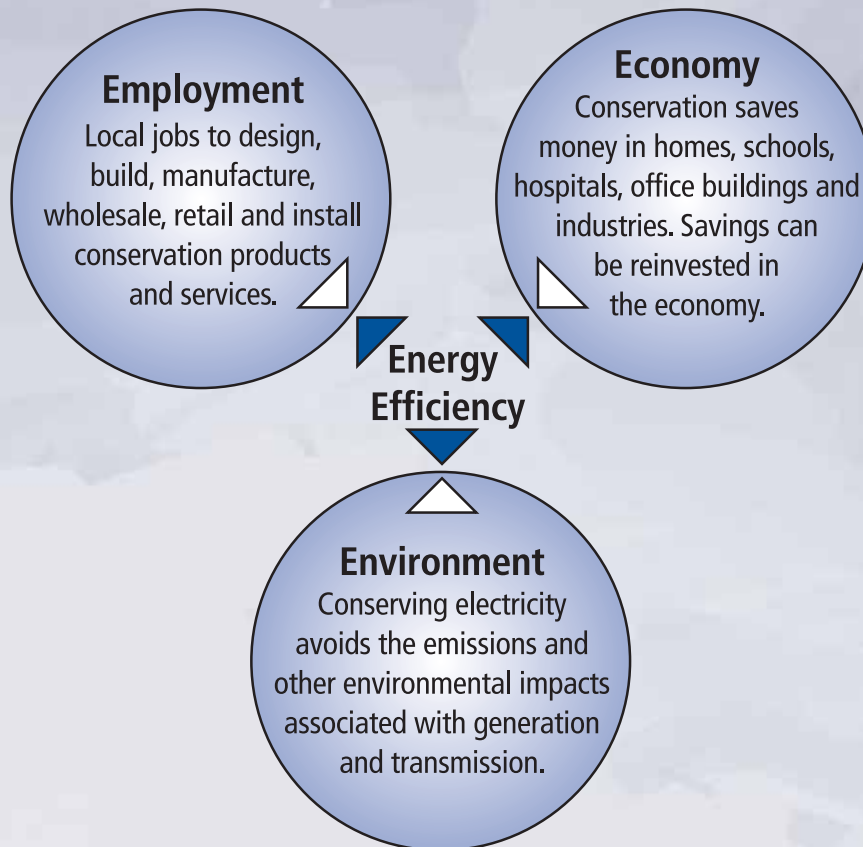
Conservation also can help lessen the strain on Ontario's electricity system, ensuring a more reliable supply of power for all users. By reducing the need for investment in electricity infrastructure over time, Ontario's conservation efforts can lower demand for often expensive electricity imports from Ontario's neighbours, sometimes from coal-fired stations.

One important theme of this report is the triple "E" benefits of conservation and energy efficiency, as explained in Figure 1.1. These three Es – employment, economy and environment – are akin to the three pillars of corporate sustainability – financial, social and environmental – also known as the "triple bottom line."³ Increasing the triple bottom line is often what drives electricity users to conserve.

A sustainable electricity future for Ontario will depend upon the proper, long-term management of electricity demand and consumption. **Demand*** is the total amount of electricity needed at a given point in time and is measured in watts, kilowatts or megawatts. For example, a home theatre with a large plasma screen, DVD and state-of-the art sound system might require from 500 to 1,000 watts to operate. **Consumption** is the amount of electricity used over time and is often expressed in kilowatt-hours. A 500-watt home theatre system will consume one kilowatt-hour over the course of a two-hour movie.

** Terms in boldface are defined further in the glossary at the end of this report*

Figure 1.1: The Three Es of Electricity Conservation



Conservation and energy efficiency have employment, economic and environmental benefits. Conservation products and services are labour-intensive, and many of the jobs generated by the industry provide local employment. Using energy more efficiently saves money for homeowners, businesses, offices and institutions such as schools and hospitals. These savings can be reinvested in the economy to create even more jobs and drive

further investments in energy efficiency. Finally, since more than 80 percent of the emissions in Canada that contribute to climate change result from the production and use of energy, energy conservation helps to preserve resources and the environment for future generations. In fact, Ontario's climate-change plan⁴ identifies energy efficiency as an important part of the province's strategy to reduce greenhouse gas emissions.

Energy efficiency, employment and the economy

A review by the Conservation Bureau of recent studies that examine the links between employment and investments in energy efficiency indicates that the potential for energy conservation-related jobs in Ontario is great. A recent study completed by the American Council for an Energy-Efficient Economy concluded that annual investments in energy-efficiency technologies support a high level of employment in the United States – 1.63 million jobs in total.⁵ The building industry generated about two-thirds of all energy efficiency-related jobs. Investments in the appliance and electronics sector generated the most jobs in the building industry, followed by residential and commercial construction and renovation. Other significant levels of employment are associated with investments in the industrial sector, followed by the transport and utility sectors. The Conservation Bureau intends to investigate further the potential employment benefits of a culture of conservation for Ontario.



Weather and peak demand

The weather has a significant impact on Ontario's electricity peak.

On a summer day:

- Every degree over 16 degrees Celsius can raise demand by 150 megawatts to as much as 450 megawatts per degree at 35 degrees (primarily air conditioning load).
- Wind, by cooling equipment, can have an effect similar to reducing the temperature by five degrees.
- Cloud cover, by providing shade from the sun, can reduce Ontario's demand by as much as 1,000 megawatts.
- The temperature drop following an afternoon thunderstorm can bring down demand by more than 1,000 megawatts.

On a winter day:

- Each degree below 10 degrees Celsius can raise demand by 50 megawatts to as much as 250 megawatts per degree at minus 20 degrees (primarily heating and furnace load).
- Strong winds on cold days can increase demand by as much as 800 megawatts.
- Too much cloud cover can increase lighting loads and, in winter, can increase Ontario's demand by as much as 750 megawatts.

Source: Independent Electricity System Operator



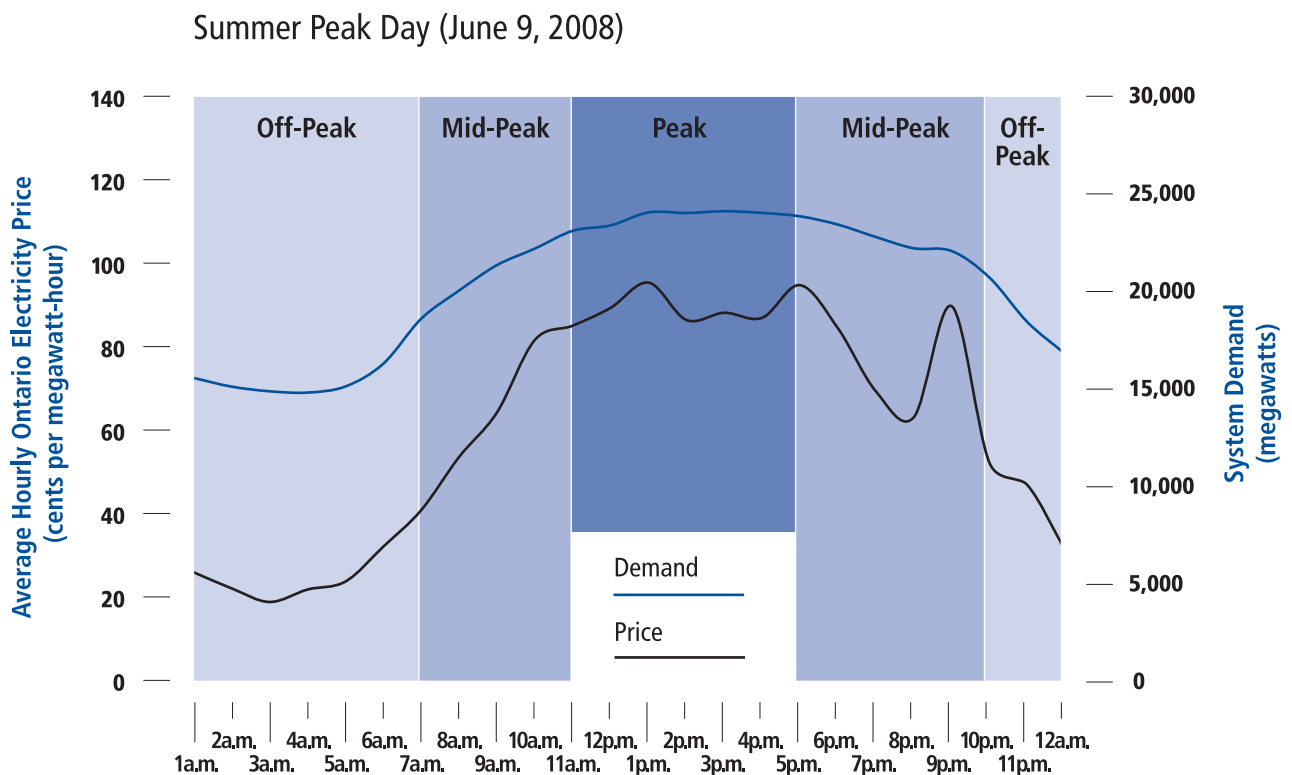
Peak demand is the greatest amount of demand during a specific period of time and is often used in reference to Ontario as a whole. It varies by season and, with increased summer air conditioning load, the highest annual peak demand in Ontario tends to occur during the summer. Since 2001, Ontario has been Canada's only summer-peaking province.⁶ Figure 1.2 below illustrates the winter and summer days with the highest electricity demand in 2008.

When **smart meters** are installed across the province,⁷ the cost of electricity will vary depending on the

time that it is used. **Time-of-use** electricity rates take into account when, as well as how much, electricity is used by each consumer.

“Conservation” is a collective term for behaviours and technologies that result in using less electricity or using electricity at different times, or employing technologies designed to provide the same service for less electricity. These fall into four **conservation categories: conservation behaviour and demand management, energy efficiency, customer-based generation and fuel switching.**

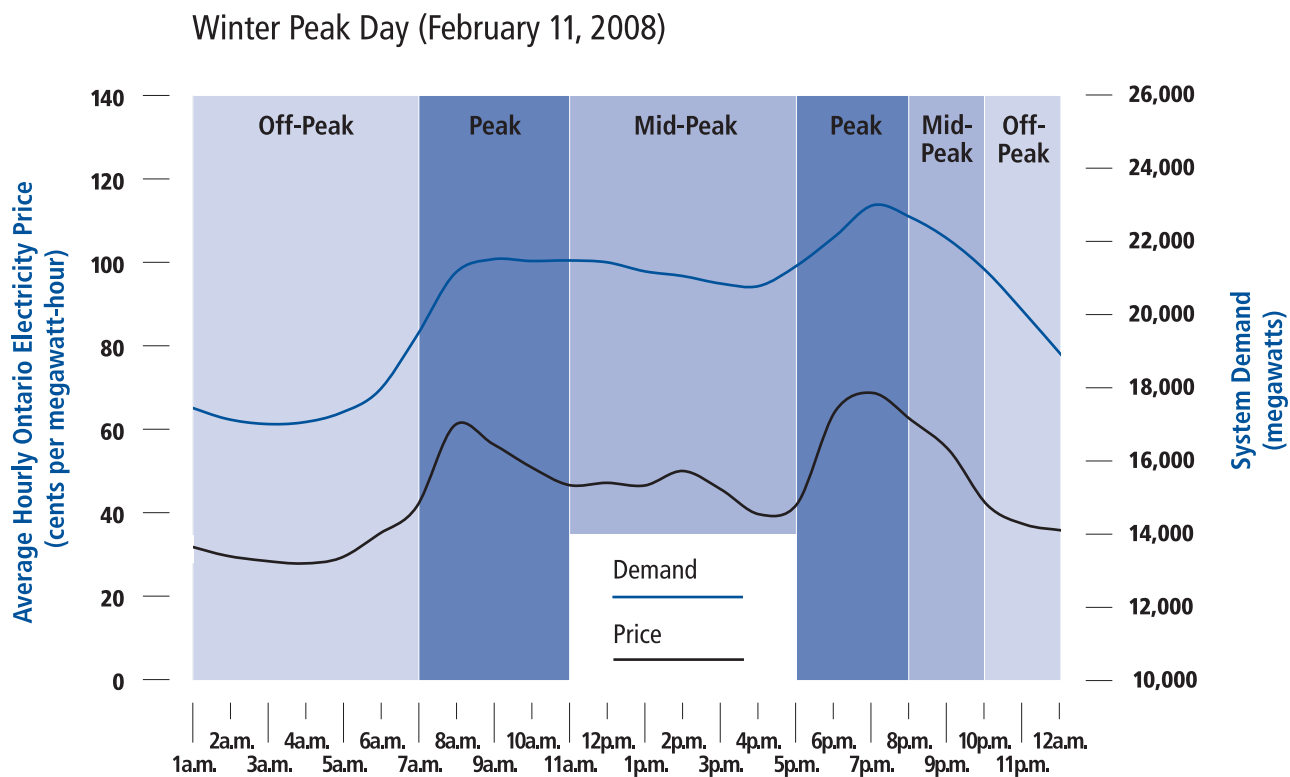
Figure 1.2: Summer and Winter Peak Days – Ontario Demand



The two **load shapes** shown in Figure 1.2 illustrate actual summer and winter days with the highest demand in 2008. The Ontario Energy Board's time-of-use periods are shown as different coloured bars for off-peak, mid-peak and peak periods, respectively. All three sectors – residential, commercial/institutional and industrial – combine to form the system load shape, although the load shape for each individual sector varies. The price curves are an average of the hourly Ontario electricity price, or wholesale price, for every regular weekday for the month that

the peak occurred.⁸ These curves help to illustrate the need for time-of-use electricity rates because generating electricity during peak periods is more expensive.

Ontario's time-of-use rate schedule is more predictable than the wholesale price because electricity customers know the price for each time period in advance. As of November 1, 2008, the regulated time-of-use rates per kilowatt-hour are just 4 cents off-peak, 7.2 cents mid-peak and 8.8 cents peak.



Sources: Independent Electricity System Operator, Ontario Energy Board

ARCA Canada Inc. creates new jobs while recycling Ontario's electricity-guzzling old fridges

Meeting Ontario's needs for energy-efficient products, tools and strategies to reduce energy demand means new investment and new jobs for the economy. The Ontario Power Authority's Great Refrigerator Roundup Program led to the creation of about 100 jobs in Ontario, when it awarded ARCA Canada Inc. a multi-million dollar contract to recycle older, inefficient working refrigerators, freezers and room air conditioners.

Under the program, ARCA collects eligible appliances from homes and recycles them in an environmentally responsible manner. To handle the large recycling volumes, the company has spent more than \$650,000 on equipment and refurbishing a 42,000-square-foot appliance recycling centre in Oakville, as well as \$1.6 million on the leases for its fleet of vehicles.



The Ontario Power Authority's Great Refrigerator Roundup Program has led to the creation of about 100 jobs in Ontario, many of them at this Oakville facility.

Chapter 2: Conservation Leadership and Awareness

Leadership is practiced not so much in words as in attitude and in actions.

*Harold S. Geneen, former president and Chief Executive Officer
of ITT Corporation*

The Conservation Bureau, headed by the Chief Energy Conservation Officer, plays a leadership and coordination role in raising awareness and championing the development of a culture of conservation in Ontario. A large part of this role involves fostering and recognizing the many leaders in conservation and energy efficiency in Ontario. This is accomplished, in large part, by celebrating their successes and leadership. Since his appointment in 2005, the Chief Energy Conservation Officer has been raising conservation awareness and engaging leaders in championing energy efficiency across the province.

Since the beginning of 2008, the Chief Energy Conservation Officer has made more than 100 public appearances⁹ and his activities have generated more than 130 million earned media impressions.¹⁰ A wide variety of vehicles have been used to help spread the conservation message, including speaking engagements, webcasts, radio, television and newspapers. For instance, Ontarians could tune into *PowerLines*, a weekly radio show that aired for 13 weeks in 2008, in which the Chief Energy Conservation Officer featured individuals leading the movement toward conservation and energy efficiency in Ontario, Canada and around the world. The diversity of stories shared with listeners on *PowerLines* were meant to inspire even more leadership and motivate action. The episodes are available on the Conservation Bureau website.



Liza Fromer and Peter Love co-host PowerLines, a weekly radio show that aired for 13 weeks in 2008, featuring individuals leading the movement toward conservation and energy efficiency in Ontario, Canada and around the world.

Certificates of Recognition

In recognition of the importance of leadership in building a culture of conservation, the Chief Energy Conservation Officer awards Certificates of Recognition to individuals or organizations that demonstrate leadership in electricity conservation. Twenty-seven Certificates of Recognition were awarded in the first eight months of 2008.¹¹ A listing of all certificate recipients is available on the Conservation Bureau website.

Readers are invited to nominate an organization that has demonstrated a leadership role in making a long-term commitment to electricity conservation. The nominated project or initiative must operate within the Province of Ontario to be eligible for a certificate. Completed nomination forms should be submitted by e-mail to the Conservation Bureau. The certificates are typically awarded at public events.

Conservation in Every Sector

The efforts of businesses and industry to combine energy savings with conservation awareness are critical for driving the culture of conservation forward. To the business community, the Chief Energy Conservation Officer's message is simple: conserving electricity is an opportunity to improve the triple bottom line. This message has been embraced by the Toronto Building Owners and Managers Association that delivers, in partnership with the Ontario Power Authority, an energy-efficiency program for large office buildings in Toronto.¹²

Small and medium-sized businesses have risen to the challenge as well. Across Ontario, leading companies have participated in the Electricity Retrofit Incentive Program, which supports energy-efficiency retrofits by commercial/institutional, industrial and agricultural customers.¹³ Other Ontario Power Authority incentive programs aimed at businesses are described in Appendix 1 of this report.



In September, the Ontario Home Builders' Association received a Certificate of Recognition for its role in actively supporting green buildings and green builders. The award was accepted by Mark Basciano, president of the association from September 2007 to September 2008.

One of the recommendations in this report is a call for all businesses to designate energy conservation officers, similar to the Chief Energy Conservation Officer's call in 2007 to appoint municipal energy conservation officers. This does not necessarily mean hiring new staff – upon committing to increasing energy efficiency, many organizations find opportunities to assign the responsibility to act as an internal “energy champion” within their existing ranks. Once economic benefits begin to be realized, businesses often can make a case for dedicating additional resources to increase energy efficiency.

To the federal and provincial governments, the Chief Energy Conservation Officer's message revolves around **codes and standards** for energy efficiency. Research indicates that one of the most cost-effective ways to advance energy efficiency is through more stringent codes and standards. In California, close to half of all electricity savings from increased efficiency over the last 30 years occurred as a result of improved building codes and equipment performance standards.¹⁴ Building developers and equipment manufacturers are also critical to reducing the energy requirements of buildings and appliances. In addition to codes and standards, the federal and provincial governments have played important roles in delivering conservation through in-house, incentive, awareness and training programs.

In Ontario, the *Energy Efficiency Act*¹⁵ sets energy-efficiency standards for refrigerators, freezers, air conditioners and other appliances/equipment, while amendments to Ontario's *Building Code*¹⁶ in 2006 created stringent energy-efficiency standards for homes and buildings. These legislative changes mean that all new buildings will have to meet what are among the most stringent minimum energy performance standards in the world by 2012.

Strong community champions will be pivotal in the effort to foster leadership and develop coordinated efforts to meet Ontario's conservation targets and increase the energy efficiency of buildings, institutions, industries and households. The Chief Energy Conservation Officer has been encouraging municipalities to appoint energy conservation officers to engage their communities in creating a culture of conservation at the local level.

Since late 2007, 15 municipal energy conservation officers have been appointed to actively encourage their communities to take advantage of existing conservation programs and activities and create locally managed conservation initiatives.¹⁷ An updated list of municipal energy conservation officers is provided on the Conservation Bureau website. To promote this initiative and other local conservation activities, the Chief Energy Conservation Officer continues to meet with municipal officials at every opportunity.

Leadership and Awareness

Conservation leadership and awareness in 2008 has been marked by a number of significant events across Ontario. Some initiatives to raise awareness about energy issues originated in the province, while others started internationally and spread to Ontario.

On Saturday, March 29, 2008, more than 50 million people around the world participated in the World Wildlife Fund's Earth Hour, the largest voluntary "power down" in history. Ontario led Canada in participation, with an astonishing 80 communities out of a worldwide total of 300 turning off their electricity between 8 and 9 p.m. Ontario had more communities participating than any country in the world. This symbolic gesture shows not only that awareness is increasing, but more importantly, that Ontarians can get things done if they, as individuals, collectively pursue a common goal. In fact, demand across the province was down about 5.2 percent, according to Ontario's Independent Electricity System Operator.¹⁸

Just two months later, Ontario made a powerful statement about the importance of electricity conservation by launching its first Energy Conservation Week during the last week of May. Coordinated by the Ontario Power Authority and the Chief Energy Conservation Officer, in partnership with the Ministry of Energy, the Independent Electricity System Operator and the Electricity Distributors Association, this week was a concentrated period of focused efforts to encourage wiser electricity use. Many other groups and individuals participated in what was largely a grass-roots, decentralized, province-wide set of events.



In addition to building upon awareness of the need to conserve electricity and use it more efficiently, Energy Conservation Week was also about motivating action, particularly before the summer peak season. From municipal resolutions declar-

ing the importance of the week in their communities, to events co-ordinated by businesses, schools and local distribution companies, to the actions of individuals province-wide, Energy Conservation Week was a highly successful first-time effort.

Planning for the second Energy Conservation Week in the spring of 2009 is now underway. To learn more about this event and how you can become involved, please contact the Conservation Bureau.

Tracking Conservation Awareness

The Ontario Power Authority conducts ongoing research to better understand trends in attitudes, behaviours, motivations and barriers to conserving electricity among Ontarians. In 2008, a province-wide telephone survey followed up on the baseline research on electricity conservation usage and attitudes and reported on differences in key metrics over the past year. These surveys are completed throughout the year to determine whether peoples' attitudes and behaviours toward electricity and conservation are affected by the conservation programs and initiatives deployed in the marketplace. The results are available online.¹⁹

In addition to gaining insights into broad-based attitudes and awareness, the research covers:

- the importance of energy conservation on consumers' personal agendas
- concerns about reliability, environmental impacts and the cost of electricity
- personal efforts made to increase knowledge of electricity conservation measures and specific actions being taken in the home
- roles and performance of government, utilities and individuals in conserving energy.

Public opinion concerning the priority of electricity reliability has remained steady over most of 2008, with the number saying electricity reliability should be a very high priority remaining constant at about one in four. And fewer than half of Ontarians believe the province has enough generating or transmission

capacity to provide reliable electricity for the next 10 years. Still, when it comes to electricity issues, people seem to understand their importance but do not have a sense of urgency – for them, it is more a problem to be anticipated and prevented than to be solved.

Although the conservation message has yet to reach everyone, the survey results indicate that Ontarians increasingly feel empowered about conserving electricity. Individuals are learning more about what they can do to use electricity more efficiently, and almost everyone reports having taken some action to conserve electricity in the home. Since 2007, progressively more Ontarians continue to cite cost savings and reducing impacts on the environment as the main drivers for electricity conservation behaviours.



Oakville's municipal energy conservation officer

Since her appointment as a municipal energy conservation officer, Suzanne Austin, a policy analyst with the Town of Oakville, has been a driving force behind a variety of conservation initiatives. One of the key messages of the Chief Energy Conservation Officer in 2007 was the need for leadership in conservation at the local level. "I am ready to take on this challenge," Ms. Austin said after the announcement of her appointment on February 26, 2008. "It's important for young people like me to take a leadership role by encouraging a culture of conservation in our community and throughout Ontario."

As part of Energy Conservation Week 2008, the Town of Oakville sponsored a contest for elementary school children to create a poster that depicts ways to conserve energy at home or at school. Students from the Enviro Club at Chisholm School were especially enthusiastic about Energy Conservation Week. The winning poster, shown at left, was created by Ellen McGee, a Grade 3 student, who, along with her classmates, demonstrated that even someone as young as nine can play the role of an energy conservation champion.

Compact fluorescent lamps: disposal and service life guarantees

Compact fluorescent lamps have become a prominent symbol for promoting energy efficiency in Ontario. This is due in large part to the number of different organizations promoting these products for their cost savings, despite the fact that their initial cost is higher than comparable incandescent lamps. However, as compact fluorescent lamps increase in market share, the trace amounts of mercury they contain have raised concerns about their proper disposal.²⁰ Large retailers, such as The Home Depot, IKEA and Rona Home and Building Centres, have responded by accepting spent compact fluorescent lamps for proper recycling at all their retail locations. The Chief Energy Conservation Officer supports these leading retailers in helping to address this concern.

Media reports have also raised some concerns about the lifetime performance of compact fluorescent lamps. All consumer products vary in quality and performance, including these energy-efficient products. ENERGY STAR® qualified lamps are required to include a two-year and a minimum hour-life warranty by the manufacturer.²¹ The Chief Energy Conservation Officer encourages Ontarians to invest in ENERGY STAR lamps to ensure that they are purchasing quality products.



Ontarians also appear to be adopting more advanced conservation actions over time. While basic behaviours such as turning off electronics and lights when not in use and installing programmable thermostats have become habitual for many, more committed conservation actions, such as undertaking home energy evaluations and participating in **demand response** programs, have increased over the past year. In fact, as installing compact fluorescent lamps has become more common, the number saying that doing so is the best way to conserve electricity in the home has decreased from 25 percent to just five percent, indicating that electricity conservers are moving on to adopt more sophisticated conservation measures.²²

Furthermore, Ontarians see some progress being made: eight in 10 report both hearing more and talking more over the past year about ways to use electricity wisely in the home. While three in four still say Ontario consumers in general are wasteful in their use of electricity, this number has fallen by five points since early 2007.

About one-quarter of Ontarians report feeling that they are doing all they can possibly do at this time to conserve electricity. Interestingly, as basic conservation measures become more commonplace and awareness of more advanced conservation actions has increased, people are now more likely than in 2007 to say they are doing less than “all they can do.” Coupled with the knowledge that many individuals have yet to move beyond basic conservation measures, this finding indicates that there are opportunities to do more. In particular, there is a need for Ontarians to understand more about ways to conserve as well as to better understand the urgency for doing so.

Other highlights from the survey are:

- Roughly two-thirds of Ontarians, slightly more than in 2007, believe they can definitely make a personal contribution to reducing total electricity use in the province.
- An overwhelming 85 percent reported that using electricity wisely in the home has become more of a personal priority in comparison to the previous year.
- Individuals want to learn more about what they can do to use electricity more efficiently, with two in three saying they do not know enough about using electricity wisely in the home.
- Forty-two percent of Ontarians believe that promoting electricity conservation should be a very high priority for the provincial government.

Markham Community Centre Conservation Challenge

On July 1, 2008, the Markham Energy Conservation Office and the Town's Recreation Services Department launched the first Community Centre Conservation Challenge. The challenge pitted 10 of Markham's community centres against each other in a battle to cut down on energy consumption during the hot summer months between July and September. With a combined annual energy consumption of about 18 million kilowatt-hours – enough to power 1,700 homes for a year – the potential for energy savings in community centres is great.

From turning off unnecessary lighting and raising thermostats, to unplugging overnight all electronics that use standby power, such as computer monitors, printers and photocopiers, community centres across Markham engaged their community in their efforts to reduce power consumption. The 10 participating community centres saved more than 256,000 kilowatt-hours by the end of the three-month challenge. Markham was the first jurisdiction in Ontario to appoint a municipal energy conservation officer, Viive Sawler.



Shown at an event to celebrate the energy-saving community centres are, left to right: Markham Deputy Mayor Jack Heath; Bernie McDermott, Facility Coordinator (Milliken Mills); Viive Sawler, Manager, Markham Energy Conservation Office; Bob Bell, Facility Supervisor (Milliken Mills); and Markham Councillor Erin Shapero, (Chair Environmental Issues Committee).

Chapter 3: Update on Current Year Electricity Conservation Activities

Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it is the only thing that ever has.

Margaret Mead, anthropologist

This chapter provides an overview of the Ontario Power Authority's 2008 portfolio of conservation programs. It also describes the activities of others involved in creating a conservation culture in Ontario this year, including provincial, federal and municipal governments, electricity and natural gas utilities, private companies and non-governmental organizations.

In June 2008, the Chief Energy Conservation Officer confirmed that the actions of Ontario's electricity consumers achieved the province's peak demand reduction target of five percent, or 1,350 megawatts, by the end of 2007.²³ The impact of conservation was substantiated by the results of conservation program activities undertaken by the Ontario Power Authority, electricity and natural gas utilities, governments, energy management companies and others. The next conservation target is a further five-percent reduction from the forecasted peak by the end of 2010.

Ontario Power Authority Conservation Activities

The Ontario Power Authority, in cooperation with local distribution companies and other delivery partners, has launched a robust portfolio of electricity conservation programs designed to achieve conservation and energy-efficiency results and build capability in every sector of Ontario's economy. These programs fall into four categories: mass market, commercial/institutional, industrial and demand response. Other programs support customer-based generation and provide funding for innovative con-

servation program proposals and technology development. The province's electricity consumers are responding well to these programs, and there is potential to achieve even greater conservation results as more consumers realize the value of conservation.

The Ontario Power Authority's "portfolio approach" to conservation programming ensures that incentives for energy efficiency are comprehensive and cost-effective overall. For example, some programs focus on energy efficiency and demand management, while others focus on a particular aspect or aspects of conservation. Certain programs also focus on a particular type of electricity customer, such as affordable housing providers, or on specific areas of the province, such as those facing more immediate local electricity reliability issues.

Programs that provide incentives for switching to energy-efficient alternatives, combined with leadership by manufacturers, retailers and marketers to reduce costs and improve quality, can help pave the way to increased minimum efficiency standards. Such incentive programs will continue to play an essential

role in building momentum in the marketplace. As described further below, additional funding for innovation through the Conservation Fund is also intended to improve the delivery capability of the marketplace.

From 2005 to 2007, the Ontario Power Authority was primarily in the developmental phase of programming—both with respect to program design and delivery and its ability to measure and verify performance. Going forward, the Ontario Power Authority intends to place greater emphasis on program management and evaluation and improve the conservation delivery capability of the marketplace. The long-term goal is to have sound conservation practices and energy-efficient products dominate the market. These efforts, in addition to raising awareness and fostering leadership, make up the Ontario Power Authority's approach to developing a culture of conservation (see sidebar).

On September 18, 2008, the Minister of Energy and Infrastructure directed the Ontario Power Authority to review a portion of the proposed 20-year Integrated Power System Plan to ensure that the province can maximize the potential for renewable energy and conservation.²⁴ The Minister indicated that the proposed plan provides an excellent starting point and asked the Ontario Power Authority to build on this, with a view to accelerating the achievement of the stated conservation targets, including a review of the deployment and use of smart meters.

Approach to conservation

Three overlapping but distinct types of activities contribute to meeting Ontario's electricity conservation targets, namely:

- **Resource acquisition** – actively intervening in the market by, for example, offering rebates for energy-efficient appliances or payments to industrial or commercial customers for reducing their demand during peak demand periods
- **Capability building** – enhancing the skills of partners and other market players as well as the capability of consumers to manage their electricity consumption
- **Market transformation** – the longer-term planning objective of achieving a substantial and sustainable increase in the market share of energy-efficient technologies, buildings and production processes.

All three types of initiatives will continue in the coming years. Resource acquisition programs are expected to make the most significant contribution to meeting the 2010 conservation target. Over time, as capability builds in the market and efficiency codes and standards are improved, it is anticipated that there will be a gradual reduction in the need for resource acquisition programs. This will be paralleled by increases in capability building and market transformation activities.

The following sections provide a brief overview of the programs in each of the four portfolio areas. Descriptions of individual programs are provided in Appendix 1 (available at www.conservationbureau.on.ca), as well as in the Ontario Power Authority's quarterly progress reports on electricity conservation (available at www.powerauthority.on.ca).

Mass Market Programs

The Ontario Power Authority's mass market programs target the residential and small commercial sectors. These programs are typically delivered by other market players, such as local distribution companies and retailers.

The 2008 mass market program portfolio includes a diverse range of activities, including the free collection of certain old appliances that strain the electricity grid, consumer prizes for reduction in electricity consumption, rebates on energy-efficient products, free energy assessments and grants for retrofits.

Mass Market Conservation Awareness

The Ontario Power Authority's mass market activities are complemented by efforts to raise conservation awareness across the province. This includes supporting the conservation programs designed by the Ontario Power Authority and delivered by other parties with marketing initiatives, materials, advertising campaigns and events. Consistent branding and messaging can help promote a culture of conservation throughout Ontario.

Reaching the youth market is important. In addition to being consumers of electricity, this group acts as influencers within an array of social circles, including families, classmates and friends. Their commitment to conservation can have long-lasting impacts – these are the household and corporate decision-makers of tomorrow.²⁵

The Ontario Power Authority is working to influence youth behaviour through electricity conservation education at elementary and secondary school levels. By leveraging educational institutions to influence behaviour toward responsible use of electricity, the Ontario Power Authority will seek to expand the reach of electricity conservation education in Ontario, improve teacher access to workshops and provide additional training and tools for electricity conservation.

In 2008, the Ontario Power Authority launched a revamped Every Kilowatt Counts website, which provides comprehensive information on energy conservation programs and measures for both homes and businesses. Website features include program descriptions, energy-efficiency tips and tools, conservation program availability in particular service areas, as well as an interactive and educational section dedicated to children called Kids' Corner. This area of the website supports the youth engagement strategy and serves as a resource for students.

Commercial/Institutional Programs

The commercial/institutional programs target larger commercial, multi-unit residential, agricultural, low-income and social housing customers. These programs provide incentives for energy-efficiency retrofits and measures in new construction and major renovation projects. Fuel switching measures are being incorporated into the existing program suite in this sector.

Industrial Programs

The Ontario Power Authority is currently developing an industrial energy-efficiency program and is researching potentially eligible industrial facilities to participate. Program details were communicated early so that industrial facilities could begin to plan for energy efficiency in their business planning and budget cycles.

The industrial program is an innovative program that will require participants to have a measurement and verification plan to certify that the energy savings have occurred. The program would provide support for energy managers, electricity monitoring and target-setting, specialized training and awareness programs, energy assessments and feasibility studies.

Demand Response Programs

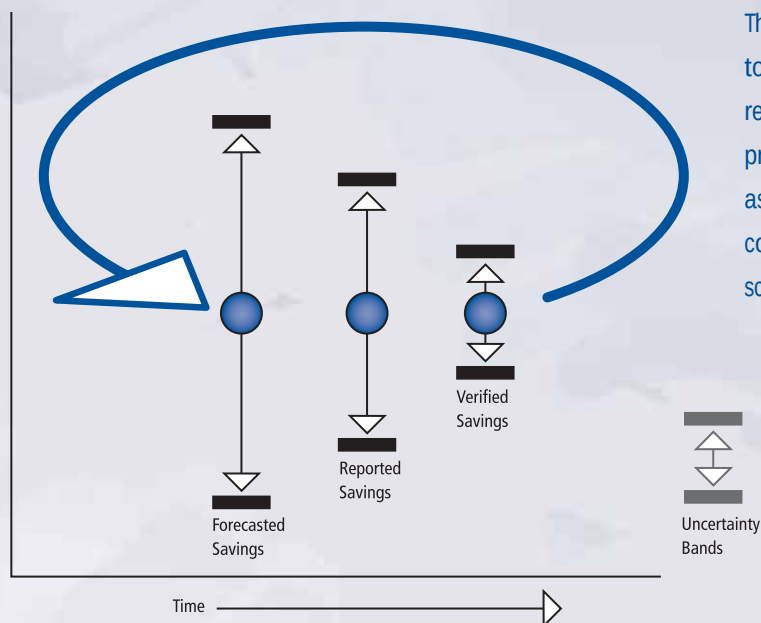
The Ontario Power Authority's demand response programs are designed to curtail load or to shift load away from peak times. Customers in the residential, commercial/institutional and industrial sectors can participate in these programs. **peaksaver**^{®26} is a residential and small business program targeting central air conditioning and electric water heaters. Commercial/institutional and industrial facilities can participate in a voluntary **load-shifting** program, or a contractual **load-shedding** program.

Evaluation, Measurement and Verification

Reporting on the results of conservation programs is important for demonstrating the progress toward meeting Ontario's conservation targets and increasing the reliability and predictability of conservation impacts for power system planning. The Ontario Power Authority's evaluation, measurement and verification framework uses an internationally recognized, standard method or "yardstick" for measuring and reporting on program results. These activities are critical for ensuring that conservation savings can be counted on as the first priority resource and can defer, or eliminate, the need for additional electricity generation infrastructure.



Figure 3.1: Ontario Power Authority Conservation Reporting Tracks



The primary purpose of evaluating programs is to verify and ensure the reliability of demand reduction and energy savings achieved, assess program design performance, validate input assumptions and provide information for continuous improvement, as shown in the schematic diagram to the left.

Comprehensive evaluations were undertaken for six 2007 Ontario Power Authority programs. The evaluation results will be released in a separate report. Overall progress has been substantial and shows a growing awareness of the value of conservation behaviour. Energy and demand savings are expected to grow steadily as programs mature. Going forward, every conservation program in the Ontario Power Authority's 2008 to 2010 program portfolio will undergo a full evaluation at least once during the three-year portfolio cycle.

Customer-based Generation

The Ontario Power Authority is actively promoting customer-based electricity generation through a standard offer program for renewable energy, and is also developing a program for clean energy.

These programs are intended to reduce the need for the provincial power system to supply customers. Renewable energy projects less than or equal to 500 kilowatts and combined heat and power projects less than or equal to 10 megawatts are classified as conservation measures.

Innovation Funding

The Ontario Power Authority has created two funds for conservation and technology projects. The Conservation Fund provides funding for action-oriented, sector-specific electricity conservation pilot projects that inform the development of future conservation programs. The fund builds marketplace capability by supporting program activity in underdeveloped market segments or through training initiatives. Its budget for 2008 is \$3 million. More information about the Conservation Fund can be found at www.power-authority.on.ca/cfund.

The Technology Development Fund supports projects that promote the development and commercialization of technologies or applications that have the potential to improve electricity supply or conservation. Its budget for 2008 is \$1.5 million. More information about the Technology Development Fund is available at www.powerauthority.on.ca/tdfund.

Codes and Standards

In addition to programs and activities to increase conservation awareness, the Ontario Power Authority supports initiatives to improve energy-efficiency codes for buildings and standards for electrical appliances and various kinds of equipment. In 2008, the Ontario Power Authority worked closely with the federal and provincial governments and was involved in national and international market transformation efforts. These include the Office of Energy Efficiency's Forum for Leadership in Energy Efficiency, Natural Resources Canada's Demand-Side Management Working Group, the Consortium for Energy Efficiency and the Canadian Demand-Side Management Alliance.



The Ontario Power Authority also continues to monitor national and international developments and best practices in this area.

Other Conservation Activities in Ontario

The following sections provide an overview of selected conservation programs and activities of governments and organizations other than the Ontario Power Authority. Further details about these programs and activities are provided in Appendix 2 on the Conservation Bureau website.²⁷

Provincial Government

The Ontario government supports a number of initiatives and activities for energy conservation and efficiency. These include funding for not-for-profit organizations and municipalities, the smart meters initiative, incentive and rebate programs and tax incentives.

Government In-House Energy Efficiency

The Government of Ontario has committed to showing leadership on electricity conservation by implementing measures to conserve electricity in government-owned buildings. The government reported that it achieved its target of a 10-percent reduction in electricity use by 2007, and that it aims to reduce electricity use by an additional 10 percent by 2012. The Chief Energy Conservation Officer interprets the government's reduction targets as compared to "business-as-usual," which is consistent with government targets for the province as a whole, as well as best practices for verifying savings from efficiency measures.²⁸ The Chief Energy Conservation Officer undertook a review of the government's progress in conserving electricity to fulfill the statutory requirements set out in the *Electricity Act, 1998*.²⁹

Ontario receives an "A" for energy conservation

On August 12, 2008, Ontario's commitment to energy conservation scored an "A" on the latest report card from the Canadian Energy Efficiency Alliance, a national non-profit group that promotes energy efficiency. Ontario's grade on the 2007 report card is the latest in a string of improved scores that began with a D+ in 2001 and climbed to a B+ grade in 2005. The alliance noted that Ontario had made the greatest improvement in conservation of all the provinces over the past four years.

This achievement reflects the province's ongoing commitment to conservation as the cornerstone of its long-term energy plan. The evaluation considers factors such as energy-efficiency codes and standards, current and planned conservation activities, energy performance in transportation and the success of the government in engaging with the public on the importance of energy efficiency. "Solid grades," the report points out. "But even more encouraging is what is in the pipeline for the future – Ontario appears to be taking energy efficiency VERY seriously."



Numerous energy-efficiency projects have been implemented by the government's property manager, the Ontario Realty Corporation. Seven other ministries that manage their own utility accounts also have been aggressively pursuing energy-efficiency opportunities. The government has clearly adopted the spirit of the conservation culture, and the size of government operations means that this could have a significant impact on electricity use in Ontario. In 2007, some of the government's largest buildings in Toronto were connected to Enwave Energy Corporation's deep lake water cooling system,³⁰ which will bring significant electricity savings for years to come.

The government has come a long way in a few short years, but there are still many more opportunities to save electricity. Some areas of improvement for maximizing the benefit of the government's in-house energy efficiency have been identified. One key improvement would be better systems to monitor the government's electricity accounts and track the savings that result from efficiency measures. The government's electricity accounts are highly diverse and situated in every corner of the province – within the service territories of virtually every one of the more than 80 local distribution companies in Ontario. Although the government has made progress in better understanding its electricity use, it needs to do more work to ensure the adequacy and robustness of its systems for tracking and monitoring electricity use and the effectiveness of its conservation measures.

The government's energy management system should account for all electricity meters in its facilities, eventually including government-owned agencies. The system will need to account for independent factors that affect energy use, including weather and changes in building occupancy and use, to determine the actual savings of energy-efficiency projects.³¹ Understanding these factors will assist facility managers in making better decisions about energy use and planning conservation measures. A robust energy management system, following an accepted industry practice, should enable all parts of government to report uniformly on the energy use and demand in each of their facilities.³² Details of such an energy management system could be incorporated into an overall energy conservation plan for the Government of Ontario.

The Conservation Bureau also has been provided with an updated list of energy conservation measures undertaken by the Government of Ontario. The government reports that between March 31, 2007 and March 31, 2008, approximately 80 new energy-efficiency projects had been initiated. The estimated electricity savings associated with all government energy-efficiency projects is approximately 107 gigawatt-hours. The Chief Energy Conservation Officer will continue to work with the government to report on future progress in implementing and verifying savings from its in-house energy-efficiency program.

Federal Government

The federal government administers energy-efficiency incentive programs under the ecoENERGY brand and through programs aimed at commercial and industrial buildings. It also has a program to increase the energy efficiency of government buildings. Other federal government activities include developing technical requirements for building efficiency standards and regulating the energy efficiency of appliances and products under the federal *Energy Efficiency Act*.³³

Municipal Government

Municipal governments have been active in conservation and energy efficiency. For example, the Federation of Canadian Municipalities provides loans and grants, builds capacity and shares knowledge to support municipal governments and their partners in developing communities that are more environmentally, socially and economically sustainable.

The Chief Energy Conservation Officer has been actively encouraging the appointment of municipal energy conservation officers to serve as a link between municipalities and communities. Municipal governments have an important leadership role to play as well, and building capability among municipal staff to identify, evaluate and carry out energy conservation planning and projects is critical to these leadership efforts.

Local Distribution Companies

Local electricity distribution companies are key players in promoting electricity conservation. They participate in conservation in two important ways: through the design and delivery of their own conservation programs approved by the Ontario Energy Board and through the delivery of programs approved by the Ontario Power Authority.

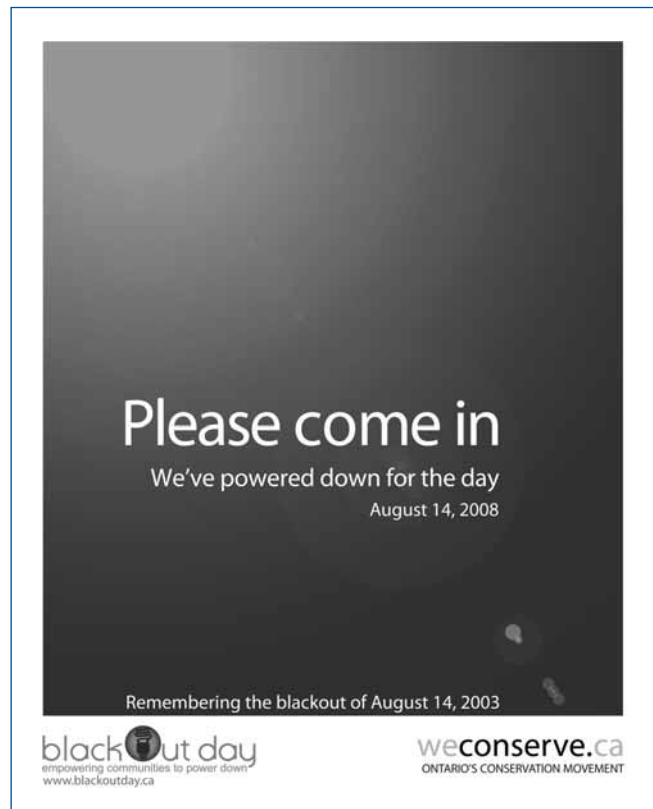
The Ontario Energy Board approved conservation programs that local electricity distribution companies were to deliver from 2005 to the end of September 2007. These programs are collectively referred to as “third tranche” conservation programs.³⁴ They covered residential and business sectors and provided a wide array of offerings, including residential and commercial lighting rebates and coupon programs, hot water heater tune-ups and water-heater load control programs.

In March 2007, the Ontario Energy Board encouraged local electricity distribution companies to apply for additional funding to continue existing third tranche programs until April 30, 2008. The extensions involved programs such as distribution system improvements, home retrofits, seasonal lighting exchanges and school conservation education programs. Energy-savings results achieved from these program extensions will be available in 2009.

Natural Gas Distributors

Ontario's two largest gas distributors, Enbridge Gas Distribution Inc. and Union Gas Limited, have been designing and delivering energy conservation programs (referred to as demand-side management) for more than 10 years. These programs range from incentives for energy-saving systems to delivery and installation of energy-efficient products. While the conservation programs are targeted at reducing natural gas consumption, some also result in electricity savings.

The expected electricity savings in 2008 for Ontario's natural gas utilities is approximately 32 gigawatt-hours. Of these savings, about 69 percent is in the commercial sector, 23 percent is in the industrial sector and eight percent is in the residential sector.



Taking the Blackout Day Challenge

Just after 4 p.m. on August 14, 2003, the lights went out for more than 50 million people from New York City to northern Ontario. A grid under enormous strain during a period of sweltering summer heat experienced catastrophic failure when a tree touched a sagging power line in Ohio. More than any other event in the past 10 years, the blackout served as a wake-up call for Ontarians. Five years later, driven in part by the lessons learned from the blackout, Ontario is steadily building a "culture of conservation" that embraces wise and responsible use of energy. To commemorate the day when Ontarians learned that the

reliable supply of electricity cannot be taken for granted, 38 Ontario municipalities took the Blackout Day Challenge put forth by the Mayor of Woodstock on August 14, 2008 to reduce their energy consumption. The City of Aylmer, south of London, won the challenge by successfully reducing its energy consumption by 4.8 percent and its peak demand by seven percent between the hours of 12 p.m. and 8 p.m. The City of Hamilton achieved the greatest overall reduction of nearly 321,000 kilowatt-hours. The combined reduction for this third annual challenge was equivalent to removing 27,000 homes from the grid that day.

Figure 3.2: Electricity Consumption Per Capita from 1960 to 2007

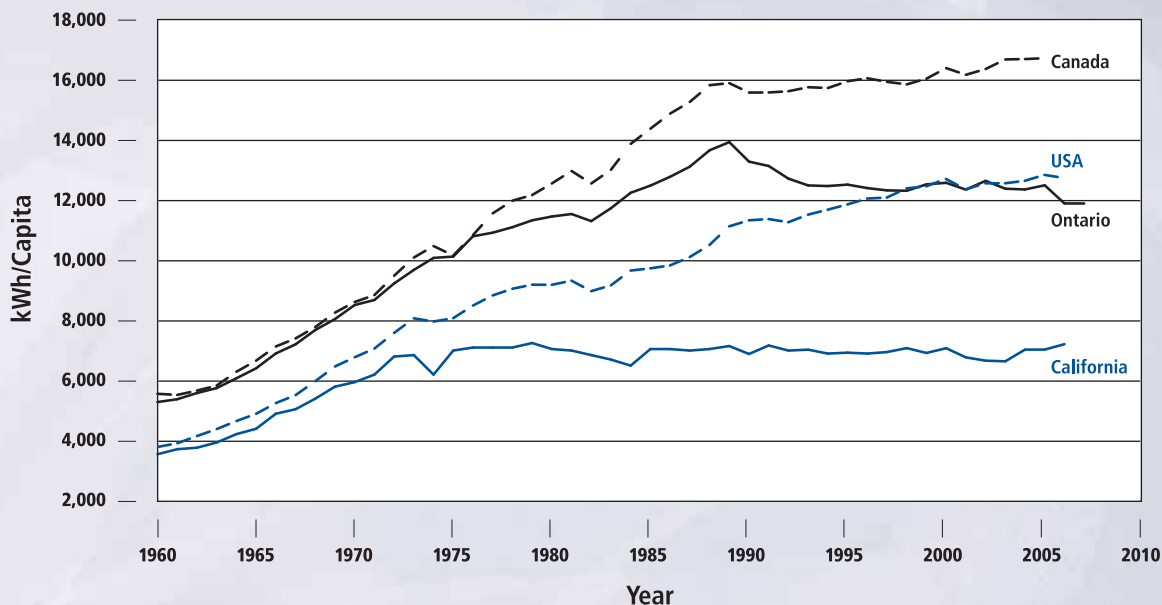


Figure 3.2 illustrates Ontario's historical per-capita electricity consumption compared to that of Canada, the United States and California. Canada and Ontario's per-capita consumption is much higher than California's, in part because of Canada's higher amount of electricity-intensive primary industry and northern climate (these data are not **weather-adjusted**). Since the early 1970s, California's per-capita consumption has been relatively flat. Several decades later, Ontario's consumption is also relatively flat, although the decline in the early 1990s was primarily due to an economic slowdown. With an aggressive, long-term plan for increased codes and standards, Ontario has an opportunity to reduce electricity consumption over the long term.

Energy Management Companies

Energy management companies deliver energy conservation projects in commercial/institutional and industrial operations. They are important delivery agents for Ontario Power Authority and gas utility programs, particularly in the commercial/institutional sector. Four of the 10 companies that responded to a survey reported savings of approximately 41 gigawatt-hours of electricity in 2007 and achieved peak demand reductions of close to nine megawatts.³⁵

Non-governmental Organizations

Non-governmental organizations are engaged in a wide array of initiatives to promote energy efficiency and conservation. Many receive funding from one or more of the three levels of government, government agencies and the private sector. A number of these initiatives are described in Appendix 2.

Chapter 4: Conservation Proposals for 2009

The future belongs to those who understand that doing more with less is compassionate, prosperous, and enduring, and thus more intelligent, even competitive.

Paul Hawken, author of The Ecology of Commerce

This chapter provides a summary of the Ontario Power Authority's conservation proposals for 2009, as well as highlights of some of the conservation activities planned by other organizations in both the public and private sectors in Ontario.

While the Ontario Power Authority's focus for 2009 includes working toward meeting the 2010 conservation target, many of the proposed activities also will deliver electricity savings that are sustained beyond 2010. The success of these activities depends on the involvement of other parties. These include local distribution companies and other partners in conservation, groups and organizations that need to build their capability to deliver conservation, and policy makers in reducing barriers to conservation and improving codes and standards to transform the market in favour of conservation.

In compliance with the ministerial directive received on September 18, 2008, the Ontario Power Authority will consider the viability of accelerating the achievement of the province's conservation targets, including smart meter deployment and use. The activities and discussions currently underway as a result of this directive may affect the conservation programs that the Ontario Power Authority has in market, as new programs may be added or existing programs adjusted.

Ontario Power Authority Proposals

Increasing Resource Acquisition

Activities in 2009 will support the organization's strategic objectives to plan, procure and manage conservation resources and promote sustainable practices that contribute to a culture of conservation.³⁶

In 2009, the Ontario Power Authority expects to have its full complement of resource acquisition programs in market. The programs in this portfolio will reach virtually all customers in the residential, commercial/institutional and industrial sectors of Ontario's economy. Further details on the portfolio are provided in Appendix 1.

In addition to completing the program portfolio, the focus of the Ontario Power Authority's activities in 2009 will begin to shift from designing and developing programs to:

- refining and improving existing programs
- managing the increasing number of program delivery channels and contracts
- verifying and reporting on program results.

Each of these activity areas is described further in the following sections.



An Ontario Power Authority conservation program offers rebates for energy-efficient products.

Refining Programs

Once a conservation program is in the marketplace, it may be modified to improve its effectiveness. Program refinements will be based on experience gained from delivering the program; information obtained from evaluation, measurement and verification activities; and any additional research on the program's impacts. Knowledge gained from program management, reporting and capability building activities will be used to improve program offerings in 2009 and the years to come.

Managing Programs

The Ontario Power Authority's focus in 2009 will also include managing the contracts with delivery agents for its portfolio of conservation programs and driving program results through increased program participation. Efforts to build the capability of program delivery partners and develop a conservation service industry will continue in 2009. The Ontario Power Authority will support programs delivered by other parties with marketing initiatives, materials, advertising campaigns and events where appropriate.

Work also will continue to further recognize and encourage conservation leadership in target markets, particularly among Ontario's business community, and in areas of the province that are facing more immediate and near-term electricity reliability issues. A portfolio management framework was initiated in 2008 and will be completed in 2009 to guide these efforts.

Reporting on Programs

The Ontario Power Authority will continue to enhance its ability to measure and report on the performance of its conservation programs in 2009 through a process of evaluation, measurement and verification. A key objective of these activities is to generate more accurate assessments of results for each of the programs funded by electricity ratepayers in terms of megawatts and megawatt-hours saved and cost-effectiveness. The results also will help to inform the assumptions used in long-term electricity system planning and conservation program design and development.

Delivery agents for non-Ontario Power Authority-funded programs will continue to be encouraged to adopt similar approaches to measurement and verification to increase overall confidence in the results of conservation across Ontario.³⁷

Increasing Capability Building

Many of the Ontario Power Authority's resource acquisition programs also aim to build capability in the marketplace to deliver and participate in conservation. Activities exclusively targeted at capability building will increase in 2009. They will address the development of skills and knowledge of the conservation service industry and other market players, as well as work to better train and educate electricity customers about the opportunities to conserve. In addition to complementing current conservation programs, these activities will help to inform the development of future proposals for the conservation portfolio.

Capability building will involve local distribution companies and third-party delivery channels that are close to electricity customers to support the establishment of a sustainable conservation marketplace. Municipalities have an important role to play in this as well. The Conservation Bureau will continue to coordinate efforts with municipal leaders to create awareness at the local level of the importance of electricity conservation, opportunities to participate in conservation programs and the need to develop local capability to measure and verify the impacts of conservation efforts.

New approaches to conservation and emerging technologies will continue to be supported through the Conservation Fund and the Technology Development Fund (described in Chapter 3), with 2009 budgets of \$3 million and \$1.5 million, respectively. These funds are also intended to advance the transformation of the conservation market so that energy-efficient choices increasingly become the norm. In 2009, through the Conservation Fund, the Ontario Power Authority will again call for innovative approaches to developing the capability of municipalities to plan and manage conservation.

Planning for Market Transformation

The goal of market transformation is supported by resource acquisition and capability building activities, as well as by a long-term planning process. The Ontario Power Authority is developing a plan for the residential, commercial/institutional and industrial sectors that will include a vision of what each sector could look like in 2025, quantifiable market transformation metrics and an implementation plan to achieve the objectives. These plans will inform the Conservation and Technology Development funds and will guide the development of future conservation program portfolios.

In 2009, the Ontario Power Authority's long-term market transformation planning will continue to involve the provincial and federal governments and will be coordinated with other domestic and international market transformation activities, including energy-efficient building codes and equipment performance standards. Responsibility for making changes in codes and standards lies with both the federal and provincial governments, and the Ontario Power Authority has an important role to play in contributing to their development.

The Ontario Power Authority will continue to identify potential opportunities to make strategic use of minimum energy performance standards, including evaluating best practices used in other jurisdictions. Its goals are to accelerate the penetration of more efficient buildings and equipment in the marketplace and provide the analysis necessary for governments to consider new codes and standards.



Raising the energy performance standards for new construction will help achieve Ontario's conservation targets.

Conservation Awareness

In moving from a planning to an implementation stage for its programs, the Ontario Power Authority continues to build and maintain public awareness of the importance of electricity conservation. The Ontario Power Authority's efforts are guided by independent research into the conservation awareness, attitudes and behaviours of Ontarians toward electricity and conservation. This will continue throughout 2009. The results of this research will build on previous years' results and will be used to track trends and inform the refinement of existing programs, as well as the development of future programs and awareness and educational activities.

Other Conservation Activities in Ontario

The Chief Energy Conservation Officer expects that various levels of government, local distribution companies, natural gas companies, energy management companies and non-governmental organizations will expand on the successes of their current programs

in the coming year. The Conservation Bureau will continue to coordinate with these organizations to report on their programs and activities, encourage more rigorous reporting of results and celebrate their leadership in developing a culture of conservation.

Greening Greater Toronto

The Greening Greater Toronto Initiative of the Toronto City Summit Alliance has begun to chart a path toward making the Greater Toronto Area the greenest urban region in North America. This densely populated area of six million people includes the City of Toronto, the regional municipalities of Durham, Halton, Peel and York, as well as six other cities, 13 towns, four townships and one municipality. Energy efficiency and conservation will be key components in each of the four steps identified by the initiative to achieve a greener Greater Toronto: retrofitting commercial buildings, establishing networks of education and demonstration centres and projects, creating a domestic emissions reduction fund and building a corporate green procurement program. The Chief Energy Conservation Officer is a member of the Greening Greater Toronto Task Force and plans to continue highlighting the need for energy efficiency as the cornerstone of any path toward a greener GTA.



Chapter 5: Conservation Opportunities

We are continually faced by great opportunities brilliantly disguised as insoluble problems.

*Lee Iacocca, former President and Chief Executive Officer
of Chrysler Corporation*

The Chief Energy Conservation Officer is required to identify any government policy or legislation that results in a barrier to the development or implementation of electricity conservation measures. This chapter summarizes findings and proposes opportunities that can help resolve barriers and promote conservation, energy efficiency and demand management.

Identifying the root causes of barriers is an important step toward understanding the range of possible solutions. Some barriers will require further research, discussion and analysis and would benefit from input from stakeholders and policymakers.

The information is organized according to the three prongs of the Ontario Power Authority's approach to delivering conservation savings: resource acquisition, capability building and market transformation. A fourth heading, reporting, relates to a key role of the Chief Energy Conservation Officer.

Resource Acquisition

1. Conservation Call to Action

The number of electricity conservation initiatives³⁸ being delivered by organizations throughout Ontario is commendable, given that conservation has emerged as a public policy priority only in the last few years. This alone represents a significant advance in the development of a culture of conservation, as Ontarians from every market sector have options to participate.

A culture represents a shared set of values, beliefs and practices, and the development of a conservation culture requires everyone to do their part to use electricity in a responsible manner. Before a culture

of conservation can fully emerge, the day-to-day behaviours and choices of a critical mass of Ontarians will have to embrace the need for wise and responsible use of energy. Much more work remains to be done in this area.

To keep the province moving in the right direction, conservation must remain a public policy priority – even in the face of uncertain economic circumstances.³⁹ This consistency is critical to ensuring the success of resource acquisition programs, as these programs not only reduce short-term demand for electricity – they also raise awareness, help build capability to deliver conservation and prime the market for more energy-efficient products and services. These programs have less chance of succeeding if individuals do not participate where they live, work, study and engage in recreation.

Opportunity

The Chief Energy Conservation Officer is issuing a call to action to every Ontarian to become involved in conservation and participate in the conservation programs and initiatives offered by the Ontario Power Authority and others.

Capability Building

2. Energy-efficiency Standards for Public Infrastructure Investments

The Government of Ontario's strategy for renewing public infrastructure involves working with municipalities, hospitals, school boards, universities, colleges and transit systems to manage and maintain existing infrastructure and build the infrastructure needed to meet future demand. Infrastructure Ontario is a crown corporation assigned to deliver these projects on behalf of the province. It uses an alternative financing and procurement model to leverage both public and private sector financing.⁴⁰ It also secures financing for projects of other public agencies through the OSIFA loan program.⁴¹

This program provides Ontario municipalities, universities and other public bodies with access to affordable loans to build and renew local public infrastructure. Many of these projects, such as buildings and public institutions, provide an excellent opportunity to address energy efficiency during the planning and design phase, when it makes the most sense to do so.

Incorporating higher levels of energy efficiency into infrastructure design, especially for buildings, can be cost-effective when the project is evaluated using a life-cycle costing approach. Premiums for energy

efficiency pay off over the lifetime of the building.

In fact, Manitoba has adopted a green building policy in which all government-funded infrastructure must meet a minimum standard for energy efficiency.⁴²

In 2006, the Chief Energy Conservation Officer recommended that all new government buildings be built to meet the requirements of Ontario's 2012 *Building Code* as a minimum standard. The government responded by committing to meet LEED standards⁴³ for new government-owned building construction and major renovation projects.⁴⁴ A similar commitment could be extended to all public-sector investments in energy-consuming infrastructure, starting with building-related projects. To facilitate this, investment decisions for public infrastructure could extend beyond the traditional criteria of creditworthiness and capital to include criteria for energy performance based on total life-cycle costing.

Opportunity

The Government of Ontario should ensure that building-related projects supported through provincial funding or provincial organizations, including Infrastructure Ontario, are built to the minimum energy-efficiency standards that will be required for all buildings in 2012.

3. Call for Energy Conservation Officers in Ontario's Institutions and Businesses

In 2007, the Chief Energy Conservation Officer recommended that Ontario's municipalities appoint energy champions, or municipal energy conservation officers, to advocate locally for a culture of conservation. To date, 15 leading municipal councils have appointed champions, and more appointments are expected in the near future.⁴⁵

Leadership is a key part of motivating others to act. Just as municipalities need more leaders to highlight and promote opportunities to conserve, Ontario's academic and health-care institutions and businesses stand to benefit from a higher level of internal energy conservation leadership.

Institutions and businesses could encourage these champions to increase awareness within the organization of available incentives to capitalize on energy-efficiency improvements; persuade managers at all levels that it makes social, environmental and economic sense to conserve; empower employees to identify energy-efficiency opportunities; and ensure that employees and management alike are made aware of the need to use energy wisely. This does not mean that every organization would need to hire an additional staff member.⁴⁶ Rather, accountability for energy efficiency could be assigned to existing staff.

In fact, a number of institutions and businesses already have assigned the responsibilities of an energy conservation officer to individuals within their organizations. Examples include the London Health

Sciences Centre, Sunnybrook Hospital, Vale Inco and the York Catholic District School Board. Most of the organizations that received Certificates of Recognition in 2008 have an individual who fulfills this role, even if not officially designated. These individuals are typically well-informed about energy conservation and environmental issues – and the organization gains from their knowledge and enthusiasm.

The benefits of institutionalizing the role of an energy conservation champion in business are twofold: it will help ensure that conservation and energy efficiency are considered in decision-making at all levels, and also will result in an improved bottom line through reduced energy costs.

Opportunity

Leading institutions and businesses should appoint an in-house energy conservation champion to motivate change by all employees as well as the organization.

4. Increasing Funding for Community-based Conservation Initiatives

The number of community-based activities that support a culture of conservation is increasing in Ontario. Typically organized and delivered by local not-for-profit groups, these activities focus on raising awareness of conservation as part of a broader environmental mandate. Some have been active in distributing compact fluorescent lamps and energy-efficient seasonal lighting, for example. A number of activities have been funded by the Ontario government's

Community Conservation Initiatives Fund. There are also province-wide, non-profit initiatives that play an important role, and these could be further supported as well.

Such local, grassroots activities could be expanded upon, but the groups and organizers behind them often lack the necessary funding and resources to do so. In addition, the Chief Energy Conservation Officer has noted that these grassroots organizations often do not have the resources to adequately measure and track the extent of their activities.

Opportunity

The Government of Ontario should recognize the value of community-based conservation activities to the province's electricity conservation efforts and increase funding for them.



Building code amendments provide opportunities to improve the energy efficiency of new and existing buildings.

Market Transformation

5. Additional Resources to Increase Energy-efficiency in Ontario's *Building Code*

Ontario's *Building Code* is a regulatory tool for ensuring that new buildings and renovations of existing buildings meet safety and technical standards, including requirements for energy efficiency.⁴⁷ The energy-efficiency provisions in the 2006 code were a significant improvement and are expected to reduce Ontario's peak system demand by 550 megawatts over the next six years. Future updates to the building code present additional opportunities to improve the energy efficiency of new and existing buildings.

The Ministry of Municipal Affairs and Housing is responsible under provincial legislation for the development of Ontario's *Building Code*, and the Ministry of Energy and Infrastructure is responsible for energy policy. These two organizations could increase their collaboration in developing a long-term strategic vision for the energy efficiency of buildings as regulated by the building code. In this regard, Ontario can learn from best practices used in jurisdictions seen as leading in energy-efficient buildings.

California's long-term plan for building efficiency includes a vision, profile and implementation strategy for each economic sector, as well as a plan with near-term, mid-term and long-term goals. A similar long-term vision and goals for Ontario's *Building Code* would give builders, developers and trades more certainty in knowing when energy-efficiency standards will be implemented and allow for the timely development of the capability to meet new standards cost-effectively.

The cooperation and resources needed to develop a vision for Ontario's buildings also could support ongoing research, public consultation and technical reviews that would help implement the vision through regular enhancements to the energy-efficiency requirements of the building code. Additional resources should be made available to support these activities and coordinated with the Ontario Power Authority's long-term planning and market transformation activities.

Opportunity

The Ministry of Municipal Affairs and Housing and the Ministry of Energy and Infrastructure should increase the available resources and their degree of collaboration in developing a long-term strategic vision for improving the energy efficiency of new and renovated buildings in Ontario's *Building Code*.

Set-top boxes and phantom load

Phantom load, or standby power, is electricity used by appliances and electronic devices when they are plugged in but not in active-on mode. The 2011 phase-out of analog television signals will require all Canadians who now receive cable television through an analog signal⁴⁸ or antenna to purchase a type of set-top box called a digital television adapter.⁴⁹ The current annual consumption of most models is estimated to be from 165 to 275 kilowatt-hours per year, depending on the model.

An ENERGY STAR requirement has been developed for television set-top boxes focusing on total electricity consumption per year. ENERGY STAR Tier 1 set-top boxes will consume between 45 to 236 kilowatt-hours per year, and Tier 2 set-top boxes will consume from 36 to 116 kilowatt-hours per year.⁵⁰



The federal government is now working to implement a series of minimum energy performance standards covering both "active" and "standby" mode commencing in 2012.⁵¹ To accelerate the penetration of efficient digital television adapters in the market, utilities across Canada are considering developing a joint program to increase the supply of energy-efficient products throughout the supply chain. Relatively few companies distribute the majority of set-top boxes as part of cable and satellite television packages. Consumers should request that more energy-efficient units be included in these offerings.

6. Additional Resources to Accelerate Energy-efficiency Standards

Ontario's *Energy Efficiency Act* establishes energy-efficiency standards for a wide range of energy-using products, with the objective of eliminating the least energy-efficient products from the Ontario marketplace. The Ministry of Energy and Infrastructure's recently proposed amendments to the regulation under this act would create minimum energy performance levels for eight new products and update the referenced standard for 11 existing ones.⁵² These updates demonstrate the government's recognition of the important role for energy-efficiency standards, but, for such standards to best contribute to meeting long-term objectives, they should be guided by a long-term vision and plan.

The Ontario Power Authority is developing such a road map for integrating conservation activities across the province, as well as various tools to transform the market to achieve lasting energy and demand savings. This plan will include interim and long-term objectives. California is undertaking a similar process, and the California vision for its codes and standards includes accelerating – ahead of the United States federal government – the deployment of energy-efficient equipment.

There are many players that must act to transform the market into a sustainable, energy-efficient economy. Achieving long-term savings depends upon continued government support for regulations to develop and continuously improve standards under the *Energy Efficiency Act*. The Chief Energy Conser-

vation Officer therefore suggests that sufficient human resources be allocated within the Ministry of Energy and Infrastructure to undertake the standards development work needed to support these goals. Improved standards should support the implementation of Ontario's long-term conservation plan.

Opportunity

The Ministry of Energy and Infrastructure should dedicate additional human resources to develop and update energy-efficiency standards for energy-consuming products.

7. Sub-metering in Multi-unit Residential Buildings

In an estimated 90 percent of the multi-unit residential buildings in Ontario, the electricity used by the entire building is metered in bulk, and each tenant pays a fixed rate for electricity that is included in the monthly rent.⁵³ Tenants in these bulk-metered buildings have little motivation to conserve electricity because there is no financial incentive for them to reduce their electricity consumption.

Installing individual suite meters in multi-unit buildings gives tenants responsibility for electricity use in their own units, but tenants do not have control over non-discretionary equipment because landlords own the appliances.⁵⁴ Therefore, when sub-metering a building, landlords should be responsible for ensuring that electric appliances are as energy-efficient as possible. The absence of such a requirement for landlords gives rise to the dilemma known as the "split incentive" or landlord-tenant problem.⁵⁵

Two additional issues that have been identified are the efficiency of the building envelope in electrically heated buildings and electricity use in common areas. Furthermore, new administrative and hardware costs associated with individual metering may challenge the tenant's ability to benefit financially from conservation.

The provincial government can require landlords to meet in-suite energy-efficiency obligations and adhere to rent reduction formulas when a landlord unilaterally transfers the costs of electricity over to tenants.⁵⁶ However, no rules or regulations have been developed to guide sub-metering practices in rental buildings, even though a smart sub-metering code has been developed to guide these practices in condominiums.⁵⁷ Current sub-metering practices

Government commits to LEED standards in its own facilities

The Roy McMurtry Youth Centre, Brampton's new youth justice facility, is an innovative complex that will accommodate youth in detention and/or serving secure custody sentences. Scheduled for completion in 2009, the facility's design will conform to the Canada Green Building Council's Leadership in Energy and Environmental Design (LEED) certification standards. The residential buildings are being designed to meet LEED silver standards, and the administrative buildings are being designed to meet LEED gold standards.

Green features of the youth centre include using vehicles with alternative energy to transport construction workers on site; using environmentally friendly building materials in the construction of the facility, such as low-emitting, water-based adhesives; diverting 90 percent of job site construction waste by salvaging or reusing materials; and installing ultra-low-flow plumbing fixtures, waterless urinals and dual-flush toilets in the new facility, which will reduce washroom water use by 20 percent.

The Ontario Realty Corporation is seeking certification to the LEED silver standard for its new office space, located at One Dundas Street West in Toronto. The open-concept office is modern, energy-efficient and filled with natural light, and is intended to be a showcase for the Ontario government's workplace of the future.

The Ontario Realty Corporation has also begun the process of ensuring that government operations are accountable for their electricity use. Eighty-three sub-meters have been installed in government buildings. Under the previous bulk-metering system, individual government offices or divisions had no information about their electricity use. Once sub-meters are installed, they will be able to better understand and manage their electricity consumption.



One Dundas Street West in Toronto, where new office space for the Ontario Realty Corporation will be located.

in rental buildings are not subject to guidelines for rent decreases or other mechanisms to ensure that sub-metering is conducted fairly. Despite these challenges, transferring responsibility for electricity use to tenants has demonstrated in-suite electricity consumption reductions of 15 to 30 percent.⁵⁸

Installing sub-meters with smart-metering capability will allow tenants in multi-unit rental buildings to benefit further from managing their electricity use once Ontario's time-of-use rate structure is implemented.

Opportunity

The Ministry of Energy and Infrastructure and the Ministry of Municipal Affairs and Housing should collaborate to develop rules and guidelines to ensure the fair implementation of in-suite metering in multi-unit residential buildings.

8. Sub-metering in Commercial Buildings

In most multi-unit commercial buildings, electricity for tenant-controlled and common areas is metered in bulk and electricity costs are charged to the tenants as part of their rent or added on to rents in a net lease structure.⁵⁹ Electricity costs passed on to individual tenants are based on their proportion of rented space. This leads to cross-subsidization among tenants, where tenants with low usage of electricity per square metre subsidize tenants using more electricity per square metre. In this situation, individual tenants have relatively little incentive to conserve electricity.

Individual tenants in commercial buildings need to receive price signals to encourage them to conserve and participate in energy-efficiency programs. Sub-metering allows tenants to be billed only for electricity use that is under their direct control.⁶⁰ This would provide tenants with both the information they need to manage their electricity use better and financial rewards for conserving. Tenants that are responsible for their electricity costs are also more likely to participate in energy-efficiency programs.

Opportunity

Leading commercial tenants and landlords are encouraged to plan for and install sub-meters in rented spaces in order to transfer to tenants the responsibility for the costs of electricity under their direct control.

Reporting

9. Measurement and Verification of Conservation

In the June 2008 supplement to the 2007 annual report, the Chief Energy Conservation Officer recommended that those delivering conservation should place more emphasis and resources on evaluating, measuring and verifying results using standardized and transparent methods. These evaluations are needed to confirm the reliability of demand reductions and energy savings targeted by conservation programs and activities. They also generate lessons on the effectiveness of energy-efficiency measures – including what is working and what isn't – so that programs can be improved over time.

A Vision for Smart Homes

The Ontario Smart Grid Forum is aiming to develop a vision for a provincial smart grid that would provide consumers with more efficient, responsive and cost-effective electricity service.⁶¹ The concept of a “smart” grid refers to the application of technologies and two-way communications that monitor and automatically optimize the interconnected elements of the power system – from generators of all sizes through to high-voltage networks and distribution systems, to end-use consumers and their thermostats, appliances and other household devices.⁶²

Smart grid concepts are being developed around the world to use advanced, information-based technologies to increase grid efficiency, reliability and flexibility. These technologies, working together, can improve the performance of existing electricity delivery infrastructure to optimize grid operations and resources in real-time. In addition to improving system reliability and providing environmental benefits, smart grids will enable electricity customers to achieve greater conservation.

Smart meters and time-of-use pricing will allow customers to respond to price signals through automated demand response and in-home load control devices, similar to the current *peaksaver* devices for central air conditioners. These load control devices could extend beyond air conditioners to include other appliances – eventually to the entire home as an integrated, flexible load. Other opportunities include the integration of smaller, embedded generation resources such as micro combined heat and power units.

An opportunity exists to develop a vision for a smart home with initiatives such as the Ontario Smart Grid Forum and ongoing industry dialogue. This vision would call upon electricity consumers to become more active participants in the real-time management of electricity demand through price signals and more options for managing their electricity demand.



The Ontario Power Authority is committed to measuring and verifying the impacts of its own portfolio of programs. There is also a good opportunity for other public sector participants, starting with provincial government ministries, public agencies and the Ontario Realty Corporation, to demonstrate conservation leadership by developing comprehensive measurement and verification plans for their in-house energy-efficiency and conservation programs.

These plans can assist in improving understanding of energy use; identifying and prioritizing opportunities to conserve; building capability to design, implement and manage energy conservation measures; and confirming conservation and related savings.

There is no prescription for measurement and verification across a diverse portfolio of energy conservation projects, but there is an *International Performance Measurement and Verification Protocol*⁶³ to provide an industry-accepted standard. The measurement and verification plan could be designed and implemented in-house or by external consultants – either approach should endeavour to build capability among staff or managers to better understand, document and communicate energy use. Other important variables, such as water use and greenhouse gas emissions, also could be monitored under the plan.

The Ontario Power Authority could assist the government in realizing this opportunity, as well as encourage others, such as the federal government and non-governmental organizations, to implement more robust systems to measure and verify their conservation activities.

Demonstration of leadership by the provincial government is important if other public sector agencies are to be expected to prepare plans that include a measurement and verification component. In 2006 and 2007, the Chief Energy Conservation Officer called on the provincial government to issue regulations under subsection 4(1) of the *Energy Conservation Leadership Act, 2006*,⁶⁴ to require public sector agencies to develop such energy conservation plans. Ontario's 445 municipalities, 210 hospitals and long-term care facilities, 104 school boards and 46 colleges and universities represent a particularly important conservation opportunity.

The Chief Energy Conservation Officer recognizes the varying levels of capability in the public sector to develop these plans and urges a phased approach to issuing regulations. This would allow smaller public sector organizations more time to develop resources and learn from other, better-resourced organizations. In this context, the government could also start to communicate about the importance of energy measurement and verification through a commitment to energy conservation in the Statement of Environmental Values required of prescribed government ministries under the *Environmental Bill of Rights, 1993*.⁶⁵

Opportunity

The Government of Ontario should develop and implement an energy conservation measurement and verification plan for its in-house energy-efficiency program. The federal government and others engaged in conservation should take a similar approach.

Chapter 6: Status of 2007 Recommendations of the Chief Energy Conservation Officer

The times they are a-changin'.

Bob Dylan, singer-songwriter

This chapter sets out the recommendations made in the Chief Energy Conservation Officer's 2007 annual report and a summary of the government's actions taken in response to them, as reported by the Ministry of Energy and Infrastructure (where applicable).

1. The Ministry of Energy should develop a comprehensive and cohesive energy conservation policy for all government departments that aligns the province's electricity policies with other related policies. All government departments should be required to consider this policy in their decision-making processes, and prescribed government ministries should be required to include a commitment to energy conservation in their Statement of Environmental Values.

- The Ministry of Energy and Infrastructure⁶⁶ consolidated the various energy conservation initiatives across the Ontario government into a single report earlier this year, which was sent to the Canadian Energy Efficiency Alliance. On August 12, 2008, the alliance gave Ontario an A grade for the work being done.
- The Ontario Public Service Green Office has been created within the Ministry of Government Services. Working with the Premier's Parliamentary Assistant, David Ramsay, the Climate Change Secretariat, the Ministry of

Energy and Infrastructure and the Ontario Realty Corporation, the Green Office will strategically support policy development, tracking and reporting, employee engagement/education and stakeholder management as it relates to sustainability initiatives inside the Ontario Public Service. Priorities include sustainable procurement, green fleet management and telecommuting.

- The Statements of Environmental Values will be updated with a commitment to energy conservation, and revised statements will be posted on the Environmental Registry later this year.

2. The government should reconfigure the role of the Chief Energy Conservation Officer to include advocacy for conservation of other important forms of energy used in Ontario, including natural gas and transportation fuels.

- The government is committed to conserving all energy forms. Activities are underway to encourage conservation of natural gas, as well as oil and other fuels.

- The Chief Energy Conservation Officer plays an important role in documenting progress on Ontario's electricity conservation targets and is encouraged to continue to work with the government to aggressively pursue its conservation goals.

3. The Ministry of Municipal Affairs and Housing should prepare a plan for the orderly consideration of energy efficiency in all renovations and retrofits.

- The issue of requiring energy efficiency in all renovations and retrofits was considered during the 2006 review of Ontario's *Building Code*, when issues regarding cost and feasibility were raised by stakeholders.
- The Ministry of Municipal Affairs and Housing worked with the building sector to strike a balance between these costs and energy-efficiency goals and to reduce any disincentives to upgrading the existing building stock.
- Under Ontario's *Building Code*, additions to buildings must meet current energy-efficiency requirements. As well, energy-efficiency upgrades are generally required when a building is gutted or where major building systems are replaced.

4. The Ministry of Energy should raise the minimum energy performance standards for the six consumer products currently exempt from provincial retail sales tax (refrigerators, freezers, dishwashers, clothes washers, dehumidifiers and air conditioners) to the highest levels in North America.

- The Ministry of Energy and Infrastructure's current approach is to harmonize standards with those of other leading jurisdictions in North America. The Ontario government will continue to work with other leading jurisdictions to use more aggressive standards and mandatory labelling requirements moving forward.
- To date, 14 amendments to Ontario Regulation 82/95 (the fifteenth is pending) under Ontario's *Energy Efficiency Act* have established minimum energy-efficiency levels for more than 50 product categories that consume 80 percent of the energy used in the residential sector and 50 percent of that used in the commercial/institutional sectors. This regulation covers an estimated 95 percent of the energy consumption covered by California regulations. California is typically viewed as the leading jurisdiction in the area of energy-efficiency standards.
- The *Energy Efficiency Act* applies to central air conditioners, clothes washers and dryers, dishwashers, freezers, furnaces, heat pumps, ovens, ranges, refrigerators, room air conditioners, pool heaters and water heaters.

- The latest 2008 proposed amendment to the regulation encompasses 11 product revisions with new standards and eight new products: torchieres, commercial/industrial unit heaters, wine coolers, through-the-wall split residential air conditioners, oil-fired swimming pool heaters, windows, commercial clothes washers, and video and digital television adapters.
- The ministry and the Ontario Power Authority also have various incentive programs to accelerate the uptake of the most energy-efficient products in the market.
- Ministry staff will continue meeting with and funding standard-setting organizations in the province to raise the energy-efficiency requirements for products sold in Ontario.

5. The government should evaluate options to assist households defined as low-income to deal with economic burdens associated with upgrading to energy-efficient products affected by new codes and standards.

- The ministry has identified dealing with poverty as a major issue.
- In 2007, the then Minister of Energy directed the Ontario Power Authority to develop programs to assist low-income households in becoming more energy efficient. These programs are now being rolled out.

- The Ministry of Community and Social Services continues to ensure that these issues are properly addressed. Grants, rebates, items or services offered by energy-efficiency and conservation programs will not affect social assistance payments.
- On May 16, 2008, the Divisional Court of Ontario ruled that the Ontario Energy Board has jurisdiction to consider the ability to pay when setting utility rates. The Board held stakeholder consultations from September 22 to 25, 2008, to help it gain a better understanding of low-income energy issues and consider the need for and nature of policies or measures that could address those issues. The Ministry of Energy and Infrastructure, along with other interested ministries, will follow these developments closely.

6. The Ministry of Energy should issue regulations under the *Energy Conservation Leadership Act* requiring public agencies to prepare annual energy conservation plans with a high priority on implementing energy conservation measures in their daily operations and capital projects.

- The Government of Ontario has made great progress in conserving energy in its own operations. One example is the government's commitment to meeting LEED standards for new government-owned building construction and major renovation projects. Certified buildings have energy consumption that is 25 to 60 percent less than ones built to the *Model National Energy Code of Canada for Buildings*.

- Ministry staff are developing options for consultations with public sector participants consistent with the Chief Energy Conservation Officer's recommendation. Developing a plan is the first step toward better managing energy needs and identifying conservation opportunities.
- Ministry staff in the areas of energy and public infrastructure renewal are working to prepare and publish an energy plan for the government. This will help the ministry to understand the practical issues associated with the proposed regulation.
- The ministry will continue to develop options for implementing such a regulation.

7. The Ministry of Energy should issue regulations under the *Energy Conservation Leadership Act* to designate combined heat and power projects, clotheslines and solar collectors so that they may be used where there are restrictions, such as municipal zoning by-laws, that would otherwise prevent or impede their use.

- Following a consultation process on the clothesline issue, the Premier of Ontario announced a regulation to overturn bans on clotheslines in communities across Ontario on April 18, 2008.

- The Ontario Solar Task Force will provide advice to the Minister of Energy and Infrastructure on how to remove barriers to residential solar thermal systems to help Ontario meet its target of 100,000 solar systems installed in households across Ontario. A report is expected before the end of 2008.
- In the City of Toronto, as of March 2008, a new zoning bylaw now makes it easier to have solar panels and other forms of renewable energy installed on property in the city. The Ministry of Energy and Infrastructure encourages other municipalities to address similar zoning issues through their local bylaw and official plan amendments.
- Ministry staff continue to gather data about barriers, consult with external stakeholders (including other ministries and municipalities) and consider policy options as more information becomes available.

8. The Ministry of Energy and the Ministry of Municipal Affairs and Housing should collaborate with the federal government and other provinces to introduce voluntary labeling of the energy performance of all new and resale buildings coincident with the current *Ontario Building Code* review cycle, with the intent of issuing a regulation to require labels for all new and resale buildings.

- The Ministry of Energy and Infrastructure is working with the federal government and other provinces on labelling. This effort has produced a label prototype for commercial and multi-residential buildings. The prototype and related consultations are nearing completion.
- Staff from the ministry will continue to work with the federal government and other provinces on a variety of technical aspects and the scope of labelling.
- The Ministry of Energy and Infrastructure will continue to consult with the Ministry of Municipal Affairs and Housing to review the options relating to the inclusion of labelling in future updates to Ontario's *Building Code*.

9. Ontario's municipalities should appoint municipal energy conservation officers to engage communities at the local level in creating a culture of conservation throughout the province.

- The Ministry of Energy and Infrastructure encourages all municipalities to designate a local champion to encourage energy conservation. Fifteen municipal energy conservation officers have been appointed to date.

10. All government procurement policies and contracts should include current ENERGY STAR requirements for energy efficiency where available.

- The Ministry of Government and Consumer Services is taking a number of approaches to "going green" in the context of procurement, including policy and standards, consumption and commodity strategies.
- The government procurement directive requires ministries to take into account environmental considerations such as reduction, reuse and recycling measures when developing commodity specifications, terms and conditions and making contract award decisions.
- Federal Environmental Choice Program standards are mandatory for acquiring goods and services valued at \$10,000 or more.
- In establishing corporate vendor of record arrangements for information technology hardware, the ministry will continue to incorporate energy-saving requirements. For multi-functional devices (such as copy/print/scan/fax), the vendor of record requires ENERGY STAR compliant devices with an energy-saving standby mode. Also, as Infrastructure Technology Services undertakes its planning for the next generation of vendor of record arrangements for desktop computers and servers, ENERGY STAR compliance will be mandatory.

11. The government should ensure that future changes to the way electricity bills are presented to consumers provide enough information and transparency to enable them to make better decisions about electricity use.

- The Ministry of Energy and Infrastructure is working with utilities, the Independent Electricity System Operator, the Ontario Energy Board and the Ontario Power Authority to develop a coordinated and comprehensive implementation strategy for time-of-use pricing with a full customer education component.
- This work includes a review of electricity bills as an educational tool to support the introduction of time-of-use pricing.



Smart meters are being installed across Ontario.

12. The government should work with the appropriate players in the electricity sector to coordinate research and develop educational programs and tools needed to enable customers to learn about and benefit from the use of technologies such as smart meters.

- The Ministry of Energy and Infrastructure and the Independent Electricity System Operator are co-chairing working groups with utilities, the Ontario Energy Board and the Ontario Power Authority to develop a comprehensive implementation strategy for time-of-use pricing introduction, with a full customer education component.
- The ministry, the Independent Electricity System Operator and local distribution companies are conducting time-of-use communication pilots to assess the effectiveness of various communication tools.

Glossary

The following terms appear in boldface in the text of the report.

Codes and standards:

Codes: government ordinances regulating the construction, renovation and retrofitting of buildings, including safety and health standards and provisions for minimum levels of energy efficiency. In Ontario, this is done through Ontario's *Building Code*.

Standards: technical specifications for the energy efficiency of appliances and other energy-consuming equipment designated by government regulations. Standards typically specify a minimum level of energy performance for a piece of equipment.

Conservation categories:

Conservation behaviour/demand management: reducing or shifting electricity usage by, for example, turning off lights or appliances when not in use, eliminating phantom load by using a power bar or timer, or waiting until off-peak hours to perform electricity-intensive tasks like running the dishwasher or using an electric clothes dryer.

Energy efficiency: using technologies that provide the same or similar level of service but use less electricity. This category includes upgrading to energy-efficient compact fluorescent lamps, ENERGY STAR appliances or variable drive motors.

Customer-based generation: electricity that is produced close to or at its point of use, for example, solar photovoltaic cells or micro-sized combined heat and power units. It is considered conservation because it offsets demand from the grid.

Fuel switching: substituting another fuel for electricity for a given application, such as geothermal heat pumps, solar thermal water heating or high-efficiency natural gas furnaces.

Consumption: the amount of electricity used over time, expressed in kilowatt-hours. For example, if an air conditioner requires 1,500 watts to operate, it will consume 1.5 kilowatt-hours each hour it runs. Consumption is sometimes referred to as "energy."

Demand: the rate at which electricity is used at a given point in time and is expressed in megawatts. A megawatt is equal to 1,000 kilowatts. Demand is sometimes equated with capacity – the total installed electricity generating capacity required to meet the demand. Demand can also be referred to as load.

Demand response: the practice of either load reduction or load shifting.

Load shape: refers to the distribution of energy requirements over time. When energy requirements are plotted on a chart or graph, the resulting curve usually has a distinctive shape. This shape changes when the distribution of energy requirements changes.

Load shedding: the practice of curtailing energy use during peak periods in response to a signal or contractual obligation.

Load shifting: the practice of altering the pattern of energy use so that energy normally consumed during the peak period is now consumed during, or shifted to, off-peak periods.

Peak demand: the greatest amount of demand during a specific period of time, such as on hot summer weekdays when industries and businesses are active and people at home are using air conditioning.

Phantom load: the power required by appliances and gadgets when they are switched off or placed into a “stand-by” mode. Any electronic appliance with an instant “on” feature, such as a television or stereo with remote control, consumes power when turned off.

Smart meter: a device that electronically tracks how much electricity is used and when it is used. For consumers with active smart meters, the price of electricity depends on when it is used. This is referred to as time-of-use rates.

Time-of-use rates: an electricity pricing scheme that is sensitive to the time of day, day of week and/or season that electricity is used. Prices are higher when the demand for energy is highest. Typical peak hours are during weekday mornings and evenings. Prices are lower during low demand hours.

Weather-adjusted: weather affects electricity demand. For example, on hot summer days, air conditioning drives up electricity use. As a result, peak electricity load data are adjusted to account for deviation from normal weather conditions using multiple years of weather information. The Independent Electricity System Operator uses 31 years of data. For example, if the conditions on a summer day are 10 percent hotter than the average normal weather conditions, the weather-sensitive portion of peak demand will be reduced by 10 percent. This allows comparisons of peak demand from one year to the next to see if changes in usage are due primarily to differences in weather or to other factors, such as conservation efforts.

References and Notes

Chapter 1

1. Available on the Conservation Bureau website, www.conservationbureau.on.ca.
2. Life-cycle costing considers both the capital costs, including any premiums associated with energy efficiency, and the operating costs, including maintenance and energy costs, over the estimated expected lifetime.
3. The triple bottom line refers to an expanded corporate performance and reporting framework that includes environmental and social performance in addition to economic performance. This set of performance metrics commonly forms a part of corporate sustainability reporting.
4. *Go Green, Ontario's Action Plan on Climate Change*, www.ene.gov.on.ca/publications/6445e.pdf, p. 4.
5. Ehrhardt-Martinez and Laitner, *The Size of the U.S. Energy Efficiency Market: Generating a More Complete Picture*, American Council for an Energy Efficient Economy, May 2008, Report No. E083.
6. With the exception of 2004, a year in which Ontario was winter peaking.
7. Close to 1.7 million smart meters were installed to the end of September 2008.
8. Weekends are always off-peak.

Chapter 2

9. As of August 31, 2008, the Chief Energy Conservation Officer had participated in events in 51 Ontario communities and 29 of 40 Ontario cities with a population over 50,000.
10. The figure of more than 130 million earned media impressions excludes over 310 million paid media impressions by the Ontario Power Authority.
11. An additional 16 certificates were awarded in September and October 2008.
12. The Toronto Building Owners and Managers Association (BOMA) program aims to achieve 150 megawatts of demand savings by 2010.
13. In Toronto, this program is delivered by the City of Toronto, Toronto Hydro-Electric System Limited and BOMA under the Toronto Comprehensive Program. Outside of Toronto, it is delivered by 66 different local distribution companies.
14. See the *Public Interest Energy Strategies Report, 2003*, California Energy Commission, www.energy.ca.gov/reports/100-03-012F.PDF, p. 39.
15. *Energy Efficiency Act*, R.S.O. 1990, c. E.17.

16. Ontario's *Building Code* is a regulation (Ontario Regulation 350/06) under the *Building Code Act, 1992*, S.O. 1992, c. 23. It sets out technical and administrative requirements for the construction, renovation and change of use of buildings. Among other things, the building code regulates fire safety, structural requirements, energy efficiency, resource conservation and mechanical systems, including plumbing, accessibility and sewage systems.
17. The communities with municipal energy conservation officers are Barrie, Burlington, Callander, Dryden, Guelph, Hamilton, Markham, Norfolk County, Oakville, Oshawa, Peel Region, Thunder Bay, Toronto, Welland and Windsor. Appointments are expected in a number of other communities in the near future.
18. Independent Electricity System Operator, www.ieso.com/imoweb/media/md_newsitem.asp?newsID=4012.
19. These reports are available at www.powerauthority.on.ca/Page.asp?PageID=1224&SiteNodeID=316.
20. According to Natural Resources Canada, "the amount of mercury in a CFL is so small – less than one-fifth of the mercury found in a wrist-watch battery – that it does not pose a significant threat to human health or the environment (nevertheless, CFLs should be handled with care and disposed of properly)." See www.see.nrcan.gc.ca/energystar/english/consumers/questions-answers.cfm?text=N&printview=N#better-environment.
21. *ENERGY STAR® Program Requirements for CFLs Partner Commitments*, www.energystar.gov/ia/partners/prod_development/revisions/downloads/cfls/Criteria_CFLs_V4.pdf, p. 8.
22. Some differences in results also may be seasonal in nature, with more respondents citing lighting as the best way to conserve in a survey conducted closer to the winter months.

Chapter 3

23. *Taking Action, Supplement: Conservation Results 2005-2007*, June 2008, www.conservationbureau.on.ca/Storage/19/2450_CECO_Report_June_2008_Final.pdf.
24. On October 2, 2008, the Ontario Energy Board decided to suspend the hearing on the Integrated Power System Plan to allow the Ontario Power Authority time to respond to the Minister's amending directive. The directive is available on the Ontario Power Authority website at www.powerauthority.on.ca/Storage.asp?StorageID=4726.

25. Research conducted in 2007 by the Ontario Power Authority and the University of Waterloo with secondary school students identified teachers as a highly credible source of information about electricity conservation. See *Teen Attitudes Towards, and Awareness of, Electricity Conservation in Ontario: Study Highlights*, www.powerauthority.on.ca/Storage/44/4002_Highlights_from_Teen_Study_OPA_-_22_June_07.pdf.
26. Registered trademark of Toronto Hydro Corporation. Used under license.
27. See also *Summary of Electricity Conservation Programs and Initiatives in Ontario from 2005–2007, Excluding OPA Funded Programs and Ontario Government Buildings, Final Report*, May 23, 2008, available on the Conservation Bureau website at www.conservationbureau.on.ca/Storage/19/2451_Summary_of_Non-OPA_Funded_Conservation_Programs_2005_-_2007.pdf.
28. Electricity savings as a result of conservation and efficiency are compared to what the electricity use would have been in the absence of these actions. In the case of the provincial target, these are compared to the peak demand forecast.
29. *Electricity Act, 1998*, S.O. 1998, c. 15, Schedule A. A summary of these findings will be available on the Conservation Bureau website, www.conservationbureau.on.ca. The findings are based on data to March 31, 2007, and do not include electricity conservation measures that came into effect after this date. The full report by Kaladar Enersave Management also will be available on the website.
30. Enwave's deep lake water cooling is a lake-water source cooling system that reduces electric air conditioning use in commercial and government buildings in downtown Toronto.
31. These independent variables are used to determine an "adjusted baseline" against which actual electricity use is compared. The adjusted baseline represents what electricity use would have been in the absence of the efficiency measure.
32. One recognized standard is the Efficiency Valuation Organization's *International Performance Measurement and Verification Protocol* at www.evo-world.org.
33. *Energy Efficiency Act*, S.C. 1992, c. 36.
34. Third tranche programs were funded by \$163 million that was approved by the Ontario Energy Board in 2005 for conservation and demand management initiatives by local distribution companies.

35. These figures are based on data received from four leading Ontario energy management companies in response to a survey by the Ontario Power Authority in 2008. The data have not been prorated.

Chapter 4

36. The Ontario Power Authority's strategic objectives for 2009 are outlined in its *2009-2011 Business Plan*, which will be available at www.powerauthority.on.ca.
37. *Taking Action, Supplement: Conservation Results 2005–2007*.

Chapter 5

38. These activities include incentive programs and awareness and educational initiatives offered by the Ontario Power Authority and other organizations.
39. Even in times of economic uncertainty, investments in energy efficiency make financial sense because they can result in reduced energy costs and lasting economic competitiveness advantages.
40. Alternative financing and procurement can leverage private-sector resources and expertise. Project risks are transferred to the private sector, which commits to deliver projects on time and within budget. Refer to www.pir.gov.on.ca/english/aboutpir/faq-infrastructure.htm for more information.
41. The OSIFA loan program bears the name of the former Ontario Strategic Infrastructure Financing Authority.

42. Manitoba's *Green Building Policy* justifies additional upfront capital costs through operating savings. See www.gov.mb.ca/greenbuilding/pdf/green_building_policy.pdf.
43. LEED stands for Leadership in Energy and Environmental Design, the Canada Green Building Council's green building rating system. An alternative to LEED is the Green Globes' building assessment and rating system.
44. The Government of Ontario announced this commitment in June 2007. See ogov.newswire.ca/ontario/GONE/2007/06/01/c7699.html?lmatch=&lang=_e.html.
45. The municipal energy conservation officer initiative is discussed in chapter 2. The officers are listed on the Conservation Bureau website.
46. The goal is to increase the capability of employees to seek and identify opportunities for electricity conservation, and of employers to realize these opportunities and communicate their benefits.
47. See reference 16 above.
48. *Canadian Radio-television and Telecommunications Commission (CRTC) Broadcasting Public Notice CRTC 2007-53* (www.crtc.gc.ca/archive/ENG/Notices/2007/pb2007-53.htm).

49. A set-top box is a device whose principal function is to receive television signals and turn them into content that is displayed on a television screen.
50. This range in annual consumption is based on the Tier 1 ENERGY STAR levels for basic and advanced set-top box functionality, assuming advanced functionality includes a digital video recorder, an additional tuner and high definition (*ENERGY STAR® Program Requirements for Set-top Boxes Version 2.0.*). Tier 1 is required for set-top boxes manufactured after January 1, 2009; Tier 2 is required for those manufactured after January 1, 2011. See www.energystar.gov/ia/partners/prod_development/revisions/downloads/settop_boxes/Set-top_Boxes_Spec.pdf.
51. In April, the Ministry of Energy and Infrastructure proposed to amend the regulation under Ontario's *Energy Efficiency Act* to set a maximum standby wattage for basic set-top boxes, including digital television adapters, by referencing the Canadian Standards Association's standard, C380-07, *Test procedure for measurement of energy consumption of set-top boxes*. The ministry is proposing a compliance date of January 1, 2010, two years earlier than the federal *Energy Efficiency Act* regulations.
52. New product categories in the proposed amendment include residential air conditioning equipment, wine chillers, commercial clothes washers and set-top boxes (Ontario Regulation 82/95).
53. *Rental Housing and Smart Sub-metering: Realizing the Potential*, Federation of Rental Housing Providers of Ontario, November 2007, p. 4.
54. Electricity use involves both non-discretionary use by appliances that are pre-installed in the unit, such as refrigerators and stoves, and discretionary use, such as by lighting, televisions and computers.
55. The landlord-tenant problem occurs when the landlord provides energy-inefficient appliances, but the tenant pays the electricity bill. In this case, there is little incentive for the landlord to choose the most energy-efficient appliance (International Energy Agency, 2007, www.iea.org/Textbase/press/pressdetail.asp?PRESS_REL_ID=237).
56. Sections 137 and 138 of the *Residential Tenancies Act, 2006*, S.O. 2006, c. 17 (unproclaimed).

57. *Installation of smart meters and smart-sub-metering systems in condominiums*, Ontario Regulation 442/07 made under the *Electricity Act, 1998*, allows for the board of directors of a condominium corporation to approve and install smart meters and smart sub-meters in individual units. See also *Smart Sub-Metering Code*, Ontario Energy Board, www.oeb.gov.on.ca/OEB/_Documents/EB-2007-0772/smart_sub_metering_code.pdf.
58. The range of conservation savings resulting from sub-metering is based on data from three sources: *Residential Electrical Sub-Metering Manual*, New York State Energy Research and Development Authority, 2001, www.nyserda.org/publications/SubmeterManual.pdf; *Evaluation of Individual Metering and Time-of-Use Pricing Pilot*, Navigant Consulting, March 2008; and *Rental Housing Smart Sub-metering: Realizing the Potential*, Federation of Rental Housing Providers of Ontario, November 2007.
59. A net lease is a property lease in which the lessee agrees to pay all expenses normally associated with ownership, such as utilities, repairs, insurance and taxes.
60. Common usage areas, such as lobbies, elevators and stairwells, still could be metered separately and billed to tenants on the basis of the percentage of the building area occupied.
61. The forum was launched in 2008 by the Independent Electricity System Operator in collaboration with representatives from local distribution companies. See www.ieso.ca/imoweb/marketsandprograms/smart_grid.asp.
62. *Smart Grid Promises and Challenges*, Energy Business Reports, October 2007.
63. See reference 32 above.
64. *Energy Conservation Leadership Act, 2006*, S.O. 2006, c. 3, Schedule A.
65. *Environmental Bill of Rights, 1993*, S.O. 1993, c. 28.

Chapter 6

66. The Ministry of Energy became the Ministry of Energy and Infrastructure in June 2008.

Environmental Savings

This report is printed on Enviro 100 stock, which contains 100 percent post-consumer fibre, and was printed using waterless technology. By using these materials and printing processes, the Conservation Bureau has derived the following savings.

From Printing Process

- **180 kilograms** of carbon dioxide (CO₂)
- **708 grams** of sulphur dioxide (SO₂)
- **151 grams** of nitrogen oxide (NO_x)
- **5.1 litres** of press dampening chemicals
- **34 grams** of press blanket washing chemicals, due to automatic cloth blanket washing
- **42.5 litres** of water savings

From Paper

- **12 trees**
- **336 kilograms** of solid waste
- **31,751 litres** of water
- **2.1 kilograms** of suspended particles in the water
- **737 kilograms** of air emissions
- **48 cubic metres** of natural gas



About the Ontario Power Authority

The Ontario Power Authority was established under the *Electricity Restructuring Act, 2004*, amending the *Electricity Act, 1998*, and began 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. It reports to the Ontario Legislative Assembly through the Minister of Energy and Infrastructure and is licensed and regulated by the Ontario Energy Board.

The Ontario Power Authority contributes to the development of a reliable and sustainable electricity system. In doing so, it encourages and facilitates conservation and adequate electricity supply from diverse resources.

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



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About the Chief Energy Conservation Officer

The position of the Chief Energy Conservation Officer was created by the *Electricity Restructuring Act, 2004*, to provide leadership for the planning and coordination of conservation in Ontario. The focus of the office is on promoting a culture of conservation by building awareness; advocating for improvements in regulations, codes and standards to promote energy efficiency; and reporting on conservation progress. The Chief Energy Conservation Officer heads the Conservation Bureau, which is a division of the Ontario Power Authority.

More information is available at
www.conservationbureau.on.ca.



Ontario Conservation at a Glance

- **The actions of Ontario's electricity consumers** contributed to the achievement of the province's first conservation target of a five-percent peak demand reduction by the end of 2007.
- **The sustained efforts of governments, local utilities, consumers, delivery agents and the conservation service industry** will help ensure that Ontario is on track to meet its long-term 6,300 megawatt peak demand reduction target—equivalent to taking one in five electricity users off the grid.
- **Ontario scored an "A" grade** on the Canadian Energy Efficiency Alliance's latest report card—Ontario showed the greatest improvement in Canada over the past four years.
- The Ontario Power Authority's conservation portfolio provides **incentive options to all market sectors**, including residential, commercial/institutional and industrial customers.
- Many conservation actions are invisible, but the benefits are clear—these are **the three Es of conservation: employment, economy and environment**.
- For electricity conservation to be a reliable system resource, there must be **more rigour in measuring and verifying conservation savings**.
- **Codes and standards are among the most cost-effective ways** to achieve conservation savings; Ontario can lead with best practices by ensuring that these regulatory tools contribute to a long-term vision.
- Ontario's Chief Energy Conservation Officer is calling upon the province's institutions and businesses to **appoint an internal energy-efficiency champion**.
- Accelerating the province's conservation targets **will require that barriers to conservation be overcome** and opportunities be created to enhance energy efficiency in public infrastructure, improve codes and standards, increase community-based initiatives and hasten sub-metering in multi-unit buildings.

Questions? Comments? Tell us what you think about this report by completing our online survey on the Conservation Bureau website, www.conservationbureau.on.ca.