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Conservation Bureau

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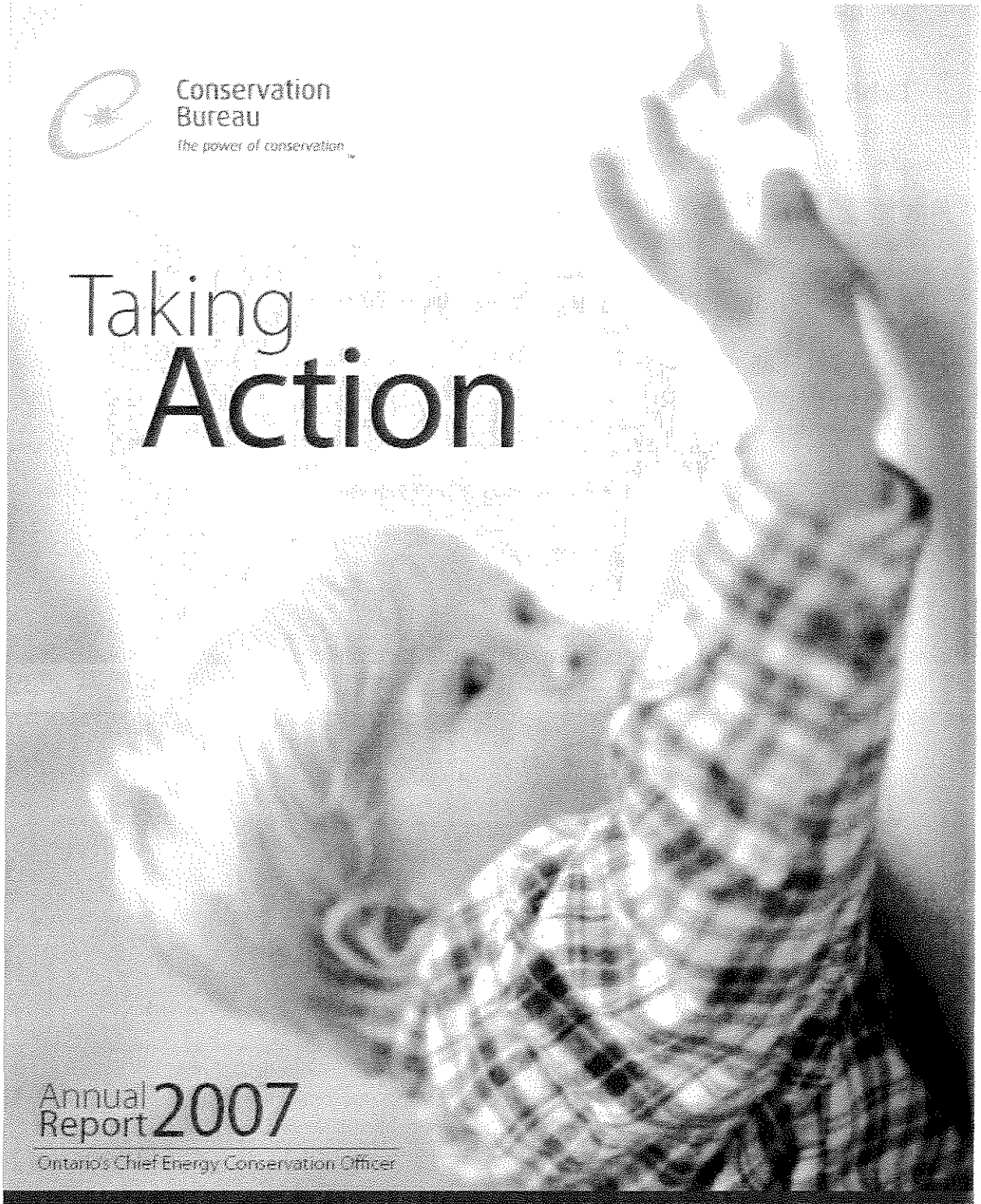
Taking Action



Annual Report 2007

Ontario's Chief Energy Conservation Officer

SUPPLEMENT: Conservation Results 2005-2007

June 2008

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2007 Conservation Highlights

- Current reported results indicate that, as of the end of 2007, Ontario electricity consumers had met Ontario's peak demand reduction target of 1,350 megawatts.

- The period 2005 to 2007 has seen unprecedented capability building in Ontario's conservation marketplace – for both conservation suppliers and consumers. Programs, outreach and awareness activities have helped to kick-start the conservation industry and consumer participation.

- Many parties are now involved in the delivery of conservation in Ontario, including the Ontario Power Authority, local distribution companies, natural gas companies, the Independent Electricity System Operator, federal and provincial governments, Enwave with its deep lake water cooling, energy management companies and non-governmental organizations. This level of activity is a good start in creating a diverse and active conservation supply industry for Ontarians.

- By the end of 2007, about 1,125,000 smart meters had been installed by local distribution companies across the province. This surpasses the goal set by the provincial government to have 800,000 installed by 2007. About 1.4 million were installed by April 2008.

- Polling results indicate that Ontarians are taking action to conserve, and that awareness of the importance of electricity, and energy generally, is increasing among Ontario consumers in all market segments.

- Sixty-two individuals and organizations were recognized in 2007 with Certificates of Recognition for taking a leadership role in building a long-term commitment to electricity conservation. Since 2005, 171 certificates have been awarded.

A Message from the Chief Energy Conservation Officer

Ontarians are taking action on electricity conservation. As Chief Energy Conservation Officer, one of my duties is to report on the progress being made toward meeting Ontario's conservation goals. To ensure that timely information is available on the province's conservation efforts, I am supplementing my 2007 Annual Report with this spring summary of programs results and activities. This supplement reports on results from 2005 to the end of 2007.

I am pleased to report that the actions of Ontario's electricity consumers have contributed to meeting the target for reducing the provincial peak electricity demand by 1,350 megawatts by the end of 2007. This is based on currently available reported results from the many participants in the conservation market, including the Ontario Power Authority, local distribution companies, governments, natural gas companies, not-for-profit organizations and energy management companies.

All those who took action to contribute to these results can take pride in this achievement – this has been and will continue to be the most aggressive conservation effort in Ontario's history. However, I must caution that more work needs to be done on several fronts. First, the methodologies used to determine the results of conservation programs and activities are evolving, and they currently include a mix of forecasted and reported results. Methods of measuring actual conservation results should be consistent among the various participants and practitioners of conservation, and these results should be independently verified where appropriate. Second, meeting the next target – reducing peak demand by a further 1,350 megawatts by 2010 – will present an ongoing challenge. Meeting it will require continued cooperation and action by all Ontarians and all sectors.

Conservation is a cornerstone of the Ontario Power Authority's 20-year plan to ensure a reliable and sustainable electricity system for the province. Unlike other commodities we use such as water, electricity is invisible. One of my goals is to make conservation visible – a necessary step toward achieving a permanent culture of conservation. We are all learning along the way, and there is now evidence that people are willing to ***think*** about electricity and how they use it. When people are aware of it, they can begin to ***believe*** that electricity must be used more responsibly and ***act*** to conserve. We need to continue to step up these efforts.

Peter Love
Chief Energy Conservation Officer
June 2008

1. Introduction

Purpose of this Report

The purpose of this supplement to the Chief Energy Conservation Officer's 2007 Annual Report is to provide a summary of available information on Ontario's electricity conservation progress to the end of 2007. It reports on progress toward meeting Ontario's conservation goals and includes results of the Ontario Power Authority's conservation activities as well as those of local distribution companies,[1] governments and others across the province. The report is being released as soon as possible after the previous year's results are available to provide transparency in reporting the results of conservation activities that are funded by Ontario electricity ratepayers and others.

Conservation has a critical role to play in meeting Ontario's need for a reliable and sustainable electricity system. In fact, the Ontario Power Authority's 20-year Integrated Power System Plan places a priority on conservation over new generation. This priority reflects Ontario's electricity conservation targets and the long-term goal of creating a permanent culture of conservation in Ontario.

The results presented in this report are based on the best information currently available. More information on reporting methodologies is in Chapter 2 of this report.

Demand versus Consumption

Electricity **demand** is the rate at which electricity is being used at a given point in time and is expressed in megawatts (MW). One kilowatt (kW) is the rate of electricity use by a typical two-slice toaster, and one thousand kilowatts equals one megawatt (MW). Peak demand is the greatest amount of demand during a specific period of time, such as that which occurs when industries and businesses are active on weekdays and people at home are using air conditioning.

The peak demand period varies according to the day and season, but typically occurs between 11 a.m. and 5 p.m. on summer weekdays and from 7 a.m. to 11 a.m. and 5 p.m. to 8 p.m. on winter weekdays. Ontario is a "summer peaking" jurisdiction – meaning that its electricity system experiences the highest annual peak demand on a hot summer day, resulting mainly from air conditioning load.

Demand is sometimes equated with capacity – representing the total installed electricity generating capacity required to meet the demand. Conservation and demand management can reduce demand so that electricity does not need to be generated or, ultimately, fewer power plants need to be built.

Consumption is the amount of electricity used over time and is expressed in kilowatt-hours (kWh). For example, if an air conditioning unit has a power requirement of 1,500

watts to operate, the unit will consume 1.5 kilowatt-hours if run for one hour or 15 kilowatt-hours if run for 10 hours. Consumption is sometimes referred to as "energy." One kilowatt-hour will make some 40 pieces of toast.

Power plants are classified as either baseload, peaking or intermediate resources, according to their operational characteristics, flexibility and capability to be dispatched on or off. Conservation resources fall under similar categories. Some conservation measures, such as those that increase energy efficiency, save energy throughout the day – much like a baseload power plant – and have little impact on demand. Other conservation measures, such as demand response programs, primarily affect the system peak and are called upon when needed. Ontario needs both kinds of generation and conservation resources in a portfolio of resource options, to make sure that the electricity system has the flexibility to meet power needs at all times.

2. Reporting Methodologies

Measuring conservation is challenging. Not only are we measuring the absence of consumption, but we are measuring against "what might have been." That is, demand reduction needs to be measured against a forecast of what the demand would have been without conservation interventions – given the time of year, weather and a host of assumptions regarding business activity, trade, population and other factors.[2]

Various approaches have been used to report on the progress of conservation activities in previous reports of the Chief Energy Conservation Officer. These include "top-down" and "bottom-up" analyses. Each method has its advantages and disadvantages. The 2006 top-down approach suggested that the provincial peak demand in summer 2006 was 950 megawatts less than the forecasted peak for 2006, after adjusting for economic growth and weather conditions.[3] In May 2007, the Chief Energy Conservation Officer's bottom-up approach was based on reported results from conservation program activities undertaken by the Ontario Power Authority, local distribution companies, governments, energy management companies and others. This approach showed that the province achieved a total of 1,080 megawatts of demand reduction in 2006.[4]

These results are encouraging, but it is recognized that more work is required to develop measurement and verification methodologies to better assess the impact of conservation programs. The Ontario Power Authority's portfolio of programs is being assessed using a measurement and verification standard to increase the certainty of energy and demand savings. The current mix of results from the various parties involved in delivering conservation in Ontario is derived from program forecasts or reported results. These results are based on assumptions regarding the activities undertaken and, while they provide an indication of the success at reducing Ontarians' need for electricity, they are not as reliable as verified results based on a comprehensive, independent measurement process.

This report relies on a combination of results, based on currently available information, to assess Ontario's conservation performance from 2005 to the end of 2007.

Given the importance of the conservation contribution in ensuring the reliability of Ontario's electricity system over the next 20 years, the Chief Energy Conservation Officer encourages all delivery agents in the conservation marketplace to adopt more rigorous and consistent methods of measuring and verifying results.

Recommendation

To enhance public understanding of the progress of conservation, those delivering conservation should place more emphasis and resources on evaluating, measuring and verifying results using standardized and transparent methods.

Ontario Power Authority's Conservation Reporting Methodology

The Ontario Power Authority uses three different reporting "tracks" to report on its funded conservation programs -- forecasted, reported and verified savings. Each of these tracks provides estimates of energy and peak demand savings resulting from conservation programs, and each track has a different level of certainty associated with the results.

Forecasted Savings

Planning, designing and developing a conservation program involves developing predictions of the potential energy and demand reductions that could result from it. These forecasted savings are based on a set of input assumptions, including estimated participation rates, energy and demand reductions resulting from program measures, the effective useful life of measures and other factors. The forecasted savings can be used as targets for the program, against which actual performance can be measured.

Forecasted savings tend to have the largest bands of uncertainty associated with them.

Reported Savings

Reported savings reflect the preliminary results of conservation programs using the same input assumptions that were used to develop the program. Program activity is tracked using units specific to the program, such as coupons redeemed, appliances retired or control devices installed. These activity units are used to estimate energy and demand savings with the same assumptions used to create the program – allowing for straight comparisons to the forecasted savings.

Reported savings reflect the success of program efforts in driving participation and can be used to gain early insights into a program's effectiveness. These results are more certain than forecasted savings and can help to improve the assumptions used for the further development or refinement of conservation programs.

Verified Savings

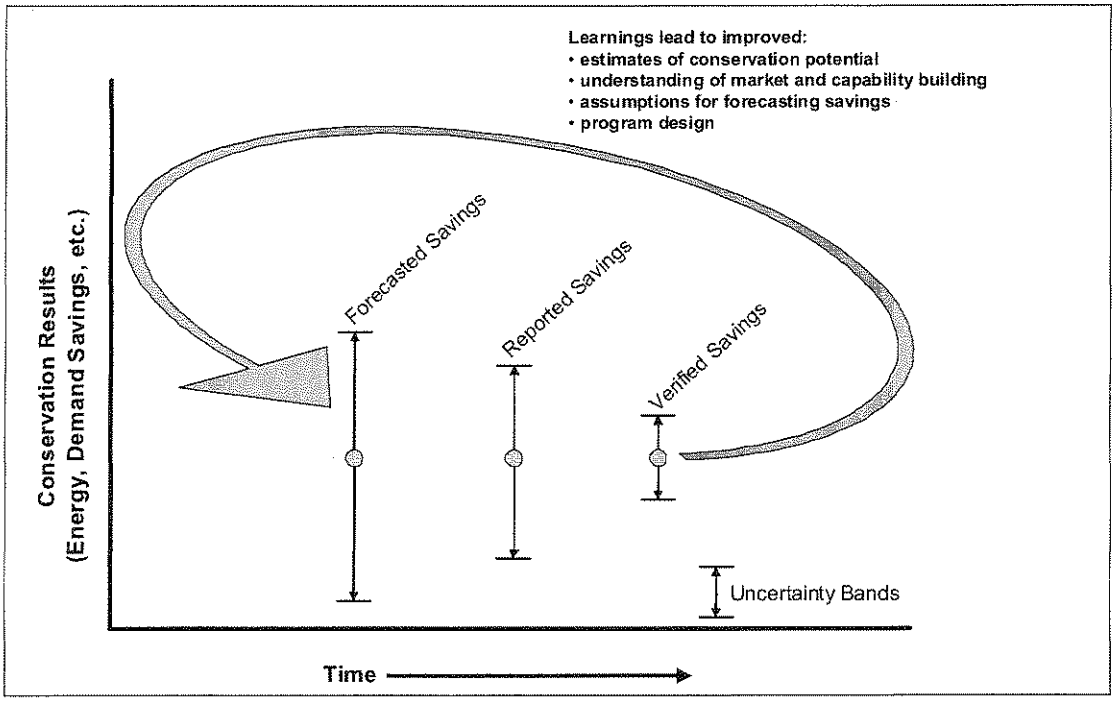
Measurement and verification studies are conducted to confirm that reported claims of energy and peak demand reductions have actually occurred. The measurement component involves collecting data from various sources, including site visits, surveys, utility bills, equipment invoices, sensors, occupancy records and/or production reports. The verification component involves using the measured data to verify that anticipated energy and peak demand savings occurred. This means verifying that conservation measures have been implemented to a reasonable standard of quality, are operating as intended and are capable of generating energy and peak demand savings. Telephone,

web-based and mail surveys may be used for simple measures, such as light bulb replacements, but on-site inspection would be preferred.

Verified results represent the best estimate of a conservation program's actual savings and greatly reduce the level of uncertainty surrounding program results. Verified results can be greater or less than forecasted and reported results, depending on factors beyond the program administrator's control. Although verified savings represent the results with the highest degree of certainty, these factors mean that some level of uncertainty will always be associated with reporting on conservation program results.[5] The credibility of verified results will be improved by separating the responsibility for program design and implementation from the responsibility for verification.

Figure 2.1 illustrates the uncertainty surrounding the results of the three reporting tracks. The decreasing uncertainty as results move from forecasted and reported to verified indicate that measurement and verification can provide results that are more reliable, predictable and transparent. The verification process can provide regular feedback about program performance, leading to the development of more effective programs and activities. The assessments also assist in refining estimates of conservation potential, improving understanding of market and capability building requirements, and generating better assumptions for forecasting savings. Verified savings, in terms of megawatts or megawatt-hours, can be less than reported savings – but the verified results are more valuable to system planners because the capacity they represent (e.g., demand reduction) can be more consistently equated with capacity of supply resources.[6]

Figure 2.1: Ontario Power Authority conservation reporting tracks



3. 2005 – 2007 Conservation Performance in Ontario

Ontario's conservation goals are among the most ambitious in North America. In the long term, these goals include creating a culture of conservation and reducing peak demand by 6,300 megawatts by 2025, which is reflected in the Integrated Power System Plan. Interim targets include reducing peak demand by 1,350 megawatts by 2007 and another 1,350 megawatts by 2010.

This chapter summarizes the results of conservation programs and activities by the Ontario Power Authority and other market players that contributed to meeting the 2007 demand reduction target.

Progress Toward Meeting Ontario's Peak-Demand Reduction Target

In 2004, the Ontario government set a target for 2007 to reduce Ontario's peak electricity demand by five percent from the Independent Electricity System Operator's 2007 forecast peak electricity demand of 27,000 megawatts. This meant a reduction of 1,350 megawatts. Since 2004, the 2007 peak demand forecast was revised downward to 26,282 megawatts (reference forecast) as a result of various factors,[7] including some naturally occurring conservation.[8]

A comparison of forecast and actual peak demand provides a macro-level perspective of the electricity system. Caution needs to be used in gaining insights from this top-down view because of the multiple factors influencing system peak demand, including changes in rates and types of economic activity, naturally occurring conservation and other factors beyond the control of power system planners. Factors such as weather variations can be accounted for by weather normalizing actual system peak demand.[9]

Table 3.1 shows the weather-adjusted 2007 system peak demand compared to the reference demand forecast for 2007. The 1,350 megawatt target is to be assessed against Ontario's weather-adjusted peak demand for 2007, since the forecast itself is weather-adjusted.[10] This comparison shows that the peak system demand in 2007 was 1,462 megawatts less than forecast.

Table 3.1: Comparison of 2007 peak demand to forecast (megawatts)

Forecasted 2007 peak demand	Weather-adjusted 2007 peak demand	Demand reduction including conservation and other factors	Percent below forecast
26,282	24,820[11]	1,462	5.6

Sources: Independent Electricity System Operator, Ontario Power Authority

Simple comparisons of the system peak to the forecast indicate conservation progress, but other factors, such as changes in economic activity, will also affect the demand placed on the electricity system. Decreases in economic activity will affect electricity use and thus,

the difference between the 2007 peak demand and the forecast must, in part, be attributed to a decrease in energy-intensive industrial activity. Between 2005 and 2007, large end-use customers that purchase electricity directly from Ontario's wholesale electricity markets experienced, on average, an 11-percent decrease in electricity consumption.

Since the demand reduction is measured against a forecast, a note regarding forecast uncertainty is warranted. In general terms, a forecast is an estimate of what is likely to happen in the future. Forecasting energy demand is challenging because it involves extending past and present trends as well as making predictions about many indirect but influencing factors. Similar to a meteorological forecast, when a forecast is made about a period a long time into the future, there is more uncertainty associated with it. In contrast to the weather, which is typically forecast a week in advance, energy demand must be forecast years in advance to accommodate the long lead-times needed for development of the infrastructure and programs needed to balance supply and demand.

Ontario's Reported Conservation Results

An analysis of conservation performance from the "bottom-up" includes reported results in assessing the potential for peak demand savings. Once individual program results are available, they are combined to establish the projected electricity savings attributable to conservation initiatives delivered in Ontario. Many conservation programs administered and funded by organizations other than the Ontario Power Authority have provided forecasted results because the programs are too new to have reported results.

Table 3.2 on page 10 shows reported results that are currently available for the various conservation programs and activities in Ontario. Reported results are an indication of program participation and activity levels and have been counted toward the 2007 demand reduction target. However, they may be subject to adjustment for system planning purposes upon detailed measurement and verification. Because forecasted results are indicative only and not counted toward the target, they are not included in Table 3.2. Results in Table 3.2 are cumulative for the 2005-2007 period.

All results in Table 3.2 are as reported by the appropriate agency or delivery agent. Programs and reported results not funded by the Ontario Power Authority are summarized in the report, *Summary of Electricity Conservation Programs and Initiatives in Ontario from 2005-2007, Excluding OPA Funded Programs and Ontario Government Buildings,* available at www.conservationbureau.on.ca.

Table 3.2: Ontario conservation reported results

Conservation Activities	Estimated Demand Reduction 2005-2007 (megawatts)
Ontario Power Authority's portfolio of programs:	
Mass market	130
Commercial/institutional	150
Industrial (demand response)[12]	317
Customer-based generation[13]	1
LDC programs (not OPA-funded)	257
Natural gas companies	38
Non-governmental and other organizations	30
IESO demand response/dispatchable load program	273
Provincial regulations	1
Federal buildings/programs	117
Enwave deep lake water cooling	56
Energy management companies	21
Total	**1,391**

Note: All results are rounded down to the nearest megawatt

Ontario Power Authority Programs

More details on the Ontario Power Authority's 2007 portfolio of programs are summarized in *A Progress Report on Electricity Conservation*, available at www.powerauthority.on.ca.

Local Distribution Companies (LDCs)

The "LDC programs" result in Table 3.2 is based on reports submitted to and compiled by the Ontario Energy Board. Local distribution companies reported that their conservation programs reduced peak demand by 257 megawatts and consumption by 1,045 gigawatt-hours.[14]

These 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.[15] Eighty-five individual plans were submitted to the board for approval and included initiatives such as conservation, demand management, demand response, power factor correction, line loss reduction and distributed generation. These initiatives began in 2005, and the funds were to have been spent by September 2007. More details on these results are available at www.oeb.gov.on.ca.

Natural Gas Companies

Conservation and demand management initiatives run by Ontario's two largest natural gas distributors, Enbridge Gas Distribution and Union Gas, have been responsible for 38 megawatts of peak electricity demand reduction by 2007. Many of these programs are aimed at conserving natural gas but also result in some electricity savings. Other initiatives save electricity by encouraging fuel switching.[14]

Non-Governmental and Other Organizations

Conservation activities of non-governmental organizations and others contributed approximately 30 megawatts of peak demand reduction since 2005. Seven megawatts of this total demand reduction have been reported by the Conservation Council of Ontario for the Doors Closed program.[16]

Many diverse conservation programs and initiatives have been undertaken by this sector. Demand reductions are attributed to programs administered by the Clean Air Foundation, various non-governmental agents delivering Energuide for Houses/EcoEnergy Retrofit programs, EcoSchools, Green Roofs for Healthy Cities and the Conservation Council of Ontario. Other programs have not reported results or are aimed primarily at raising conservation awareness. A number of non-governmental programs are also funded by various levels of government. Highlights of some of the activities of this sector are presented in Chapter 4.[14]

Independent Electricity System Operator

The Independent Electricity System Operator operates a dispatchable load program and, until 2007, a transitional demand response program. The maximum load that was dispatched "off" in 2007 from the dispatchable load program was 259 megawatts. The transitional demand response program contributed another 14 megawatts of demand reduction.[17]

Provincial Government

Provincial government results in Table 3.2 include the impact of the net metering regulation, which has reduced peak demand by a reported 1.59 megawatts. Other provincial initiatives, such as the Ontario Refrigerants Regulation and revisions to the Ontario Building Code, have not generated reported results as of the end of 2007. Some provincial programs, such as the Home Energy Audit and Home Energy Retrofit Programs, are new and have not generated reported results even though much activity has taken place. For example, since Ontario's Home Energy Audit and Home Energy Retrofit Programs started in mid-2007, more than 43,000 audits have been completed and more than 9,500 retrofits have been undertaken. Changes to the Ontario Building Code are

expected to generate significant peak demand savings and are discussed under the subsection entitled Building Codes and Equipment Standards in this chapter.

The provincial government also supports a number of conservation programs delivered by third-parties, and some of these activities have generated results shown in Table 3.2 under non-governmental organizations. The activities of these participants are discussed in Chapter 4.[14]

Federal Government

Reported results from federal government conservation activities contributed 117 megawatts of peak demand reduction from 2005 to 2007. Federal initiatives include the Commercial Building Incentive Program and ecoENERGY for Buildings and Houses. Other federal programs that do not have reported or verified results at this time have generated forecasted results, which are not included in Table 3.2.[14]

Enwave Deep Lake Water Cooling

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. The Enwave system expanded in 2007 to yield a total reported peak demand reduction of 56 megawatts.[14]

Energy Management Companies

Energy management companies (also known as energy service companies) are important private-sector delivery agents of conservation audits, projects and associated expertise. Since their activities are often supported by other conservation initiatives, the impacts of energy management company activities are, to a large extent, assumed to be accounted for in the reported results of other conservation programs. The 21 megawatts from energy management companies included in Table 3.2 is the reported result that is not accounted for within the results of other programs.[14]

Other Conservation Results

The other conservation activities summarized in this section are in addition to the programs summarized in Table 3.2. Some of these activities have been forecasted to result in peak demand reductions; however, reported results are not currently available.

Building Codes and Equipment Standards

Revisions to the Ontario Building Code and federal and provincial equipment standards are important contributors to energy and peak demand reductions. These demand reductions are not shown in Table 3.2 because estimates of energy and/or demand savings from these initiatives have not yet been received. Although it is estimated that the 2006/2007 revisions to the Ontario Building Code have made a minimal direct contribution to summer peak demand reduction in 2007, new commercial equipment standards referenced in the code are likely to be included in the energy savings estimates provided by the provincial and federal governments.[14] In years to come, these and subsequent changes to codes and standards will likely contribute several hundred megawatts of demand reduction.

Conservation Behaviour

Conservation behaviour includes those changes in behaviour specifically aimed at using less energy (conservation) or changing the times in which energy is used (demand management). Changes in behaviour result from awareness and education of consumers as well as responses to price signals such as time-of-use rates. It is assumed that some permanent behavioural change has occurred in Ontario as a result of awareness activities. Participation levels in the March 29, 2008, Earth Hour event demonstrated the growing environmental awareness of Ontarians. Of the about 300 cities and municipalities that officially participated worldwide, 85 were in Ontario.

Naturally Occurring Conservation

In addition to conservation programs and activities that provide incentives to conserve, there are many examples of natural conservation occurring across Ontario. The average energy efficiency of appliances and equipment is increasing over time due to incremental technology improvements. This means that just about anytime that an appliance or piece of equipment is replaced, some natural conservation occurs. In fact, many people go beyond the average and choose the highest level of efficiency when replacing equipment. There are other examples of businesses and households going beyond compliance with the Ontario Building Code and building to a higher energy performance standard, such as the Leadership in Energy and Environmental Design (LEED) silver or equivalent. Maintaining the conservation awareness effort will help to keep energy use and efficiency a priority for Ontarians – and increase the impact of naturally occurring conservation over time.

Ontario Power Generation

Since 1994, Ontario Power Generation has run an energy-efficiency program.[18] Many projects have been implemented under the program, including upgrades to hydroelectric

stations and turbines, and efficiency improvements at fossil-fueled plants. Even small efficiency improvements at large generators can yield large energy gains. Ontario Power Generation reports that energy-efficiency improvements at its facilities resulted in energy savings of 57.5 gigawatt-hours in 2005, 109.7 gigawatt-hours in 2006 and 151.7 gigawatt-hours in 2007.

It is important to note that energy-efficiency upgrades at the generator are not considered to be part of Ontario's conservation targets. However, these types of initiatives result in more efficient supply of electricity and reduce the amount of fuel required by the generating plant to produce each kilowatt-hour of electricity – resulting in fewer environmental emissions per unit of energy.

Smart Meters

The Ontario government set a target to install 800,000 smart meters in Ontario homes and small businesses by 2007. Traditional electricity meters measure only the total amount of electricity used over the entire billing period. Smart meters measure when electricity is used in addition to how much is used. Together with time-of-use rates, smart meters will be an important conservation tool for Ontarians by providing a financial incentive to encourage shifting of electricity use to lower-demand periods.

By the end of 2007, about 1,125,000 smart meters had been installed by local distribution companies across the province. As of April 2008, that number had grown to approximately 1.4 million. The province intends to have essentially all homes and small businesses equipped with smart meters by 2010.

Progress Toward Meeting the 10-Percent Consumption Challenge

In 2005, the Chief Energy Conservation Officer challenged everyone in Ontario to reduce their electricity consumption by 10 percent. By the end of 2007, Ontario's per-capita electricity consumption was approximately four percent lower than consumption in 2005, after adjusting for weather and population growth.[19]

While the 10-percent consumption challenge was not met, the Chief Energy Conservation Officer continues to encourage Ontario residents, institutions and businesses to reduce their electricity consumption in every way they can, and in particular, by taking advantage of the numerous programs available to assist in this effort.

4. Other 2007 Conservation Activities

Ontario Power Authority Activities

Conservation Awareness and Polling Results

In 2007, the Ontario Power Authority conducted market research to analyze existing consumer attitudes, behaviours and barriers to energy conservation. The research established baseline data that will be used in subsequent years to track changes in consumer attitudes and behaviours.

This polling research indicates that while most Ontarians are aware of energy issues and conservation programs, conservation has yet to become a priority for many. Most Ontarians are familiar with or have participated in conservation programs and over the past year, two-thirds of Ontarians have taken steps to learn more about conservation. Yet, the results suggest that less than half of the province feels that changes to consumer behaviour and lifestyles are needed to reduce overall demand. The primary motivator for pursuing conservation initiatives at the individual level is cost savings associated with reducing electricity use, rather than the goals of conserving energy, reducing peak demand and ensuring future adequate supplies of electricity. Because economic issues continue to dominate the benefits that Ontarians associate with conserving electricity in the home, there appears to a low sense of urgency in permanently changing electricity use behaviour and establishing an enduring culture of conservation.

Knowledge gained from delivering conservation programs indicates that consumers who are engaged can make a difference. For example, since mid-2007, the 43,000 audits and 9,500 retrofits that have been completed under Ontario's Home Energy Audit and Home Energy Retrofit Programs will result in an average of 24 percent energy savings per retrofitted home, up to 34 percent savings for houses built before 1945. Based on this activity to date, it is apparent that more savings are possible if the Ontario Power Authority, governments, utilities, and others continue to expand education, awareness and outreach efforts to drive participation in conservation.

Chief Energy Conservation Officer's 2007 Awareness and Leadership Activities

Media coverage and public appearances raise awareness and encourage conservation action. The Chief Energy Conservation Officer uses a variety of media, such as radio, television and newspaper, to reach a wide variety of people across Ontario in all sectors. Given the unseen nature of electricity and conservation, public appearances and media coverage are important to promote the long-term goal of building a culture of conservation.

The Chief Energy Conservation Officer made 173 public appearances in 2007, raising the total number of public appearances made since 2005 to 425. A total of 450 million media impressions were made by the Ontario Power Authority, Conservation Bureau and the Chief Energy Conservation Officer in 2007.[20]

The Chief Energy Conservation Officer awarded 62 Certificates of Recognition in 2007, raising the number of certificates awarded to a total of 171 since 2005. Certificates are awarded to recognize the leadership role taken by individuals and organizations that have made long-term commitments to conserve electricity in Ontario. A list of the 2007 recipients is available at www.conservationbureau.on.ca.

PowerLines Radio Program

PowerLines is a radio broadcast hosted by the Chief Energy Conservation Officer and a co-host in which they talk about energy conservation with interesting people across Ontario, Canada and around the world. In 2007, the series explored how everyone, from homeowners to industry, can conserve electricity to help save money and reduce impact on the environment.

All five episodes broadcast in 2007 are available to download as podcasts on the Conservation Bureau's website at www.conservationbureau.on.ca. Thirteen more episodes are planned throughout the 2008 summer peak season.

Municipal Energy Conservation Officers

In 2007, the Chief Energy Conservation Officer recommended that the province's municipalities appoint Municipal Energy Conservation Officers to engage communities at the local level in creating a culture of conservation. Having a strong local champion will be pivotal in engaging communities and individuals in Ontario's conservation efforts. These municipal energy champions will encourage their respective communities to take advantage of existing conservation programs and initiatives and build their own capacity to create a culture of conservation.

Think. Believe. Act. – A Video on Energy Conservation

The Chief Energy Conservation Officer produced a video entitled "Think. Believe. Act." to highlight the energy crunch facing the province and to emphasize the importance of conservation for closing the gap between supply and demand. The film's title and message are intended to inspire all Ontarians to think about their use of electricity, believe in the need to conserve and take action to conserve. Conservation is the most environmentally friendly way to contribute to meeting the need for a reliable supply of electricity for today and future generations. Many thousands of Ontarians have seen this video to date.

Ontario Power Authority's Conservation Awareness Events

The Ontario Power Authority undertook a broad range of conservation awareness activities in 2007. These include a launch of summer conservation programs, Electricity Conservation Awareness Day at Rogers Centre, a Use Electricity Wisely Wheel and a seasonal greeting card contest. The Ontario Power Authority also operates two funds: the Conservation Fund to provide funding for action-oriented, sector-specific electricity conservation pilot projects, and the Technology Development Fund to provide funding for projects that promote the development and commercialization of technologies or applications that have the potential to improve electricity supply, conservation or demand management. Information on these initiatives is available in *A Progress Report on Electricity Conservation 2007*, available at www.powerauthority.on.ca.

Activities of Other Conservation Participants

Following are some examples of conservation programs run by organizations other than the Ontario Power Authority. Many of these activities are supported by others, including governments. For example, in support of the province's Go Green climate change initiative, the Ontario government contributes funding to some of them.

Clean Air Foundation

The Clean Air Foundation is a not-for-profit organization dedicated to developing, implementing and managing public engagement programs and other strategic approaches that lead to measurable emission reductions, to improve air quality and reduce the impact on climate. The Foundation delivers two key programs aimed at energy efficiency and conservation. The Keep Cool program offers financial incentives for residents to replace their old, inefficient room air conditioners with new ENERGY STAR™ qualified units. The Go Solar program provides Ontario residents with information and contacts to facilitate the installation of solar energy systems to heat water or generate electricity. For more information, visit www.cleanairfoundation.org/programs.asp.

EcoSchools

Ontario EcoSchools is an environmental education program designed collaboratively by school boards to incorporate environmental education and action into the school setting. The purpose of this project is to provide teachers with environmental education resource units for elementary and secondary grades, to save money and reduce impact on the environment at both the board and individual school levels, and to provide related opportunities for learning and action outside the classroom. There are now approximately 27 school boards participating in the program, which represents more than 60 percent of

all Ontario school buildings. A total of 359 schools in the province have significantly reduced energy demand and have been designated as EcoSchools. For more information, visit www.yorku.ca/ecoschl.

Eneract Smart Living Programs

Eneract is a registered charity that delivers innovative solutions to environmental problems and builds capability in communities to work toward a sustainable future. Eneract launched a series of four "smart living" programs targeted at promoting a culture of conservation by changing behavior and implementing technological innovations at the local neighbourhood level. These programs cover four main areas, including environmental education for Toronto's ethnic communities, residential workshops on energy efficiency, a practical guide on energy-efficient products and services, and designing grassroots conservation programs at the community level. For more information, visit www.eneract.org/our-projects/default.php.

FLICK OFF Campaign

This social-marketing campaign, launched in 2007, is designed to encourage Canadian youth to conserve energy by making simple changes in their everyday lives, such as switching to energy-efficient lighting and turning off lights when leaving the house. The campaign maintains a website and markets apparel, videos and music concerts to promote energy conservation. For more information, visit www.flickoff.org.

Green Communities Canada

Green Communities Canada is one of the not-for-profit organizations that deliver three government energy-efficiency incentive programs: the federal ecoENERGY Retrofit and the provincial Home Energy Audit and Retrofit Programs. These programs are also delivered in association with other not-for-profit member organizations. They provide customized audit reports and ratings that identify upgrade opportunities with quantified savings estimates and include federal government grants that are available for residential energy-efficiency retrofits. Green Communities Canada reported that in 2007, 2,133 houses were retrofitted, contributing approximately 2,040 megawatt-hours of electricity savings. For more information, visit egh.gca.ca.

Green Roofs for Healthy Cities

The mission of Green Roofs for Healthy Cities is to increase awareness of the economic, social and environmental benefits of green roof infrastructure and to advance the development of the market for green roof products and services. The program is targeted

at the commercial and institutional sector. It is estimated that 2,000 megawatt-hours of electricity has been saved by green roof installations in Ontario between 2005 and 2007.

green Tbiz (Toronto Association of Business Improvement Areas)

green Tbiz delivers a series of programs designed to encourage businesses and properties within the business improvement areas to improve their environmental record through energy efficiency and conservation. Its programs include promoting the use of LED pedestrian and decorative lighting, organizing seminars to discuss relevant energy and environmental conservation opportunities, encouraging schools to fundraise through the sale of compact fluorescent and LED lights, and two programs focused on facilitating the sharing of best practices among business improvement area members. For more information, visit greentbiz.org.

Northern Energy Program (Northern Ontario Heritage Funds Corporation)

This program, run by the Ministry of Northern Development and Mines, is designed to help northern organizations capitalize on energy opportunities, including the creation of sustainable jobs, pursue clean alternatives and reduce their demand on external energy sources. The program focuses on providing funding for the planning and installation of renewable energy and energy conservation projects. For more information, visit www.mndm.gov.on.ca/nohfc/program_nep_e.asp.

Wattwize (Citizens' Environment Watch)

The Citizens' Environment Watch is a not-for-profit charitable organization that provides education, equipment and support for community-based environmental monitoring projects. The Wattwize Teacher and Student Guide is designed to contribute to increasing energy conservation education and awareness among teachers and students. The package focuses on three main project areas: performing a school energy audit, developing a school-wide energy conservation plan, and measuring success and sharing results with other schools across the province on a program website.

5. Next Steps

Examining Barriers to and Opportunities for Conservation

In fulfilling the mandate described in the *Electricity Act, 1998* (amended 2004), the Chief Energy Conservation Officer has been asking representatives from all sectors to describe what they perceive as barriers to conservation. Responses indicate that many barriers result from policies or legislation as well as a host of subjective factors that require further investigation and analysis. Identifying the root causes of these barriers is an important step toward understanding the range of possible solutions and will help inform the development of the Chief Energy Conservation Officer's recommendations to break down barriers to conservation action.

Research and discussion on the barriers to conservation are ongoing, but some issues have been identified that require further analysis and input from conservation stakeholders and policymakers. Examples of these issues include the following:

Bulk-metering

Bulk-metering in multi-unit residential and commercial buildings can create a disincentive for either the landlord or the tenant to take actions to conserve. The costs and benefits of conservation apply to either the landlord or the tenant, depending on the situation. The underlying issues and potential solutions differ between the residential and commercial sectors, but the resulting barrier is similar. Removing this barrier will require equitable conditions where both landlords and tenants can benefit from conservation.

Customer-based Generation

There are impediments to customer-based generation and conservation technologies, such as solar photovoltaic collectors and small-scale renewable and clean power. Many stakeholders have cited municipal zoning by-laws as the root cause of this barrier, but the issues are complex. Municipal zoning regulates the use of property and restricts areas to residential, commercial, industrial or other uses. Although customer-based generation projects have historically been viewed as industrial uses, many newer, smaller-scale technologies may be appropriately designated under other land uses. In addition, customer-based generation projects are not easily classified, and the range of technologies is rapidly changing. Fully defining this issue and identifying the range of options for resolving it will take time and coordination with stakeholders and experts.

Smart Meters and Price Signals

Smart meters are being steadily rolled out across Ontario. To capture the full potential for demand reduction from smart meters, customers need to be equipped with information and price incentives that will enable them to make the best choices. This could include

timely feedback of electricity consumption information, which would make the cost implications of electricity use more easily available and transparent. Time-of-use rate structures and the possible use of critical peak pricing to encourage load shifting will affect Ontario's conservation results. The Ontario Energy Board is currently reviewing time-of-use pricing in Ontario. In addition, with recent policy development toward pricing carbon emissions, it will be important to further explore the implications of carbon pricing on electricity rates – and how this could help promote a culture of conservation.

The Conservation Bureau will continue to coordinate with a wide range of stakeholders to appropriately define these issues and barriers, explore options for resolving them and develop recommendations for moving forward. The Chief Energy Conservation Officer will also be coordinating with those that deliver conservation programs and projects throughout 2008, encouraging them to adopt a more rigorous standard for measuring and verifying the impacts of their conservation activities. It is up to everyone to make conservation more visible and the impacts more certain and reliable.

References

[1] The local distribution company (LDC) conservation results included in this report were from programs not funded by the Ontario Power Authority. These LDC programs have been funded by ratepayers through their LDCs, which used the Ontario Energy Board's third-tranche funding mechanism.

[2] For power system planning purposes, demand forecasts need to be made far in advance. All forecasts have some degree of uncertainty because many unpredictable factors influence energy demand. Forecast uncertainty is addressed further on page 9.

[3] *Ontario – A New Era in Electricity Conservation*, 2006 Annual Report of the Chief Energy Conservation Officer, November 2006, available at www.conservationbureau.on.ca.

[4] *May 2007 Supplement to Ontario – A New Era in Electricity Conservation*, available at www.conservationbureau.on.ca.

[5] These factors can vary by the type of program. For savings that rely primarily on voluntary behaviours, such as coupon redemptions, verified results can be less than forecasted or reported results, given that a certain number of participants will receive a rebate but may not install the efficient product (e.g., a compact fluorescent lamp). Some programs also have high free-ridership rates. A free rider is a program participant who would have undertaken the promoted conservation activity on his or her own initiative even in the absence of the program incentive. Measurement and verification studies also assess the impact of "free drivers" or "spillover," which are people who undertake the conservation activity but do not claim the program incentive and are thus not on the record as a participant.

[6] The Ontario Power Authority's evaluation, measurement and verification framework is available at www.powerauthority.on.ca.

[7] Factors that have contributed to this decrease from 27,000 megawatts include: impacts of previous conservation promotion and incentive efforts; changes to the gross domestic product; variances in the economic factors intrinsic to the overall demand calculation (e.g., housing starts and industrial production); and variations in the amount of savings attributed to stock turnover and purchase of energy-efficient goods.

[8] Naturally occurring conservation accounts for changes in end-use efficiency (e.g., machines, motors or appliances) that occur in the absence of any new market interventions, incentives or rebates. Changes in behaviour resulting from electricity pricing are not naturally occurring. When equipment needs to be replaced, newer models are generally more efficient than older models. Also, some people simply choose more efficient models when buying new equipment. The Ontario Power Authority's long-term

conservation goal is to enable the market so that everyone makes efficient choices – effectively making all conservation naturally occurring.

[9] Weather has an impact on electricity use. On hot, humid summer days, keeping cool uses more energy than normal, driving up electricity consumption. Weather normalization adjusts peak load data to take into account normal weather conditions over multiple years. The Independent Electricity System Operator uses 31 years of data. For example, if the conditions on the peak day of 2007 were 10 percent hotter than the average normal weather conditions, then the weather-sensitive portion of peak demand is lowered 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 other differences, such as conservation efforts.

[10] Similar to the weather normalization of peak load data, forecasts are also adjusted to account for variations in weather.

[11] The actual peak demand occurred on the 16th hour of June 26, 2007, and was 25,737 megawatts, before weather normalization.

[12] Contracted demand response is used for reporting on 2007 targets, whether or not the capacity was called upon during the 2007 peak demand day.

[13] Renewable energy standard offer projects equal to 500 kilowatts or less that have reached commercial operation and clean energy projects equal to 10 megawatts or less that have reached commercial operation are considered toward the conservation target.

[14] Additional information on these activities is included in *Summary of Electricity Conservation Programs and Initiatives in Ontario from 2005-2007, Excluding OPA Funded Programs and Ontario Government Buildings*, *Final Report*, dated May 23, 2008, available at www.conservationbureau.on.ca.

[15] In 2004, all local electricity distribution companies in Ontario were granted approval from the Minister of Energy to apply to the Ontario Energy Board for an increase in their 2005 rates by way of the third installment or "tranche" of their incremental market-adjusted revenue requirement. This funding approval was conditional upon reinvestment in conservation and demand management.

[16] Non-governmental organizations contributed 23 megawatts of demand reduction, which are as reported by the responsible agency or delivery agent and are included in the *Summary of Electricity Conservation Programs and Initiatives in Ontario from 2005-2007, Excluding OPA Funded Programs and Ontario Government Buildings*, *Final Report*. Information on the Doors Closed program can be accessed at weconserve.ca/doorsclosed.

[17] Results from the Transitional Demand Response Program are included in the *Summary of Electricity Conservation Programs and Initiatives in Ontario from 2005-2007,*

Excluding OPA Funded Programs and Ontario Government Buildings, Final Report, dated May 23, 2008, available at www.conservationbureau.on.ca. Results from the Dispatchable Loads Program have been provided to the Conservation Bureau by the Independent Electricity System Operator.

[18] The energy-efficiency program was started by Ontario Power Generation's predecessor company, Ontario Hydro.

[19] Based on data from the Independent Electricity System Operator and *Ontario Demographic Quarterly*, the per-capita energy consumption in 2007 was 11,834 kilowatt-hours, compared with 2005 per-capita energy consumption of 12,458 kilowatt-hours, a difference of five percent. The per-capita weather-adjusted energy consumption in 2007 was 11,725 kilowatt-hours, compared with 2005 per-capita weather-adjusted energy consumption of 12,293 kilowatt-hours, a difference of 4.6 percent.

[20] Media impressions are tracked for the Conservation Bureau by Environmental Communications Options.