







Rethinking Energy Conservation in Ontario

Annual Energy Conservation Progress Report – 2009 (Volume One)

E C O
C E O
Environmental
Commissioner
of Ontario

Front Cover:

How we see a problem affects our ability to find solutions to it.

Consider the design on the front cover of the report as a puzzle. Connect all nine circles on the cover by making four straight lines without lifting your pencil or retracing along any line.

Please turn to the back cover for the solution. Solving the puzzle requires extending the lines beyond the square in which the circles are placed – going beyond our habitual ways of thinking which prevent finding new ways of approaching a problem.

Environmental
Commissioner
of Ontario

Commissaire à
l'environment
de l'Ontario

Gord Miller, B.Sc., M.Sc.
Commissioner

Gord Miller, B.Sc., M.Sc.
Commissaire

May 2010

The Honourable Steve Peters
Speaker of the Legislative Assembly of Ontario

Room 180, Legislative Building
Legislative Assembly
Province of Ontario
Queen's Park

Dear Speaker:

In accordance with Section 58.1 of the *Environmental Bill of Rights, 1993,* I am pleased to present Volume One of the *Annual Energy Conservation Progress Report - 2009* of the Environmental Commissioner of Ontario for your submission to the Legislative Assembly of Ontario.

The *Annual Energy Conservation Progress Report - 2009* is my independent review of the Ontario Government's progress in conserving energy, and will be issued in two separate documents. This first volume covers the broader policy framework affecting energy conservation in Ontario. The second volume, to be released later this year, will describe initiatives underway, assess energy savings derived from these initiatives and measure progress on meeting targets.

Sincerely,

Gord Miller
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Abbreviations and Acronyms Used in the Report

CDM	Conservation and Demand Management
CIPEC	Canadian Industry Program for Energy Conservation
CPP	Critical Peak Pricing
DR	Demand Response
DSM	Demand-Side Management
EA	Environmental Assessment
EBR	*Environmental Bill of Rights, 1993*
ECLA	*Energy Conservation Leadership Act*
ECO	Environmental Commissioner of Ontario
EVs	Electric Vehicles
FIT	Feed-in-Tariff
GEA	*Green Energy Act*
GEGEA	*Green Energy and Green Economy Act, 2009*
GHGs	Greenhouse Gases
HOV	High Occupancy Vehicle
IESO	Independent Electricity System Operator
IPSP	Integrated Power System Plan
ITS	Intelligent Transportation Systems
kW	kilowatt
kWh	kilowatt-hour
LCVs	Long Combination Vehicles
LDCs	Local Distribution Companies
MEI	Ministry of Energy and Infrastructure
MTO	Ministry of Transportation
MUSH	Municipalities, Universities/Colleges, Schools, Hospitals
MW	megawatt
MWh	megawatt-hour
NEB	National Energy Board
OEB	Ontario Energy Board
OEBA	Ontario Energy Board Act
OPA	Ontario Power Authority
PJ	petajoule
REALpac	Real Property Association of Canada
TEMP	Transportation Energy Management Program
TDM	Transportation Demand Management
TOU	Time-of-Use

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1 Executive Summary

Under the *Green Energy and Green Economy Act*, *2009* (*GEGEA*), the Environmental Commissioner of Ontario (ECO) has a new responsibility to report annually to the Speaker of the Assembly on the progress of activities in Ontario to reduce or make more efficient use of electricity, natural gas, propane, oil and transportation fuels. The ECO is also required to review the progress in meeting any government-established targets to reduce energy consumption and increase efficient use of these fuels, as well as to identify barriers to conservation and energy efficiency.

The ECO's first energy conservation report covers the period January 1, 2009 to December 31, 2009 and will be issued as two separate documents.

This report is Volume One and covers the broader policy framework and operational issues affecting energy conservation in Ontario. It raises policy issues that need resolution, requests certain policy actions we believe necessary if the ECO is to fulfill its mandate, and points to potential gaps, weaknesses and uncertainties in the policy framework. Volume Two, a separate report to be issued later in 2010, will describe initiatives underway, assess the energy savings that have been achieved and measure progress on targets.

This report summarizes Ontario's energy consumption trends, provides an overview of energy conservation and its benefits, and urges development of a comprehensive, multi-fuel energy conservation strategy.

The report then examines the policy framework governing conservation on a fuel-by-fuel basis, looking at electricity, natural gas, propane and oil, and transportation fuels. Also reviewed are the conservation elements of the *Green Energy and Green Economy Act*, *2009*, and the issue of targets and benchmarking for the energy sector.

Barriers to energy conservation expressed to the ECO by workers in the energy sector (utilities, building operators and conservation practitioners) are summarized, and several recent conservation initiatives that are particularly innovative and demonstrate leadership in advancing the practice of energy conservation in Ontario are highlighted. Readers are invited to visit the ECO website at www.eco.on.ca to contribute to the discussion and share their thoughts on barriers and initiatives.

The Policy Agenda

From the policy review in this report, four issues stand out that the ECO believes should set the energy conservation policy agenda.

1. Develop a comprehensive energy conservation strategy.

Several other provinces and Ontario municipalities have energy conservation strategies but Ontario does not. The Ministry of Energy and Infrastructure should make the creation of a comprehensive strategy applicable to all energy sources its first priority.

The strategy should provide a definition of conservation to guide the measurement of progress; it should set objectives and targets as appropriate; and, the strategy should co-ordinate government-wide initiatives. Development of the strategy should incorporate public comment by posting it on the province's Environmental Registry.

2. Stabilize electricity policy, and provide clarity and certainty to that policy.

There is a need for stability in Ontario's electricity policy in order to consolidate the gains already made and to capture the

potential created by the *GEGEA*. This does not mean there should be no further activity. Our report suggests some initiatives to be pursued as the *GEGEA* framework is implemented, but these are mostly refinements of the existing policy as opposed to new departures.

The *GEGEA* has been characterized as a "game-changer". There is a need now, however, to pause, implement, evaluate and adjust. Most of 2009 was devoted to creating the *GEGEA* and implementing its renewable energy provisions. Conservation provisions (regulations and directives) of the *GEGEA* have been slow to emerge, and 2010 may be another year of instability, negatively affecting the energy savings achieved. Organizations tasked with delivering conservation would benefit from a multi-year commitment to the *Green Energy Act* (*GEA)* policy framework, together with the assurance of stable financing. Such a commitment would allow them to do the assigned job, as well as to be evaluated properly by policy makers and regulators.

The process for approving the proposed Integrated Power System Plan (IPSP) is in hiatus at the time of writing this report. It is essential that the issue of the proposed IPSP be settled. It must be determined whether the IPSP process will be resumed with revised conservation targets, or whether it will not be used at all, or whether another method, such as a blended policy-making approach using the minister's directive power and IPSP planning will be adopted.

3. Examine the role of benchmarking and energy targets.

To date, Ontario's electricity conservation targets have been established using a fairly blunt approach. A provincial target is set for a given year, measured as a reduction in the peak or maximum amount of electricity (in megawatts). [1] The overriding objective of system planning is to ensure that enough electricity is available to meet the highest expected peak demand. This approach places a high value on activities that reduce demand through temporary reductions or shifting the demand to an off-peak time, but may not necessarily reduce the overall consumption of electricity.

Quantitative targets are powerful tools because they provide a simple metric for measuring progress. The ECO believes that the government should review its approach to target setting, given the several targets and goals adopted by the province, and use a more integrated and nuanced approach that reflects all aspects of conservation.

The government should also implement reportable benchmarking by sector as the *GEA* enables the government to do. Following measurement and benchmarking, the Ministry of Energy and Infrastructure should also consider whether reforms to setting natural gas demand-side management (DSM) targets would be beneficial. It should also determine whether such targets should extend to other fuels (i.e., oil, propane, gasoline and diesel) not subject to regulatory oversight and, if so, how they would be implemented.

The development of a comprehensive conservation strategy would provide an opportunity to re-evaluate Ontario's use of targets as a policy tool.

4. Ensure accountability, transparency and public input on energy directives.

Accountability, transparency and public participation are essential to maintaining energy consumers' support for conservation. Under the current (and possibly under the future) regulatory framework, it is not clear that meaningful public scrutiny can occur.

In the absence of an approved IPSP, the minister has made extensive use of the directive power to require the Ontario

Power Authority (OPA) to undertake conservation activities, without public input. The *GEGEA* expands the minister's directive power over both the OPA and the Ontario Energy Board (OEB). This effectively removes a previous restriction on ministerial direction to the OPA: namely that the duration of the minister's directive authority would be limited to the time period leading up to the passage of the IPSP, at which time the minister would relinquish this power. Thus, the lack of public input on conservation that has characterized the period before an approved IPSP will now persist. The minister will be free to set conservation and demand management (CDM) goals and budgets with little or no public input. The IPSP review process, if it resumes, will not need to consider the merits of initiatives directed by the energy minister.

The extensive use of directives to guide conservation action has also removed accountability for ensuring implementation of the desired actions.

2 The Context of the Report

2.1 The ECO's New Energy Reporting Mandate

The *Green Energy and Green Economy Act*, *2009* (*GEGEA*), proclaimed in May 2009 [2], introduced legislative amendments to several existing acts. The act incorporated new requirements for energy conservation and supported the increased use of renewable sources of energy. It aims to further strengthen the conservation culture that Ontario is building and to position the province to capture the environmental and employment benefits created by energy conservation and renewable energy.

As part of these legislative changes, the *Environmental Bill of Rights*, *1993* (*EBR*) was amended, and the reporting mandate of the Environmental Commissioner of Ontario (ECO) was expanded. The ECO was given a new responsibility to report annually to the Speaker of the Assembly on:

1. the progress of activities in Ontario to reduce or make more efficient use of electricity, natural gas, propane, oil and transportation fuels;
2. the progress in meeting any government-established targets to reduce energy consumption and increase efficient use of these fuels; and
3. barriers to conservation and energy efficiency. [3]

To assist with this role, the ECO has the authority to request information from several sources: agencies that regulate energy or operate the electricity system or provide conservation services, and companies that deliver energy to homes and businesses. [4] Information may also be requested from relevant government ministries and other organizations.

2.2 The ECO's Reporting Approach

The purpose of the *Annual Energy Conservation Progress Report* is to respond to the ECO's three-fold statutory obligation outlined above. The ECO interprets this mandate broadly to mean providing an analysis of the annual state of energy conservation in Ontario – including regulatory, policy, program, technology and other activity – in order to ensure continuation of successful activities and to suggest reform where needed.

By mandate, this first report covers the period from January 1, 2009 to December 31, 2009. The ECO relies on data that other organizations are required by regulation and policy direction to collect. Production of the report is, therefore, reliant on the timing in which this data is received. To address this issue, the *Annual Energy Conservation Progress Report – 2009* will be issued as two separate documents.

This report is Volume One and covers the broader policy framework and operational issues affecting energy conservation in Ontario. It raises policy issues that need resolution, requests certain policy actions needed if the ECO is to fulfill its mandate, and identifies potential gaps, weaknesses and uncertainties in the policy framework.

This is the first report issued in response to our new mandate. In addition, much of the energy policy framework is in transition or has not yet been articulated by the government, its agencies and regulatory authorities. Given these considerations, the ECO has approached this report as a foundation document on which to build future reports.

Volume Two, a separate report to be issued later in 2010, will describe initiatives underway, assess the energy savings that have been achieved and measure progress made in achieving targets.

2.3 Ontario's Consumption of Energy

Current Energy Consumption

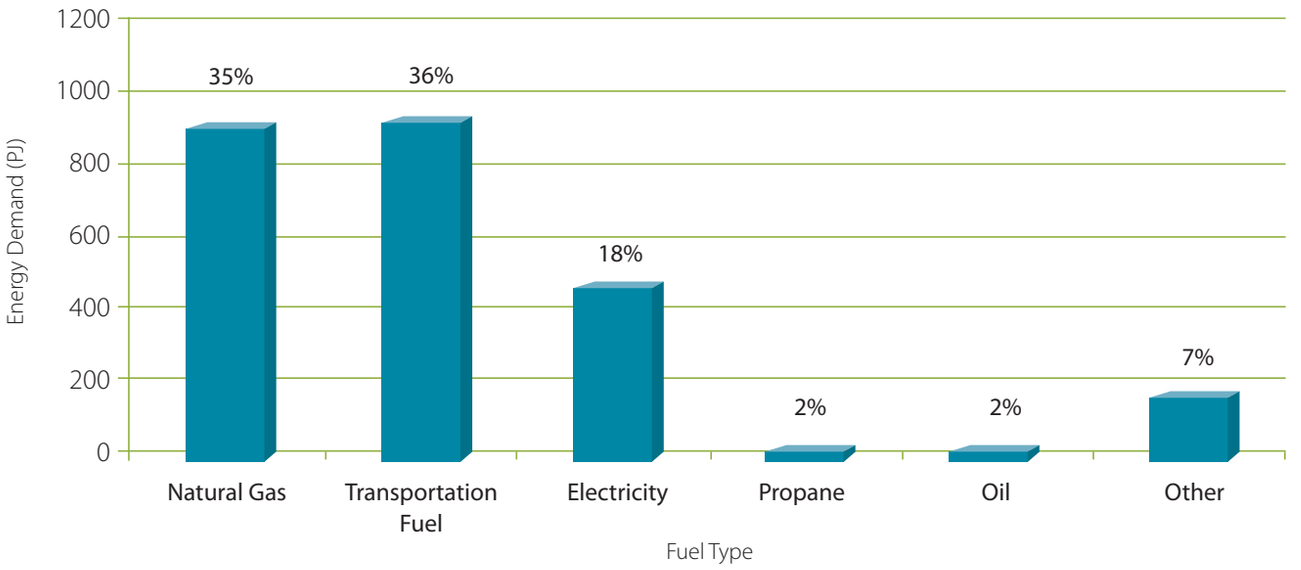
In assessing conservation efforts, it is helpful to understand how energy is currently used by Ontarians. Energy consumption can be examined in several ways: by fuel type (such as oil or electricity); by sector (such as commercial or residential); and by end use (such as heating or lighting). All three types of analysis provide insight as to where both the report's attention and conservation action should be focused.

Figure 1 shows how energy demand is met in Ontario and highlights the relative contributions that the energy sources specified in the ECO's reporting mandate make to Ontario's total energy consumption. In 2007, final energy demand was 2,640 petajoules (PJ). [5] (Final energy demand is end use demand and represents the sum of energy usage by all sectors in Ontario, but does not include feedstocks, that is, any energy used for energy production – more information on energy use is available in Appendix A.)

Natural gas and transportation fuels account for more than 70 per cent of the total energy demand in the province. In contrast, electricity plays a smaller role in Ontario's energy demand mix, representing 18 per cent of final energy demand.

Recently in Ontario, the government's policy focus has been squarely on electricity conservation. However, based on consumption patterns, there is an obvious need to look at the conservation of multiple energy sources. Both natural gas and transportation fuels are carbon-based – in contrast to electricity, which is generated from both fossil and non-fossil fuels – and represent nearly three-quarters of Ontario's end-use consumption.

Figure 1
Ontario 2007 Total Final Energy Demand by Fuel Type



Source: Statistics Canada – Catalogue no. 57-003-X

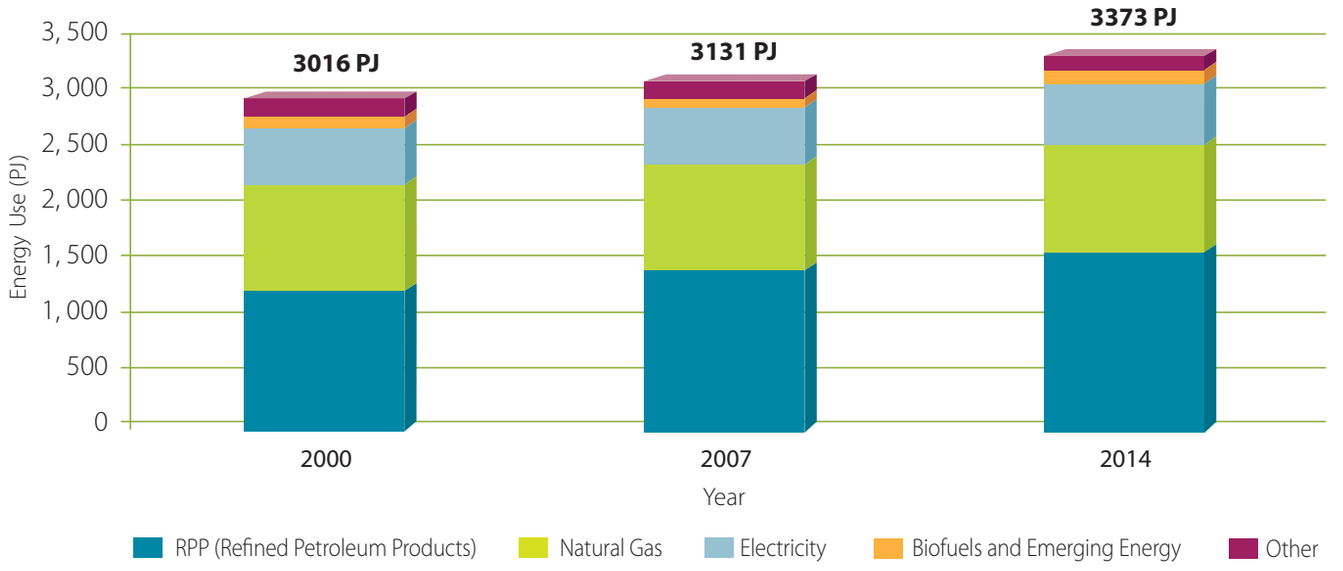
Note: Oil demand is based on kerosene and stove oil, and light fuel oil amounts. Transportation Fuel is based on motor gasoline, diesel fuel oil, heavy fuel oil, aviation gasoline, and aviation turbo fuel amounts; details of Oil and Transportation Fuels come from Table 4-8 of Statistics Canada's 57-003-X report. Other fuel amount represents the balance of all other fuels used based on Ontario's total final energy demand for 2007.

Forecast Growth in Consumption

According to the National Energy Board (NEB), secondary energy consumption in the province is expected to grow during the period 2008-14 by 325 PJ, representing about an 11 per cent increase.[6] (Secondary energy consumption includes final energy demand for all end-users and the feedstock energy demand used by energy producers. Feedstock energy is chiefly natural gas or other hydrocarbon fuels used by producers to provide fuel.) Some 71 per cent of this projected growth is expected to come from the increased use of refined petroleum products, mainly gasoline and diesel that are primarily used in the transportation sector, underscoring the importance of conservation in this sector.

Figure 2 illustrates how the NEB projects Ontario's total secondary energy consumption to grow, as well as each fuel's share of total forecast growth. Unlike the data presented in Figure 1, showing final energy demand, Figure 2 includes both final energy demand (end use demand) and feedstocks.

Figure 2
Ontario's Historic and Forecast Secondary Energy Demand



Source: National Energy Board – 2009 Reference Case Scenario – Appendices, Table A2.10: Demand, Reference Case, Ontario.

Note: Energy use amounts include end use demand by consumers and feedstocks. 'Biofuels and Emerging Energy' includes: biomass (wood), solar, geothermal, hydrogen, ethanol and biodiesel.

A note of caution: any forecast of future energy consumption should be viewed as an estimate only.

There is a history of long-term energy forecasts overestimating future increases in energy consumption. In the 1990s, for example, forecast growth in electricity demand failed to materialize for several reasons. Among these were economic slowdown, structural changes in the economy that began to move Ontario away from energy intensive industries, and concerted conservation efforts during that decade. More recently, electricity consumption in Ontario fell by 2.3 per cent in 2008 and a further 6.4 per cent in 2009, reaching its lowest level since 1997, as a result of the economic recession,

conservation efforts and mild weather. Energy prices, weather and economic activity are important factors that affect energy consumption.

Despite forecasting uncertainties, the analysis of current and projected energy consumption patterns can help us in directing conservation efforts more effectively. The future of energy consumption in Ontario is a story that we will write ourselves.

3 Introduction

3.1 The Benefits of Energy Conservation

Energy conservation policy should not merely reflect Ontario's energy objectives. It may also serve as a tool for achieving the province's other long-term goals and be employed to pursue the Government of Ontario's broader agenda. Such secondary purposes may include improving energy security, increasing societal resilience to global shifts, supporting the creation of a conserver society, reducing the emission of greenhouse gases, improving air quality, and generating both individual and societal economic returns.

For example, conservation can contribute to the province's energy security, especially for a jurisdiction like Ontario that does not produce significant amounts of hydrocarbon fuels itself. Ontario has committed to stop burning coal to generate electricity and to expand the use of lower-carbon alcohol-based fuels in transportation. The province will be challenged to fully replace fossil fuels with alternate energy sources, especially at today's levels of hydrocarbon consumption. Accordingly, conservation is an obvious way to reduce a reliance on fossil fuels.

Conservation contributes to societal resilience. Reduced consumption makes Ontario less vulnerable to unforeseen or difficult to control events, like major price swings in fuels and extreme weather events associated with climate change.

Behavioural actions taken at the level of the individual can create a conserver society. This cultural shift toward greater conservation by individuals in their daily behaviour, supported by technology that increases energy efficiency, leads to conservation improvements in the built environment. It also reduces the need for adding new energy supply infrastructure, addressing the issue of local opposition to the construction of new energy projects.

Capturing the environmental benefits of a "soft energy path" is more urgent than ever before. Energy conservation minimizes the degradation of the environment. Conservation reduces greenhouse gas emissions and improves air quality, as well as reducing land use impacts attributable to the extraction, production and delivery of energy.

Finally, economic savings can be realized by both the individual consumer and society overall. Expenditures on conservation are often lower than costs of supplying energy for individuals and organizations. The economic advantages of conservation become even more favourable when considering society as a whole, once externalities [7] of energy supply are considered.

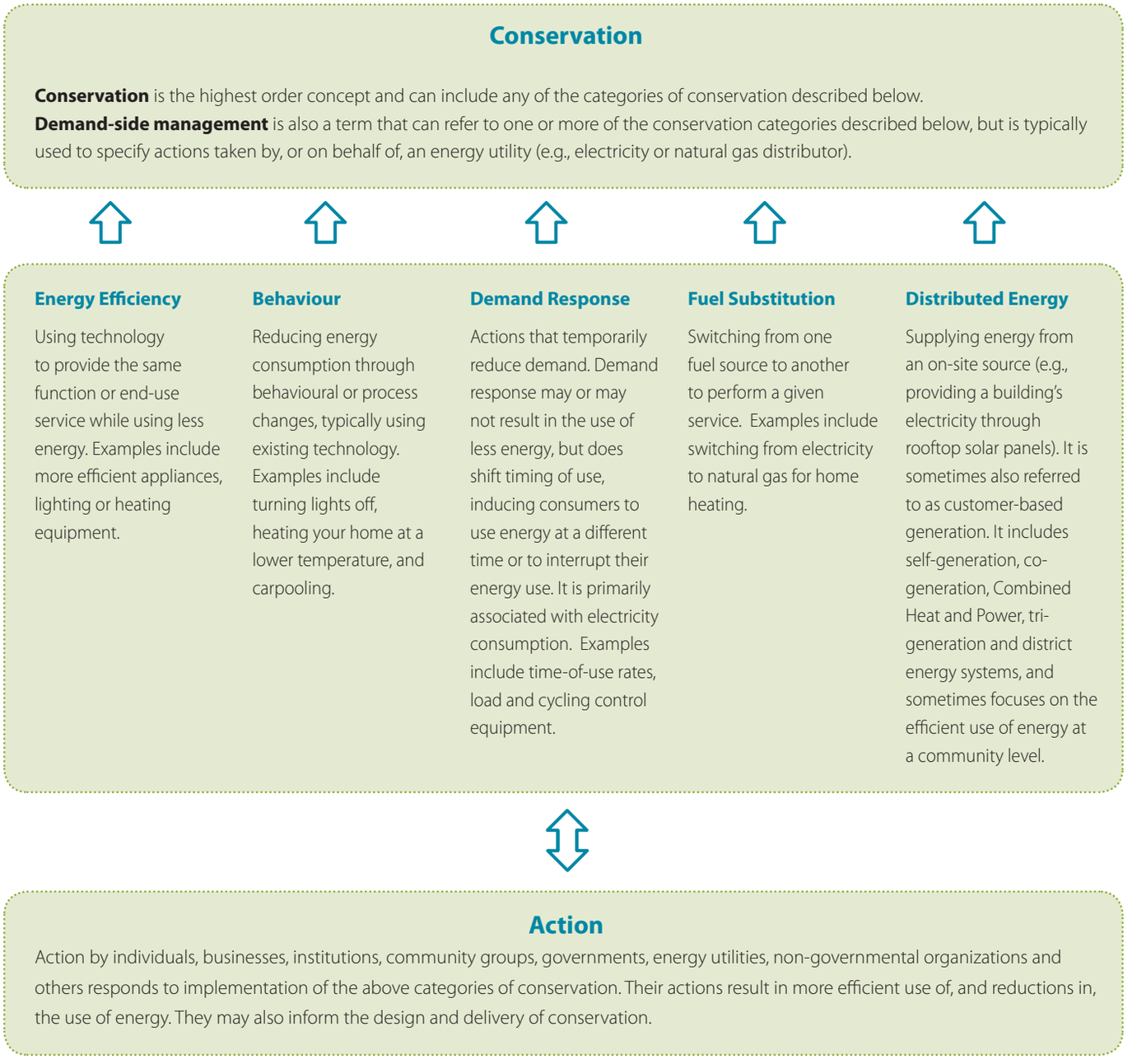
3.2 Conservation Terminology

Defining energy conservation is no simple matter. Terms such as "energy conservation," "energy efficiency" and "demand-side management" may mean different things to different people. These terms are not mutually exclusive. Energy conservation could include improvements in energy efficiency. Energy conservation or energy efficiency may be achieved through demand-side management (DSM) or demand response (DR) measures.

In general, this report uses these terms in the following context: energy conservation is the broadest or higher order term; energy efficiency has a strong technology focus; and demand-side management typically refers to programs offered by energy companies to encourage their customers to conserve.

Figure 3 describes five categories of action that could be considered forms of energy conservation: improvements in energy efficiency, changes in consumer behaviour, shifts in demand response, fuel substitution, and distributed energy (supplying energy from on-site sources).

Figure 3
Categories of Conservation



There are differing views – among Ontario residents, energy agencies, environmental groups, energy companies and others – of the extent to which these five categories of action are relevant to their definition of conservation. One might not include some of the categories at all because they do not lead to an overall reduction in energy consumption (demand response) or are based on adding supply (fuel switching and self-generation). A differing view would maintain that demand response or distributed energy is conservation because they reduce reliance on the centralized energy delivery infrastructure. An individual or societal concept of conservation ultimately depends on the goals and benefits, as outlined in Section 3.1, that serve as the rationale for pursuing conservation.

Government defines the broad social agenda and plays an important role in setting energy policy and building a culture of conservation. Therefore, it is problematic that the Ministry of Energy and Infrastructure has not publicly stated its definition of conservation except in the context of electricity system planning. The ministry's policy and actions advance all of the categories noted above. The ministry has publicly defined conservation, in the planning of the electricity system, to include elements of all of the five categories, noted in Figure 3. [8] However, the ministry's goal and the view of the Ontario Power Authority (OPA) – the government's agency responsible for planning to meet current and future power needs by procuring conservation resources and contracting for generation – on electricity conservation are strongly tied only to demand response for reducing peak demand on the centralized electricity grid.

4 A Conservation Strategy for Ontario

To launch the formulation of a conservation strategy, the government must clearly state the public policy goals to be achieved through conservation, how each of the conservation categories (as listed in Figure 3) are expected to advance these policy goals, and the roles that policy makers in ministries should play.

4.1 Role of Government Ministries

Many Ontario government ministries have the potential to advance energy conservation through their activities, as shown in Figure 4 below.

Figure 4
Conservation Role of Ontario Government Ministries

Ministry	Mechanisms to Advance Energy Conservation
Economic Development and Trade	• Administers grant programs that can support businesses producing energy conservation products and services. • Assists industry to lower energy's share of its operating costs.
Energy and Infrastructure	• Has legislative and regulation-making power over the electricity and natural gas sectors. • Sets and administers energy performance standards for appliances and equipment sold in Ontario. • Provides policy direction to other key players in the energy sector, including the Ontario Energy Board, Ontario Power Authority, Independent Electricity System Operator, Hydro One, and Ontario Power Generation. • Administers energy conservation programs and infrastructure grant programs. • Influences land use planning through growth planning policy. • Is responsible for energy efficiency in government buildings through the Ontario Realty Corporation.
Environment	• Develops Ontario's climate change policy. • Issues Renewable Energy Approvals.
Finance	• Develops tax policy changes that can influence the financial viability of energy conservation activities and energy consumption.
Government Services	• Develops government's operational and procurement practices on energy conservation and efficiency factors.
Municipal Affairs and Housing	• Administers the province's Building Code, which includes standards for energy conservation. • Develops planning policies that affect the growth and development of communities.
Natural Resources	• Makes Crown land available for renewable energy development and rights-of-way for transmission lines. • Issues certain approvals and permits for energy projects.

Ministry	Mechanisms to Advance Energy Conservation
Research and Innovation	• Administers research and innovation grant programs that can support innovative energy conservation technologies.
Transportation	• Is responsible for a broad range of legislation, policy and programs influencing the on- and off-road transportation of goods and people.
Agriculture, Food and Rural Affairs; Education; Northern Development, Mines and Forestry; Health and Long-term Care.	• Can influence energy conservation in sector of responsibility through programs and policy.

The Ministry of Energy and Infrastructure, which holds primary responsibility for the government's energy conservation policy, [9] is focused heavily, almost singularly, on electricity policy. This is a result of the many policy changes affecting the operation of the electricity system that have been introduced by successive governments in past decades. The impact of these policies has been exacerbated by a perceived need to replace or refurbish the existing generation infrastructure.

When energy conservation is examined broadly across the separate policies and initiatives of individual ministries, each tends to address conservation from its singular perspective with no overall coordination of objectives.[10] The result is that ministries act within their "silo" of perceived responsibility. They pursue their own strategies and objectives, and there is a lack of overall policy direction.

Fuel Switching: Driving in Different Directions?

The Ministry of Energy and Infrastructure has asked the Ontario Power Authority to develop a plan to reduce demand on the electricity system through conservation activities, including fuel switching (from electricity to other fuels).

At the same time, the Ministry of Transportation (MTO) has encouraged fuel switching in the opposite direction to increased electrification of transportation by initiatives such as: rebates for purchase of electric vehicles (EVs), financial assistance to commercial fleets to purchase EVs and special access to parking and High Occupancy Vehicle lanes for EVs. Growing market penetration of EVs will increase electricity demand and may result in the need for higher targets for electricity conservation.

There may be valid reasons for switching towards electricity for some end uses, and away from electricity for other end uses. However, it is not clear whether these fuel switching initiatives are being developed in a co-ordinated fashion that looks at the larger fuel supply picture. What is needed is a policy of resource optimization – a "smart" energy strategy that designates the use of each fuel to its most appropriate application(s).

4.2 Government's Influence on the Energy Sector

The lack of co-ordinated action on energy conservation results, partly, from a division of ministerial responsibility. It is also caused by the varying degree of control that the Ontario government can exert over different fuels, either directly or by setting policy and law to guide energy regulators.

Electricity and natural gas are both regulated fuels, overseen by the Ontario Energy Board (OEB), the provincial regulator of energy. The OEB does not regulate the oil and propane sectors or the use of transportation fuels.

The government develops policy and law that governs the operation of the electricity and natural gas sectors, and the OEB regulates these sectors to protect the public interest in a manner consistent with government actions. The OEB's decisions are not subject to direct government oversight, although a decision may be subject to reversal by the courts if it is determined to be "unreasonable."

The OEB's regulatory policy development is guided by government legislation, regulations and directives, but flows from the independent exercise of the Board's discretion. Acting independently within its legislative mandate, the OEB formulates the detailed regulatory policy to implement the law and government's policy objectives.

Gas and electricity distributors, energy retailers, sub-metering companies and others must follow the rules set by the OEB through its regulatory decisions and technical codes. These codes and decisions are influential and authoritative, and thus the Board can be a powerful shaper of electricity and gas conservation.

In the electricity sector, the power of the Ontario government to shape the sector's actions is further enhanced by two levers. First, it solely owns Hydro One, which offers conservation programs and smart metering to its customers. Second, it has the authority to direct the Ontario Power Authority to take various actions on the electricity system (e.g., to develop power system plans, undertake the procurement of supply and conservation resources, and to recover fees for these actions from electricity ratepayers).

In contrast, the government does not have direct regulatory authority over fuels such as oil, propane and petroleum products. Therefore, its influence on the behaviour of these fuel suppliers is by necessity more indirect. It exerts influence through such means as environmental and fiscal policy, financial incentives, provision of information, etc.

As noted, however, electricity represents a relatively smaller share of Ontario's total energy consumption. Without action taken on other fuels, the full benefits associated with comprehensive action on energy conservation will not be realized.

4.3 Towards an Energy Conservation Strategy for Ontario

The ECO believes that the Ontario government's approach to energy conservation policy and planning has, to date, been largely uncoordinated. It has been hindered by the lack of both a clear definition of conservation and an explanation of the goals to be achieved through energy conservation. This reduces the effectiveness of energy conservation efforts. In addition, it makes it difficult for the ECO to fulfill its reporting mandate to measure progress in reducing energy use.

The task of integrating activities by several ministries is critical to the strategy's comprehensiveness. Co-ordination and monitoring through a central body within government may be preferable to a single ministry leading development of the strategy. Integrating the policies and activities of all ministries into an overall provincial energy conservation strategy would enable the province to set out long-term objectives based on an understanding of the complexities – like the need to coordinate multiple actors – of achieving them.

Development of the strategy should be participatory, including posting it on the Environmental Registry, to allow the strategy to benefit from the participation of Ontarians.

The ECO recommends that the Secretary of Cabinet direct the development of a comprehensive energy conservation strategy encompassing all major energy sources used in Ontario. The strategy should be developed with public input.

To address the weaknesses that currently exist in the government's approach to energy conservation – the lack of co-ordination, articulated goals and integration of energy sources – the ECO believes that the strategy should include, at a minimum, the following elements:

- A description of the government's broader objectives to be achieved through energy conservation, potentially including environmental benefits, economic savings, energy security and societal resilience.
- A description of how different categories of conservation action, listed in Figure 3, contribute to the strategy.
- Comprehensive coverage of all energy sources.
- The role of benchmarking and energy conservation targets in the strategy (our report discusses these in more detail in Section 5.6).
- A mechanism for co-ordinating the strategy, both across Ontario government ministries and between the government and other sectors of society.
- An understanding of how the energy conservation strategy relates to the government's Climate Change Action Plan.
- Resource optimization or a "smart" energy strategy that uses each fuel in its most appropriate application(s). Optimization also pursues conservation so as to achieve high amounts of savings that will endure and does not simply seek the cheapest available conservation measures.
- A "loading order" requirement that places pursuit of all cost-effective conservation actions as the first priority for policy makers, planners and regulators before they consider supply options.[11]

5 Policy Framework Issues

The government's policy approach for each of the energy sources specified in the ECO's conservation reporting mandate is discussed below.

5.1 Electricity Conservation and Demand Management (CDM)

Ontario's electricity conservation policy has undergone continual substantive change over the past 20 years Government policy that incorporates conservation and integrated demand-supply planning, by those responsible for operating the electrical grid and acquiring generation capacity, has been a central feature of electricity policy for many decades. The period roughly spanning 1998-2003 departed from this approach. In those years, Ontario embarked on a policy to restructure its electricity system.

It introduced a competitive market for electricity supply and restructured the electricity corporations that generated, transmitted and distributed power. In terms of conservation, the restructuring essentially treated it as an activity that would naturally emerge from operation of the competitive market once consumers responded to price signals.[12] The competitive market was effectively ended in late 2002, when the government moved to protect consumers from price swings that naturally occurred in a competitive market.

In December 2004, the *Electricity Restructuring Act* was passed. The act gave Ontario its current regulatory framework with new electricity agencies and expanded regulation of the sector. The legislative reforms reinstituted the earlier approach begun in the 1980s: an integrated demand-supply plan is developed, and conservation is actively pursued through programs to transform the market to one of greater efficiency. The long-term objective is to build a culture of conservation, and enhance Ontario's conservation industry capabilities so that ratepayer or taxpayer-funded initiatives will no longer be necessary. Further changes, however, were introduced in 2009 through the *GEGEA*, and the policy remains in flux. Substantial changes contained in the *GEGEA* are expected to be implemented in 2010, through supporting regulations and directives.

The Importance of the Integrated Power System Plan (IPSP)

The only insight on the government's policy for electricity conservation that currently exists is contained in a proposed document called the Integrated Power System Plan (IPSP) that dates from mid-2006. This is a proposed 20-year plan that describes the role which conservation will play as Ontario responds to its electricity needs during the two-decade planning horizon covered by the IPSP.

The IPSP was developed by the OPA. In addition to its responsibility for the proposed IPSP, at present the OPA is solely responsible for implementing most of Ontario's electricity conservation programs: designing, approving, delivering and evaluating resource acquisition programs.[13]

The IPSP is a critically important document because it contains a central feature of Ontario's electricity conservation policy: government-established targets that set the specific amounts of electricity reductions to be achieved in certain years. As required by legislation (the *Electricity Act*, *1998*), the IPSP must set out short and long-term conservation targets, and the Plan must be reviewed every three years.

Conservation Goals of the IPSP

In its June 13, 2006 directive to the OPA[14], the government stipulated that the IPSP should reduce peak demand by 6,300 megawatts (MW) by 2025 through conservation, with interim demand reduction targets of 1,350 MW by 2007, and an additional 1,350 MW by 2010.

The directive defined conservation broadly to include energy efficiency standards, geothermal heating and cooling, solar heating, fuel switching, and small-scale (10 MW or less) customer-based electricity generation, including co-generation.

In September 2008, the government issued revised direction to the OPA, including a request to review the viability of accelerating the achievement of the original conservation targets.

Preparation of the proposed IPSP began in 2006. The OEB – Ontario's regulator of the energy sector whose duties include approval of the IPSP – began its review of the Plan in 2007. Most recently, approval of the proposed IPSP has moved haltingly; changes to the Plan, requested of the OPA by the Minister of Energy and Infrastructure in September 2008, have been delayed. The OPA was to provide a revised IPSP to the OEB for approval by March 2009. As of May 2010, the revised IPSP had still not been made publicly available. Having no Plan to consider and pending receipt of a revised Plan and targets, the OEB suspended its review.

Minister's Directive Power – Does it Support or Supplant the IPSP?

The *Electricity Act* and the *Ontario Energy Board Act*, which govern the electricity sector, empower the Minister of Energy and Infrastructure to issue a policy instrument known as a directive. The directive power is the method by which the minister guides conservation policy.

The minister has so far used this power in two ways. First, to require the OPA to develop an IPSP that meets specific goals (these are known as *Supply Mix Directives* and require Cabinet approval). Second, to request that specific conservation activities be undertaken (this second set of directives are known as *Transition Directives* and are issued by the minister without the need for Cabinet approval).

Transition directives have been used fairly extensively by the minister to guide conservation activity. During 2006-09, while the proposed IPSP was under development and awaiting OEB approval, the minister issued several transition directives to the OPA to encourage immediate conservation and avoid lost opportunities.

It is important to note that the *Electricity Act,* which governed the use of transition directives before passage of the *GEGEA*, originally assigned the minister this authority only until the IPSP was approved, at which point the minister was to relinquish the directive authority and the IPSP would guide implementation of conservation. The directive power has been a powerful policy tool shaping conservation in Ontario and may play an even more prominent role in future because of regulatory framework changes brought by the *GEGEA*.

The GEGEA Will Bring Changes to the Minister's Directive Power

Pursuant to the *GEGEA*, the minister will assume stronger control over the OEB and OPA in relation to electricity conservation through directive powers. The exercise of this control will make consideration of the transparency, accountability and oversight of ministerial directives even more critical.

For conservation program delivery and implementation of smart grid initiatives, [15] the *GEGEA* enables the minister to issue policy directives to the OEB. The Board will require Local Distribution Companies (LDCs) to undertake action to comply with their license conditions, and the Board will also monitor LDC progress. To support these responsibilities, the OEB is given new objectives to promote renewable energy, conservation and demand management, and to facilitate the implementation of a smart grid. This is a significant change from the OEB's traditional role as an economic regulator protecting the economic interests of ratepayers, and it remains to be seen how the changes will affect the Board's role.[16]

The *GEGEA* enables the minister to direct the OPA to undertake any action related to electricity conservation, demand reduction, or renewable energy. As noted above, this directive power had previously existed in legislation, but was intended to be transitional in nature, effective until the Integrated Power System Plan was in place. The new directive provision in the *GEGEA* does not have a sunset provision, enabling the minister to continue influencing conservation policy direction. This legislative change raises the issue of whether the proposed IPSP remains relevant and the extent of its influence on conservation.

Public Input on Electricity Policy and Direction

During 2005-2010, the minister's directive power has been the *only* policy-setting mechanism available. Electricity planning policy and almost all programs were developed through the directive power. This is problematic since directives have largely supplanted the government's original policy approach; it had intended to create an arm's length, publicly-reviewed planning process when the *Electricity Restructuring Act* was passed in 2004 [17] to create the OPA, assigning it the function of developing the IPSP.

The extensive use of the directive power to make policy has reduced the opportunity for public input into electricity policy. It has also created a vacuum in accountability and oversight of the OPA's actions in response to directives. Little discussion of either the government's direction to its electricity planning agency or the agency's response has occurred in the public domain.

As a prescribed ministry under the *EBR*, the Ministry of Energy and Infrastructure is legally required to post proposed policies (including "programs, plans or objectives" that could have a significant effect on the environment) on the Environmental Registry for public review and comment.

To date, however, the Minister of Energy and Infrastructure has not sought public input through the Environmental Registry on any directives to the OPA, with the exception of the first Supply Mix Directive. Even for this directive, the public was only allowed to comment, through the Registry, on the OPA's supply mix advice to the government and not on the substance of the actual directive (which specified the goals to be achieved by the IPSP). The ECO noted this in our 2006/2007 Annual Report . The second Supply Mix Directive that amended the first supply directive was not posted on the Environmental Registry.

Debate over the goals of the IPSP could have occurred during an Environmental Assessment (EA), but there was no public review because the government exempted the IPSP from an EA. The IPSP has only been subject to review by the OEB. However, the OEB is constrained by legislation[18] to only ensure that the IPSP complies with direction issued by the minister, rather than asking the broader question of whether the direction itself is appropriate.

In hindsight, the ECO believes that the government's decision to avoid a public review of the goals to be achieved by the IPSP was wrong. Clearly, the Minister of Energy and Infrastructure decided in 2008 that the proposed IPSP was inadequate – a flawed document with respect to targets – since the minister requested a review of whether conservation targets could be accelerated and other changes. Public review of the goals to be achieved through the IPSP might well have raised these and other germane issues.

Conservation policy has been made through directives in a closed and seemingly *ad hoc* fashion. Directives with clear environmental significance – like transition directives to procure conservation, electricity from waste, and renewable energy – were not posted for comment on the Environmental Registry. This is particularly troubling for conservation-related directives. Many of these have directed the OPA to procure significant amounts of conservation from specific sectors or initiatives without providing an explanation as to why this is a desirable means of achieving electricity conservation. Such decisions would have benefitted from an informed public discussion.

In future, the ministry should carefully review any new proposed directives to determine whether they are subject to MEI's statutory responsibility to post for advance notice on the Environmental Registry. This would enhance the ability of Ontario residents and interested stakeholders – including community and public interest groups, industry associations, businesses, and others – to participate in the development of ministerial directives.

The ECO recommends that the Ministry of Energy and Infrastructure provide an opportunity for public input in the development of policy directives to electricity sector institutions, as required by the *Environmental Bill of Rights, 1993*.

Possible Accountability Mechanisms

In addition to reducing opportunities for public participation in the development of energy policy, the extensive use of transition directives to guide conservation action has removed accountability for ensuring implementation of the desired action.

There are several instances where action on a directive has languished and the stipulated electricity savings have not been achieved. This has occurred despite the fact that the OPA has wide latitude to hire staff and contract for services to respond to directives and ensure conservation receives prompt attention.

The Directives that were Issued

From 2005-09, energy ministers issued a total of 35 directives to the OPA: 15 of these directives were conservation-related. The others instructed the OPA to procure renewable and conventional electricity generation.

Two of the 15 conservation-related directives were Supply Mix Directives for the IPSP. The first Supply Mix Directive instructed the OPA to create the IPSP; the second Supply Mix Directive amended the first. In the second directive, the

minister essentially requested the IPSP be revised to accelerate the timelines for the conservation targets it contained.

Thirteen of the 15 conservation-related directives were transition directives that instructed or enabled the OPA to provide conservation activities. In six [19] of these 13 transition directives, the minister stipulated the conservation savings expected (in megawatts). [20]

Those transition directives that did not request specific programs with associated MW savings requested other OPA action. For example, the OPA was directed to undertake mass media advertising for conservation. These were advertising campaigns developed by the ministry for which the OPA was instructed to assume responsibility and purchase media space. This enabled the government to discretely place funding responsibility on ratepayers rather than taxpayers. Other directives of this group amended or clarified previously-issued transition directives.

The OPA Response to the Directives and Results Achieved

The OPA responded to the first Supply Mix Directive as requested and provided an IPSP to meet the government-established conservation target of 6,300 MW. The process to approve the IPSP was started by the OEB, but suspended when the second Supply Mix Directive was issued. It is not known whether the OPA responded to this second directive. Neither the OPA nor the minister has publicly provided information on the status of completion of the second Supply Mix Directive.

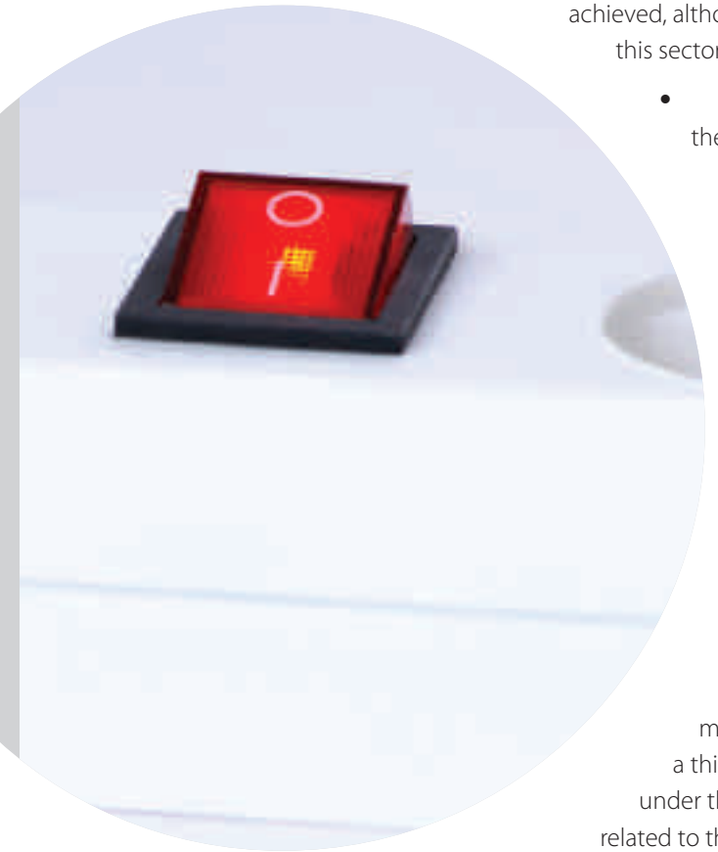
The state of implementation of the transition directives varies and progress on completion is information that is not publicly available. There has been no public scrutiny of the OPA's response to government direction.

Pursuant to its new reporting mandate, using our authority to request information, the ECO sought information on the status of the directives. According to OPA-supplied information, the ECO believes that achievement of the directives and, by extension, government policy has been mixed and in some cases underwhelming.

These directives were issued several years ago in 2005 and 2006. With one exception, the directives that specified programs with attached savings have achieved only part of the specified amounts. In some cases, no verified savings at all are reported.

The OPA advised the ECO of the status, as of the end of 2008, for the six transition directives that specified an associated megawatt amount of conservation.

- June 2005 *Demand Management Directive* – OPA was instructed to acquire "more than 250 MW" of DR/DSM. In February 2006, an addendum to the original directive re-defined "more than 250 MW" to mean "up to 500 MW". The OPA stated it acquired 554 MW, even though a cap of 500 MW appears to have been set by the minister.
- October 2005 *Low-Income Directive* – 3 MW of the 100 MW of savings for low-income and social housing has been



achieved, although the ministry has equivocated between assigning responsibility for this sector to the OPA and undertaking the initiative itself.

- October 2005 *Efficient Lighting and Appliances Directive* – 63 MW of the 100 MW from efficient lighting and appliances has been achieved.
- February 2006 *Toronto Demand Management Directive* – 141 MW of the 300 MW from conservation in the Toronto region has been achieved.
- March 2006 *Residential and Electrically-Heated Homes Directive* – 0 MW of the 150 MW from conservation in the residential sector and electrically-heated homes has been achieved.
- March 2006 *Commercial Buildings and MUSH Directive* – 0 MW of the150 MW from conservation in commercial buildings and the MUSH sector (municipalities, universities/colleges, schools, hospitals) has been achieved.

The minister has not enforced compliance where the OPA has not completed or made progress on transition directives within a reasonable timeframe. There appears to be no specific mechanism for the minister to enforce directives. In addition, there is a very low likelihood that a third party would succeed in appealing to the courts for a judicial review under the *Judicial Review Procedures Act* or obtaining other statutory relief related to the OPA's lack of compliance with a directive.

In practice, the minister's compliance tool is to place pressure on the OPA Board of Directors, which is appointed by the government. It is left to the minister's judgement to determine whether to use this tool.

The ECO believes that there are important gaps in transparency and accountability in the current OPA response to directives. To enhance transparency, the Minister of Energy and Infrastructure should require the OPA to make publicly available an annual status update on the progress in achieving ministerial directives. The status update could be a necessary condition for approval of the OPA's Annual Business Plan; ministerial approval of the business plan, as it currently operates, is not an effective accountability mechanism for the OPA's response to directives.[21]

The use of directives (in place of the IPSP while awaiting revision to the Plan) has also circumvented oversight that would have been provided by the OEB during its hearings to approve the IPSP. OEB hearings are a public forum to receive public input. Approval of the IPSP would have, thereby, provided Ontario with an official electricity conservation plan that had been discussed in the public domain. *The Electricity Act* requires the OEB to review the proposed IPSP for compliance with any directions issued by the minister and assure that it is economically prudent and cost-effective. The OPA's actions in response to the minister's transition directives, however, are not subject to OEB review, even though these actions involve substantial spending funded through provincial electricity ratepayers.

The ECO believes that the government should consider enhancing the OEB's role in oversight of the OPA's conservation actions developed in response to minister's directives. The *GEGEA* amendments to the *Ontario Energy Board Act (OEBA)* give responsibility to the OEB for setting conservation targets for Local Distribution Companies (LDCs), upon receipt of a ministerial directive instructing the OEB to assign LDC targets. As part of this function, the OEB will review LDCs' Conservation and

Demand Management (CDM) plans and results. A similar responsibility requiring an annual CDM plan from the OPA for review by the OEB should be implemented.

With passage of the *GEGEA*, the OEB's role is changing from an economic regulator to a regulatory authority that also promotes "green energy" (i.e., conservation and electricity generated from renewable sources). Review of an OPA CDM plan would create symmetry, aligning OEB oversight of OPA's activities with its oversight of the LDCs. This oversight is needed if the minister's directive power related to conservation planning increasingly supplants the IPSP.

The ECO recommends that the Ministry of Energy and Infrastructure develop a reporting mechanism to track progress on directives which ensures accountability and transparency.

Delivery of Electricity Conservation Programs – Will LDC or OPA Programs Dominate? Who is Accountable?

The role of Local Distribution Companies in delivering electricity conservation programs has varied in recent years.

From 2005 through 2007, individual LDCs were allowed to develop their own conservation programs and recover funds through distribution rates in a process overseen by the OEB.

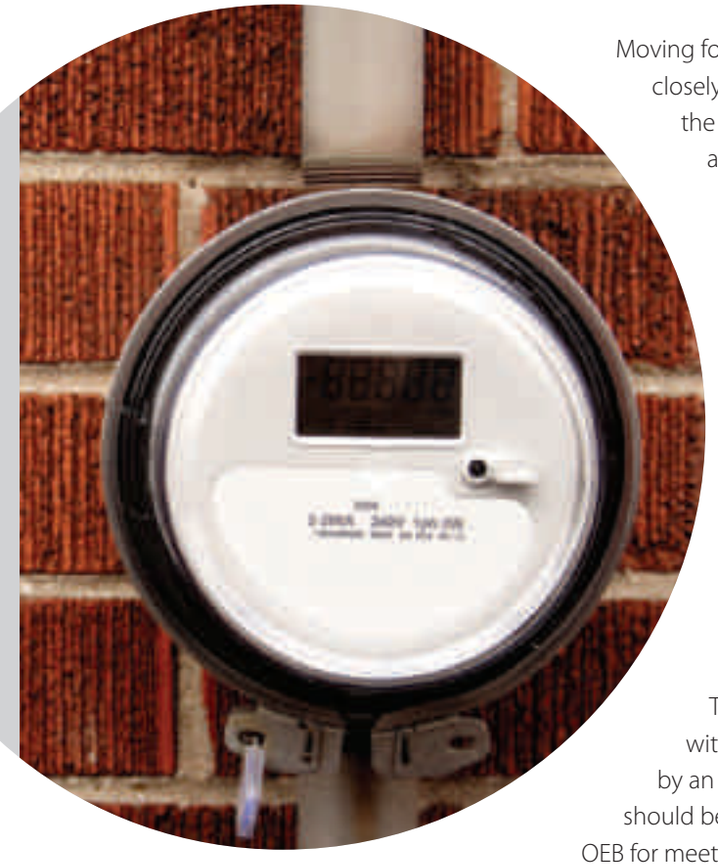
Direction in 2006 from the-then Minister of Energy chose not to extend this funding model, but instead made the newly created OPA responsible for co-ordinating the delivery and funding of conservation programs by LDCs, and provided $400 million over three years to fund such programs. [22] Under this framework, LDCs were able to access funding to deliver "province-wide programs" developed by the OPA (e.g., the residential refrigerator removal program), and could also apply to the OPA for funding of custom-designed programs. The OEB plays no role in this process.

With the passage of the *GEGEA* in 2009, the role of LDCs is changing again.

The *GEGEA* enables the Minister of Energy and Infrastructure, with Cabinet approval, to issue a directive to the OEB requiring it to set conservation targets for LDCs [23] as a mandatory licence condition. The minister's directive power also enables the OEB to specify as a licence condition of LDCs that they publicly report their conservation results. It is expected that the directive will: recognize the need for approved program budgets to meet the target; establish mechanisms to compensate LDCs for reduced electricity sales and lower revenues resulting from conservation; provide incentive mechanisms; and, require verification of savings to meet targets.

With OEB approval, LDCs will be able to deliver programs themselves, jointly with other LDCs or in partnership with the OPA. The original policy intent of this directive power was to encourage innovation by enhancing LDCs' ability to develop custom programs. The extent to which this intent is fulfilled will depend on the terms of the directive, which could either expand or restrict the role of LDCs, depending on its application.

With the LDC target directive, accountability should be enhanced and LDC compliance will be strengthened through the OEB's authority to enforce licence conditions, especially if the OEB is permitted to suspend a non-complying LDC's licence. Depending upon the directive's wording and whether it will require public consultation, it may be possible for third parties to press the OEB to enforce LDC conservation targets. Environmental and other public interest groups routinely participate in OEB proceedings and can file a motion seeking an order from the Board, for example, where an LDC does not meet a licence condition.



Moving forward with the directive, the ECO believes that it will be necessary to closely monitor the division of responsibility for program delivery between the OPA and LDCs, and to assign accountability for performance to the appropriate organization. The OEB currently has limited authority over the OPA, in contrast to its ability to assure LDC compliance with established targets.

The directive is expected to implement a regulatory framework that creates three tiers of conservation programs. Tier 1 programs will be developed by the OPA for delivery by LDCs in meeting their targets. It is unclear who – the OPA or LDCs – will be responsible for meeting the expected savings associated with these programs. Accountability may lie with the OPA through its contractual control of the LDC, and the directive may place responsibility to encourage and enforce program delivery on the OPA. [24] The accountability mechanism for Tier 1 program delivery is problematic, since the OEB has limited authority over the OPA.

Tier 2 programs are jointly designed and delivered by two or more LDCs with no OPA involvement. Tier 3 programs are solely designed and delivered by an LDC with no other LDC or OPA involvement. Accountability in these cases should be clearer. In Tier 2 and 3 cases, LDCs will presumably be accountable to the OEB for meeting the savings expected from these programs.

Stability and Policy Certainty is Needed

The introduction of the *GEGEA*, and the direction of the Minister of Energy and Infrastructure to the OPA to revisit the IPSP, has changed the rules of the game for energy conservation. However, the ECO believes that it is premature to decide whether the *GEGEA* will have a positive influence on electricity conservation .

It is important to know whether the IPSP conservation targets will be changed, what the expected savings from the various categories of conservation will be, and how central a role the IPSP will play in guiding conservation activity.

Experience to date suggests that a revised IPSP will recognize that ministerial directives and procurement through a feed-in-tariff (FIT) [25] have, to a considerable degree, replaced OPA planning through the IPSP process. It is essential to know the role that the revised Plan will play in electricity conservation. It may no longer be the definitive plan for supply and conservation as it was when first developed. It may serve more as a roadmap proposing scenarios and possible initiatives to which the OPA, OEB and LDCs could respond through mandates set out in ministerial directives.

The introduction of the *GEGEA* has added another layer of uncertainty. As discussed further in Section 5.5, the *GEGEA* is enabling legislation that requires further action by the Ministry of Energy and Infrastructure through regulations and directives to set the rules by which conservation players will operate. Until these rules are in place, action on conservation is stalled.

Once the position of the IPSP is clarified and the *GEGEA* rules are in place, time will show whether the revised framework is delivering results in line with the government's original vision. The *GEGEA* intends that electricity distributors be more centrally involved in delivering conservation programs, thus creating an environment where dozens of distributors can be innovative with programs. A period of stability would facilitate this and enable LDCs to monitor performance and then adjust programs accordingly. It is also necessary to monitor the means of oversight established by the *GEGEA*, so that its effectiveness can be assessed.

The ECO recommends that the Ministry of Energy and Infrastructure move quickly to clarify the role of the Integrated Power System Plan and to finalize the key conservation regulations and directives under the *Green Energy and Green Economy Act, 2009*.

The ECO recommends that the Ministry of Energy and Infrastructure commit to a period of policy stability to allow for implementation and evaluation of the *Green Energy and Green Economy Act, 2009*.

5.1.1 Smart Meters and Time-of-Use Prices

For the past few years, utility crews have been going house-to-house and business-to-business installing new meters on customers' properties. At the same time, regulators have been occupied devising a new electricity price structure. Ontario is embarking on one of the largest and most comprehensive electricity metering projects in the world.

Advanced metering infrastructure – or more commonly "smart meters" – are electricity meters that record the amount of a consumer's electricity consumption and the time it is consumed. Smart metering is a means to an end, not a conservation action in itself. It provides the necessary data that allows LDCs to implement time-of-use (TOU) pricing. TOU prices will be phased in by electricity distributors and monitored by the OEB over the next few years.

There are three key activities that an LDC must complete: (1) install the meters; (2) enrol their meters in the Meter Data Management/Repository (a service provider that collects the hourly consumption data from LDCs); and (3) activate TOU pricing for their customers.

Time-of-Use Rates – A Bold or Measured Step for Electricity Pricing?

Traditionally, the moment-to-moment management of the electricity system to balance supply and demand has been accomplished by adjusting the amount of power that generating stations supply to the electrical grid when demand for power rises. There is a growing interest in placing more emphasis on demand response solutions for balancing supply-demand.

Electricity demand is not constant over the course of a day. Typically, demand begins to climb in the early morning. The daily period of high demand in Ontario is roughly from 7:00 a.m. to 9:00 p.m. The moment when daily demand actually peaks, or reaches its highest point, differs between summer and winter.

In winter, during weekdays Monday-to-Friday, there are generally two peak times: demand peaks mid-morning around 10:30 a.m. and again at the dinner hour around 6:00 p.m. In summer months, because of the power demands of air conditioners,

consumption typically begins to increase noticeably around 8:00 a.m., increases all day long and peaks in the late afternoon. Throughout the year, daily demand declines noticeably around 8:00 p.m. and rapidly declines after 11:00 p.m.

Time-of-use (TOU) rates vary the price of electricity over the course of a day. Prices rise and fall to mimic changes in demand. TOU prices better reflect the real costs to purchase electricity supply – at peak periods, electricity must often be supplied from more costly sources, such as gas-fired generation and imports from the United States or neighbouring provinces.

TOU rates provide price signals to consumers that can encourage conservation, or in electricity planner parlance: load shifting and load reduction.

It is believed that TOU rates will encourage load shifting (i.e., shifting of electricity use from peak to off-peak hours), thus reducing peak demand and the amount of generation supplied. In contrast, load reduction is an overall reduction in electricity use. The amount of load reduction achieved through TOU rates may not be significant.

Nonetheless, load shifting is an important type of conservation. Network infrastructure (i.e., generating stations, transmission and distribution lines) is built to meet the highest expected peak demand on the system, despite the fact that the infrastructure capacity may only be used infrequently to meet peak demand. Consumers pay for this capacity and, of course, there are environmental effects from generating stations and power lines.

In 2004, the government established targets that 800,000 smart meters would be installed by the end of 2007, and all Ontario households and businesses (some 4.5 million electricity accounts) would have a smart meter installed by the end of 2010.

In mid-2009, the government announced targets for implementation of TOU pricing for customers that are billed under the current pricing regime (called the Regulated Price Plan). One million consumers are to receive TOU prices by June 2010 and 3.6 million by June 2011.

LDCs are required to file a plan with the OEB that serves as a baseline to measure progress and to report quarterly on their progress against this baseline.

The most recent progress report shows that at the end of 2009, some 3.4 million smart meters were installed. This represents more than 100 per cent of the projected amount for 2009 contained in the baseline plan, and LDCs are comfortably positioned to meet the 2010 meter installation target. Some 347,000 customers were paying for their electricity based on TOU pricing. This represents almost twice the projected 2009 amount contained in the baseline plan.

The 347,000 consumers paying TOU prices are customers served by nine LDCs in Ontario. The overwhelming majority of LDCs are not yet billing on a TOU basis. Toronto Hydro accounts for almost 80 per cent of the 347,000 consumers currently paying TOU rates. As of May 2010, results of the impact on conservation and load shifting were not available. Several LDCs ran pilot projects from 2006-08 and results showed variously that there were declines in consumption for on-peak, mid-peak and critical peak periods.

The ECO intends to monitor the results of this pricing policy for inclusion in future reports to determine the impacts on demand response and, if necessary, suggest policy refinements.

Future reports may address the following issues.

- Confirmation that there are changes in electricity consumption patterns and an indication of the degree of peak period demand response achieved.
- An analysis of the adequacy of the differential between peak, mid-peak and off-peak prices in influencing demand response.
- The amount of the load reduction as opposed to load shifting achieved with TOU rates, particularly for households.
- An assessment of whether additional pricing policies like critical peak pricing (CPP) [26] would help reduce demand during days of expected exceptionally high demand, and how to implement CPP.
- An assessment of whether smart meters will contribute the amount of peak reduction (575 MW) that the OPA projects will be contributed to the IPSP 2025 conservation target.
- The adequacy of consumer education provided to encourage customer acceptance of TOU pricing.
- The need for additional technologies – equipment like in-home displays that show consumption in real time or electricity storage – that can enhance the smart grid.
- The extent to which LDCs are using the information they gather from their customers' use of electricity to design new conservation programs and refine existing initiatives to enhance their customers' conservation activity.

The ECO believes that an important gap exists in the smart meter-TOU rate policy that should be addressed immediately. Customers who contract with an energy retailer for their electricity supply (approximately 15 per cent of residential consumers [27]) do not participate in TOU rates. These consumers pay the fixed price set out in their retail contract and have no incentive to conserve electricity during peak periods.

Bill 235, the *Energy Consumer Protection Act*, introduced in December 2009 (and which at the time of writing our report had not been passed by the Legislature), would allow the government to address this gap. The bill recognizes that current retail contracts do not offer products promoting energy conservation, and enables the government to require that time-of-use "products" are made available to consumers. [28] The ECO will report on Bill 235, which also has other elements relevant to energy conservation, in a future report.

5.2 Natural Gas Demand-Side Management (DSM)

Union Gas and Enbridge Gas Distribution – the two companies that distribute almost all of the natural gas consumed in Ontario – have been required to create Demand-Side Management (DSM) plans and obtain OEB approval of their DSM plans since the mid-1990s. These plans set out programs that will be delivered, their delivery cost and the natural gas savings expected by the distributor.

As with the electricity sector, the policy framework that governs conservation of natural gas in Ontario is in transition. The

original regulatory framework governing natural gas DSM was established by the OEB in 1993 and governed utilities activities, remaining largely unchanged until 2006 when the OEB reviewed several important issues. [29] In late 2008, the OEB signalled that it would begin a consultation process to review the current rules governing gas DSM. [30]

The purpose of the consultation is to produce new guidelines that build upon the existing regulatory framework set out in the early 1990s and further developed in 2006. Depending on the OEB's decision, the review has the potential to reflect an evolutionary approach that emphasizes the traditional regulatory approach or a more enhanced ambitious approach to pursue energy efficiency and environmental protection. [31] The ECO will monitor the Board's decision for inclusion in a future report.

The revised regulatory framework was to be used by Enbridge and Union to file their next DSM plans for activities that would begin in 2010. In April 2009, the OEB informed Enbridge and Union that the *GEGEA* might impact the regulatory framework of natural gas DSM and the treatment of gas conservation programs. Consequently, the Board directed the distributors to file one-year DSM plans for 2010 by May 2009 using the existing current DSM framework. In January 2010, the OEB extended the one-year extension for a further year directing distributors to again file one-year plans for 2011 using existing regulatory rules until government policy issues were settled and the review of the DSM framework could be completed.

In the meantime, the OEB advised, it would contract for expert advice to conduct a review of best practice DSM frameworks in other jurisdictions, as well as undertake a study of alternative methods to estimate conservation program impacts.

From the ECO's perspective, two key points emerge from the current reform of gas sector conservation.

First, regulation of gas conservation was neglected because the OEB stopped the review of the gas framework and requested one-year plans from distributors, while awaiting government policy direction on electricity. Gas is the primary heating fuel in Ontario. The potential savings on consumers' bills and emissions reductions from reduced consumption is large – possibly more than savings from electricity. Regulation of natural gas and electricity conservation are increasingly inter-related and this is further reason for the need for stability in the electricity sector.

Second, the delay was used productively to acquire research studies. The ECO commendably notes that one of the studies, a comparative jurisdictional review of best practices for natural gas DSM regulation, includes an examination of changes to the benefit-cost approach for screening potential DSM programs. The study, which is not OEB policy, advises that design of DSM frameworks is increasingly dependent on regulators' response to climate change and carbon emissions. It suggests that an aggressive stance on climate change may justify a different DSM framework and recommends Ontario adopt a benefit-cost test that includes environmental externalities, noting that the Societal Cost test has advantages given provincial policy objectives regarding conservation and climate change. It also recommends coordinating with MEI to establish a value for carbon emissions.

The ECO believes the need has developed to integrate Ontario's recent legislation for greenhouse gas (GHG) emissions trading – which contains market-based policy approaches to monetize environmental externalities through mechanisms like cap and trade – with energy conservation policy. Approaches like the use of carbon taxes have been broached in other provinces, for example, British Columbia and Quebec. Also, Quebec's Energy Efficiency Agency uses a Societal Cost Test that internalizes environmental externalities. A recent report indicates how this test could be used in Ontario and offers other methods to account for these costs. [32]

The ECO urges the OEB to incorporate the effect of greenhouse gas emissions and other environmental externalities in the DSM regulatory framework because the government passed the *Environmental Protection Amendment Act* (*Greenhouse Gas Emissions Trading*) in December 2009 to enable use of financial instruments and market-based approaches for GHG emissions. One of the government's stated objectives with the act is to establish a reliable "price-on-carbon" signal. This is an acceptance in principle that carbon emissions should be monetized. The ECO believes this approach to accounting for environmental effects of energy should be reflected in the regulatory framework: its impact on screening programs and conservation targets in the natural gas DSM and electricity CDM policy.

5.3 Oil and Propane Conservation

Propane and heating oil serve similar end uses. In the residential sector, they are used primarily for space and water heating (including pool heating). In the industrial and agricultural sectors, they are used primarily for process heating. For both oil and propane, the commercial/institutional sector is the largest consumer of these fuels. Propane or heating oil is often the heating fuel of choice in rural or remote areas that are not connected to the natural gas distribution system. In recent years, there has been a shift away from heating oil to propane as the price of oil has increased.

In electricity and natural gas conservation, the regulatory framework gives fuel suppliers (i.e., distributors) a vital role in delivering conservation programs. For propane and heating oil, this has not been the case for several reasons. First, the cost associated with distributing propane and oil is not regulated by the province. It is, therefore, more difficult to encourage fuel suppliers to provide conservation. Without such incentives, fuel suppliers are unlikely to promote conservation, as it can cut into their profits by reducing consumption. Second, the fuel delivery market is more fragmented for oil and propane, with many small suppliers. Finally, the propane industry in particular has been pre-occupied with safety regulation since the 2008 Sunrise Propane explosion.

The government is supporting conservation of oil and propane to some degree. The Ministry of Energy and Infrastructure delivers programs that conserve oil and propane use in the residential and commercial/institutional sectors. However, the design of these programs is largely driven by an approach that simply matches federal programs.

The *Green Energy Act (GEA)* enables the setting of minimum efficiency standards for oil and propane-using appliances, such as furnaces, boilers, and water heaters. However, as noted in Section 5.5 of our report, no updates to standards have been passed since 2006.

The federal government has encouraged industrial conservation through the Canadian Industry Program for Energy Conservation (CIPEC), a joint Natural Resources Canada-industry program. CIPEC is designed to improve energy efficiency across business sectors through benchmarking and efficiency improvements. Heating and equipment contractors have also taken some steps to address energy conservation through programs that can reduce consumption of propane and oil. Industry associations, such as mining and cement companies, also encourage conservation among their members.

Despite the initiatives described above, overall there has been less attention paid to energy efficiency for oil and propane

compared to the natural gas and electricity sectors. The lack of an organization examining conservation on a province-wide scale, such as the Ontario Power Authority or the two large gas utilities, may mean that opportunities are being missed.

To enhance conservation of oil and propane, the ECO believes that the Ontario government should determine where the greatest opportunities for conservation of these fuels reside – perhaps the commercial and institutional sectors – and determine if special approaches are needed for unique captive customers like rural markets. These are tactics that should be addressed in the energy conservation strategy (recommended by the ECO in Section 4.3 of this report). The strategy should examine, at a minimum, the following elements related to the conservation of oil and propane.

- Identification of the preferred agent(s) to encourage conservation (for example, suppliers, associations, contractors or other delivery agents).
- The incentive structure that may be needed to overcome the erosion of supplier profits due to reduced fuel consumption.
- The mechanism to implement incentives, if feasible, for non-regulated fuels like oil and propane. If feasible, a policy statement of how the public interest is supported (i.e., how the benefits of conserving oil and propane are socialized and a public benefit is realized).
- How program results will be tracked and energy savings measured.
- Whether special incentives are desirable to address the dependence of rural and remote communities on oil and propane.

5.4 Transportation Fuels Conservation

Transportation accounts for the highest demand for energy in Ontario. Passenger transportation energy is primarily met through one fuel – gasoline – and freight transportation is dominated by the use of diesel fuel. In 2007, transportation fuels accounted for 36 per cent or 953 PJ of total energy demand in Ontario. The large and growing consumption of petroleum-based transportation fuels is unsustainable and has a significant impact on the environment, affecting air quality and GHG emissions.

Ontario does not have energy reduction targets for the conservation of transportation fuels. However, GHG reduction targets are contained in *Go Green: Ontario's Action Plan on Climate Change*. Ontario's transportation energy policy, to date, has emphasized fuel switching. This may explain why substitution of lower carbon and alternative transportation fuels (like electric vehicles) plays a prominent role in Ontario's transportation energy initiatives.

The largest reduction in transportation energy use is expected to come from federal regulation of fuel efficiency standards in new passenger vehicles and light trucks. [33] Current provincial government efforts focus on three areas: fuel switching, fleet efficiency and transit funding.

The government has continued tax rebates for alternative fuel vehicles, implemented in the 1980s and 1990s (the Ministry of Revenue indicates that the rebate will end on June 30, 2010 with the introduction of the Harmonized Sales Tax (HST)). The recent announcement of additional rebates for the purchase of electric vehicles builds upon the policy of the 1980s and 1990s.

Also, the Ontario Budget 2010 announced that funding for the Ontario Bus Replacement Program (a program which provides funding for municipalities to replace conventional and specialized transit buses with new lower fuel consumption and lower emission vehicles) would be sunsetted, and there would be delays funding Ontario government buildings and transit expansion.

The government has also encouraged fleet efficiency by regulation. For example, in 2009 it introduced initiatives like speed limiters for large trucks, increasing axle weight allowances to accommodate single wide tires for transport trucks, and allowing rear-of-trailer aerodynamic fairings to reduce fuel consumption. The government has also provided incentives to improve fleet efficiency. For example, the four-year $2.9 million Green Commercial Vehicle program offers grants for anti-idling technologies and other devices.

Some initiatives aimed at transportation demand management (TDM), fleet efficiency and fuel substitution in passenger cars are in place. [34] These are a modest continuation of Ministry of Transportation (MTO) programs – like TruckSave, DriveSave and clean fuel transit vehicles – from the 1980s-1990s.

The government continues to fund transit through mechanisms, such as the Gas Tax Funding. Metrolinx developed and adopted a regional transportation policy for the greater Toronto and Hamilton Area with municipal and other partners. The plan requires significant capital funding. The Province reduced operating funding to municipal authorities in the mid-1990s, although Gas Tax Program funding can be used for certain operating expenditures by municipalities.

The ECO believes that the policy and program initiatives to conserve energy in the transportation sector do not adequately address current levels of transportation fuel consumption and its expected growth. The rate of personal vehicle use exceeds the rate of population growth. According to MTO data, between 2000 - 06, Ontario's population grew by nine per cent, but vehicle kilometres travelled increased by 11 per cent. [35]

In Ontario, trucking – the most energy intensive mode for land-based freight transport – is the dominant mode of shipping freight and goods. The annual average increase of freight transportation energy use is double the annual growth rate for passenger transportation. [36] As noted in the ECO's Annual Greenhouse Gas Progress Report 2008/2009, there has been a lack of initiatives associated with transportation, especially modes such as heavy vehicles and freight. [37]

The ECO believes that the government should expand its use of available TDM policy levers, such as modal shift to public transit, road pricing, vehicle technology and driver behaviour, active transportation modes and Intelligent Transportation Systems (ITS). The government should also maintain the financial incentives available, such as grants to encourage consumers to purchase alternative fuel vehicles. The government should recalibrate feebates, like the Tax for Fuel Conservation, that encourage manufacturers to sell and consumers to purchase fuel efficient vehicles. As noted in other sections of this report, it is desirable to coordinate these policies with conservation objectives related to other fuels.

The lack of new initiatives on the scale needed to address conservation may arise from the fact that the government's policy capacity for transportation energy, as well as formal cooperation between ministries to develop policy and programs, has atrophied over the years. Responding to a request for information from the ECO, the Ministry of Energy and Infrastructure's sparse reply spoke volumes: "[the Ministry] did not undertake any activities to conserve transportation fuels in 2009."

Addressing Transport's Carbon Footprint versus Building a Conservation Culture

The Province has taken some steps toward a fuel substitution strategy. As of 2007, fuel suppliers were required to ensure that gasoline sold in Ontario contains, on average, a five per cent blend of the alcohol fuel ethanol. Federal requirements under development are expected to add a renewable content requirement for diesel fuel (biodiesel) beginning in 2011. [38]

In May 2007, Ontario announced plans to develop a low carbon fuel standard that would require a reduction of 10 per cent in carbon emissions from transportation fuels by 2020, and signed an agreement with California to co-ordinate policy development. A low carbon fuel standard could stimulate the production of a broader range of transportation fuel alternatives. While California has subsequently implemented its standard through a regulation that requires emissions reductions beginning in 2011, Ontario has not yet taken similar action.

In July 2009, the Ontario government announced an electric vehicle plan. Under this plan, buyers will receive rebates between $4,000 and $10,000 for plug-in hybrid and battery electric vehicles purchased after July 1, 2010. [39] To encourage and reward early adopters of electric vehicles, a green vehicle license plate will be introduced allowing single-occupant electric vehicles access to high occupancy vehicle (HOV) lanes for a limited time, as well as accessing public charging facilities.[40]

Ontario's electric vehicle plan is a challenge to Ontarians to use their purchasing power and consumer leverage to support an electric vehicle infrastructure. However, implementation of the plan requires additional commitment by the government. Since July 2009, there have been no further announcements regarding the plan or any indication that funding has been approved for the plan.

Although there are strong linkages between climate change programs and energy conservation, reducing transport's carbon footprint does not always support building a conservation culture. Fuel substitution strategies reduce the reliance on or consumption of petroleum products, thereby reducing the GHG emissions but it may not lead to reductions in total energy use, particularly if it is not combined with initiatives that reduce growth of vehicle-kilometres travelled. [41]

Until the mid-1990s, the energy and transportation ministries had policy and program units dedicated to transportation energy and jointly developed TDM initiatives. [42] The Transportation Energy Management Program (TEMP) was launched in 1980 as Ontario emerged from the second oil supply and price disruption in less than a decade and governments sought ways to reduce their dependence on oil from politically volatile countries. Since the core problem was oil, attention on the transportation sector was merited to increase energy security.

TEMP was designed to further three strategies: (1) overall reduction of energy demand for transportation by promoting technologies and practices to replace transportation; (2) increased efficiencies through technology, infrastructure changes and improved driving practices; and (3) the substitution of alternative transportation fuels. DriveSave, TruckSave, municipal fleet programs, carpooling, cycling and telecommuting programs, and planning high-occupancy vehicle lane networks were examples of initiatives delivered through this successful collaboration between ministries, other governments and the private sector. [43]

The ECO urges the government to address this loss of capacity. In addition, there is the need to re-establish co-operation between ministries for a coordinated approach to energy conservation. The Ministry of Transportation has begun development of a sustainability strategy but it is directed at the ministry's own needs and operation with no linkage to the activities of other ministries. [44]

5.5 Multi-Fuel Conservation: the *Green Energy and Green Economy Act, 2009*

The Ontario government altered the conservation landscape by introducing the *Green Energy and Green Economy Act, 2009 (GEGEA)* passed by the Ontario Legislature on May 14, 2009.

The *GEGEA* enacted a new law, the *Green Energy Act, 2009 (GEA)* and amended a number of other acts relevant to energy policy.

Conservation elements in the *GEGEA* can be grouped into four categories.

1. Changing the conservation role of energy sector institutions.
2. Leading by example through conservation within government.
3. Improving energy efficiency codes and standards.
4. Overcoming barriers to energy conservation.

The first category applies primarily to the electricity sector (although there are several implications for natural gas as well) and was discussed in Section 5.1.

The remaining three categories target electricity and other fuels, particularly fuels used in space heating and water heating.

Leading by Example

The *GEGEA* intends to make energy conservation a priority both within the Ontario government proper, and within "public agencies" (to be defined through future regulations, but likely to include municipalities, universities, colleges, schools and hospitals).

Guiding principles are set in law for Ontario government facilities that include: transparent reporting of energy use and greenhouse gas emissions, ensuring the efficient use of energy, and using renewable energy sources. These principles are supported by new powers for the Minister of Energy and Infrastructure to issue directives to government ministries. Such directives may: require reporting on energy consumption; establish minimum energy and environmental standards for new construction or major renovations of government facilities; or specify other requirements relating to energy conservation, energy efficiency and the adoption of renewable energy technologies.

The *GEGEA* also adopts elements of the now-revoked *Energy Conservation Leadership Act, 2006 (ECLA)* that enable the government to require public agencies to prepare an energy conservation and demand management plan. [45] Such a plan could include a requirement for agencies to achieve conservation targets and meet energy and environmental standards. The government can also require public agencies to consider energy conservation in procurement and capital investment decisions.

Codes and Standards

Two tools that the Ontario government has used extensively to promote energy conservation have been the Ontario Building Code and the *Energy Efficiency Act*. The Building Code includes minimum energy efficiency standards for building construction, while the *Energy Efficiency Act* allowed the government to set minimum efficiency performance standards for products and appliances sold in Ontario. The government uses these tools to raise minimum standards over time as technology and best practices improve. It also provides advance notice of proposed changes to allow builders and manufacturers to adapt to the new standards.

Codes and standards are arguably the single most important tool in the government's toolbox. They are certainly the most powerful tool for addressing conservation in newly constructed buildings and reducing consumption as households and businesses replace old appliances and equipment. In its original proposed Integrated Power System Plan, the OPA assumed that codes and standards to deliver energy efficiency would achieve almost 65 per cent of the Plan's 2025 conservation target.

Codes and Standards – Timing is Everything

Minimum energy performance standards are a powerful weapon in the policy maker's arsenal. By setting and steadily increasing the efficiency performance requirements of appliances and equipment sold, the least efficient products can be eliminated from the market. A bar is set that makes formerly mid-efficiency products the new minimum standard. More stringent standards eliminate price competition for mid-efficiency products and make premium or high-efficiency products more attractive to consumers. As the average efficiency of products in the marketplace rises, the cycle can be repeated to further increase efficiency. Standardized test methods to determine efficiency across models are an essential part of this cycle, and MEI and other organizations fund development of these test methods. In 2009, the ministry contributed to funding standards and test methods for more than 30 products.

Timeliness and frequent updates of product performance standards are essential. Therefore, the ECO is concerned that the Ministry of Energy and Infrastructure last tightened standards and raised the bar in February 2006 – four years ago when Ontario Regulation 38/06 was made under the *Energy Efficiency Act*. (The act was revoked and has been adopted into the *Green Energy Act* as part of the *GEGEA* amendments and the regulation is now O. Reg 82/95 carried over from the *Energy Efficiency Act* under the *GEA*.) Ontario Regulation 38/06 raised the minimum standard on a number of regulated products like air conditioners, heat pumps and thermostats.

With its energy efficiency legislation, Ontario has traditionally tried to stay harmonized with performance standards set by the federal and United States governments but has recently become out of step. This means that Ontario lags behind other jurisdictions in regulating energy performance.

In November 2006 and December 2008, the federal government updated energy efficiency standards for a number of products, such as: lamps, ceiling fans, traffic signals, vending machines, refrigerators and others (some provisions of the federal regulations covered the same products that Ontario regulated in 2006). [46]

There have been several announcements by the Minister of Energy and Infrastructure, but implementation of regulations has been slow in arriving.

In April 2007, the minister announced that Ontario would phase-out inefficient lighting by 2012. In April 2008, the ministry

announced and posted a proposed regulation on the Environmental Registry [47] for new or updated standards for 19 products. The regulation proposed to prescribe eight new products and update the standards for 11 products already prescribed by regulation, and would have helped harmonize Ontario with federal regulation. In response to an information request from the ECO, the ministry indicated that implementation of a regulation will occur in 2010.

With the passage of the *GEA*, the government announced its intention to lead energy efficiency standards in North America. [48] It is expected this will begin with raising efficiency standards for certain household appliances to Energy Star levels (a high efficiency standard). The ministry consulted stakeholders on this proposal during 2009. The ECO will monitor the ministry's commitment to leadership and the results of its consultation. The ECO believes the ministry should post a proposed regulation on the Environmental Registry explaining how the ministry intends to lead North America and move out of step with US regulations. [49]

In November 2009, the Minister of Energy and Infrastructure announced that the government was considering the need for additional new standards and specifically mentioned large flat-screen televisions that account for a growing market share of consumer electronics. [50]

We will stay tuned with anticipation.

The *GEGEA* revoked the *Energy Efficiency Act*, but replicated its key powers to set minimum energy efficiency standards for products and appliances. It also added a new power to set water efficiency standards for products like toilets.

The *GEGEA* also made changes that will raise the importance of energy conservation in the Ontario Building Code. Energy and water conservation are added as specific purposes of the Code. The Minister of Municipal Affairs and Housing is required:

- to initiate a review of the energy conservation standards in the Building Code within six months of the *GEGEA* coming into force (March 2010);
- to appoint a Building Code Energy Advisory Council to advise the minister on energy conservation standards; and
- to conduct periodic reviews (at a minimum every five years) of the energy conservation provisions of the Building Code.

The minister appointed the Council in January 2010. The ECO will monitor the activities of the Advisory Council for inclusion in future reports. It is not certain whether an advisory council for conservation of water resources will be established. The ECO urges the minister to establish this council at an early date or immediately integrate water conservation into the work of Building Code Energy Advisory Council.

Progress during 2009 on Efficiency Provisions of the 2006 Ontario Building Code

The Minister of Municipal Affairs and Housing has made progress during 2009 on a provision contained in the 2006 Ontario Building Code by issuing a supplementary standard for energy efficiency in housing (Supplementary Standard SB-12).

The 2006 Code contained a provision that required houses to meet an energy efficiency standard that was substantially in accordance with an efficiency performance standard known as EnerGuide 80, starting January 1, 2012. According to the ministry, this would mean that a house built in 2012 would achieve an efficiency level 35 per cent higher than a house built in 2006 when the revisions to the current Building Code came into effect.

The Minister along with builders agreed that a "prescriptive" approach to meeting this standard would be the preferred approach of most home builders, and would assist builders and building inspectors to follow Code requirements.

Under the prescriptive approach, a number of "packages" were developed that builders can use to meet the efficiency standard rather than having to audit each house using a model to confirm that the EnerGuide 80 performance objective was met. Each package contains several measures. For example, a package may permit a builder to install a high-efficiency water heater, windows with high insulating values, and certain levels of insulation in the walls, attic or foundation, to meet the EnerGuide 80 standard. In designing the packages, trade-offs were permitted between the efficiency performance of mechanical equipment and building envelope materials and components: in other words, when constructing a house a builder can choose to install high efficiency heating or air conditioning systems but use, for example, lower amounts of insulation or lower efficiency windows in the building envelope.

The level of energy efficiency for any package, contained in the Supplementary Standard, is generally equivalent to the performance objective of EnerGuide 80, and the use of trade-offs between equipment and building envelope components is consistent with the objective-based framework for the Building Code, which encourages alternative compliance paths.

However, the ability to make such trade-offs, while still achieving the EnerGuide efficiency standard, means that the energy performance objective is not as high as what is possible using technology and building practices currently available. A higher level of energy performance could be mandated that would reflect advances in building materials, system and designs, and that would require both the most efficient equipment and building practices in order to reach the required performance level.

The development of the next edition of the Building Code represents an opportunity to achieve this goal. ECO plans to monitor the work of the Building Code Energy Advisory Council, which we understand will be providing strategic advice on the direction of the next edition. ECO also supports the principle of wide public consultation as part of the development of the energy efficiency requirements of the next edition of the Building Code, and suggests that this consultation should include the use of the Environmental Registry.

Overcoming Barriers to Conservation

The *GEGEA* also attempts to overcome barriers that can inhibit Ontarians from taking their own initiative on energy conservation.

The government had the power under the *ECLA* to designate goods, services or technologies that promote energy conservation. By designating a technology or service, the act allowed the provincial government to override local barriers, like municipal or condominium by-laws and property encumbrances placed by developers, which effectively prevented conservation. The government used this power in 2008 to make clotheslines a designated technology. The *GEGEA* replicates this power to override barriers to conservation, and extends it by providing the ability to override barriers to renewable energy projects.

The *GEGEA* also adds a requirement for sellers of real estate to provide information on a property's energy consumption and efficiency to prospective buyers, unless the right to this information is waived in writing. The barrier addressed here is informational. By requiring that information on a home's energy consumption be provided, the operating energy costs become an important factor in a buyer's assessment of the home's value. Energy retrofits undertaken by sellers that reduce a home's energy consumption will be more likely to increase the home's market value to prospective buyers.

Amendments to the *GEGEA* were made before the Act was passed. These amendments allowed home buyers to "opt out"

of receiving the energy information. The amendments also removed the application of the energy information provision to leased properties.

The Act, as originally proposed, also included inspection and enforcement powers. These provisions covered existing inspection and enforcement powers that pre-dated the *GEGEA*, were contained in the *Energy Efficiency Act* and the *ECLA*, and were subsequently adopted into the *GEGEA*. They addressed non-compliance issues, such as selling products that did not meet energy efficiency standards and interference with the use of a designated conservation technology.

The ECO believes that the provisions of the *GEGEA* concerning the disclosure of building energy information and the lack of enforcement provisions in the act are weaker than the original version of the bill put forward by government. The ECO believes these changes to the *GEGEA* conflict with the ministry's objective to make Ontario a North American leader in conservation: efficiency performance standards and home energy ratings are now left with no enforcement provisions because of the amendments. Somewhat embarrassingly, the government has passed a law, key provisions of which it cannot enforce.

The ECO will monitor the results of this regulatory policy for inclusion in future reports to determine whether the amended provisions are effective in making energy efficiency a key factor in homebuyers' decisions, and if manufacturers comply with efficiency standards for the sale of products in Ontario.

Implementation

The *GEGEA* gives the Ministry of Energy and Infrastructure strong conservation powers, but the use of these powers is at the minister's discretion. Almost all of the conservation elements in the *GEGEA* will be given legal force only through subsequent regulations and directives. The breadth and depth of the government's commitment to energy conservation will be shown by the specifics contained in these regulations and directives.

With similar fanfare to the *GEGEA*, the government passed the *ECLA* in 2006. The *ECLA* had many of the same enabling provisions as the *GEGEA*, including: the ability to require public agencies to develop conservation plans and consider conservation in procurement and capital investment; the ability to override restrictions on the use of conservation technologies; and even the power to require home energy information upon property sale. Yet in the three years between passage of the *ECLA* and its replacement by the *GEGEA*, the only action taken by the government was one minor regulation that overrode barriers to the use of clotheslines. While laudable in principle and ambitious in scope, the *ECLA* had minimal influence on energy conservation in Ontario.

The ECO is cautiously optimistic that the introduction of the *GEGEA* signals a renewed interest in taking action on energy conservation, but believes that the ministry must demonstrate its interest by delivering regulations, directives and policies enabled by the act.

The government's efforts in 2009 were dedicated to implementing the renewable energy elements of the *GEGEA* – particularly the streamlined approvals process and feed-in tariff. The Ministry of Energy and Infrastructure has informed the ECO that action is planned on most of the conservation elements of the *GEGEA* in 2010. The ECO will be monitoring these follow-up initiatives and will review them in future reports.

5.6 Energy Targets and Benchmarking

Setting quantitative energy conservation targets makes it easier to measure the progress made in achieving those goals. However, Ontario has a stated overarching goal to "build a culture of conservation," which is implicitly a broad-based objective that over time will mean more conservation of all uses of energy.

As discussed in Section 5.1, the government has established targets for the electricity system to reduce peak demand by 6,300 megawatts by 2025. There is no corresponding target for reducing total electricity consumption. In theory, the peak demand target could be met simply through demand response programs that shift electricity consumption to off-peak hours, rather than making use of all five of the categories of conservation described in Section 3.2 to reduce overall consumption of energy. Appendix B provides more information on the difference between energy consumption and demand.

There is some evidence that demand response initiatives are taking precedence. Of the 21 programs offered by the OPA, just three contributed more than 70 per cent of the savings target in 2008. These are the OPA's two Demand Response programs for large industrial users and the PeakSaver program for residential and small business consumers. It is arguable whether Ontario is building a broad, enduring conserver culture that includes all types of conservation when three programs – programs that are typically activated in summer for only a few hours each year to shave peak demand – represent most of the savings designated to meet Ontario's electricity target. Peak demand reduction by itself will not provide the full suite of benefits that ensue from overall energy conservation, such as significant greenhouse gas emissions reductions.

The targeted emphasis on peak demand reduction also does not reflect the diversity of current conservation program delivery. The majority of programs offered in Ontario by the OPA target energy conservation rather than demand reduction. But these programs may be vulnerable to cancellation, as they are not significantly contributing to the OPA's official conservation goal (meeting the 6, 300 MW demand reduction target).

The government is already moving toward electricity consumption targets in several areas. With the *GEGEA*, LDCs are expected to be assigned conservation targets for reductions in both peak demand and total electricity consumption. The government has set consumption-based electricity conservation targets for its own operations. Ontario has the largest property portfolio in the province and includes some 6,000 buildings that consume over 600 million kilowatt-hours (kWh) annually.

Given these considerations, the ECO believes there is a need to re-think target setting in order to place greater value on all categories of conservation.

The ECO recommends that the Ministry of Energy and Infrastructure establish targets to reduce provincial electricity consumption. These consumption targets will supplement the province's existing targets to reduce peak electricity demand and fulfill the government's commitment to build a culture of conservation.

There are currently no government-established targets for fuels other than electricity and low-carbon transportation fuels. For natural gas conservation, government does not establish targets; they are agreed to during a public hearing process overseen by the OEB. As they currently operate, gas DSM targets are used to calculate incentives for gas distributors (who are financially rewarded for meeting or exceeding the amount of natural gas that they commit to conserving).

The *GEGEA* enables the government to establish a special funds account to deliver multi-fuel programs, such as Ontario's home retrofit program that primarily addresses natural gas consumption. Accordingly, this raises the issue of whether the government should be more directly involved in establishing gas targets. As the *GEGEA* mandates the ECO to report on progress to reduce the use of oil, propane and transportation fuels, it begs the question of whether the government intends to set targets for these fuels so that results can be measured.

The ECO believes that the government should decide whether it would help to build a conservation culture by setting targets for fuels other than electricity. If targets are warranted, their formulation should be developed with public input. The ECO believes that energy use information is the key to setting meaningful targets. When developing the Integrated Power System Plan, the Ontario Power Authority commissioned a detailed analysis of the potential for electricity conservation in Ontario (both for peak demand and total electricity consumption). Studies of this type may be necessary for other fuels, as a precursor to setting meaningful targets.

The ECO believes that benchmarking energy consumption, at the building or organizational level, should also be used to identify the potential for conservation. Benchmarking shows the variation in energy consumption between buildings with similar uses. This would help to refine conservation targets as technologies and behaviours change. The approach was used in the commercial real estate sector by the Real Property Association of Canada (REALpac) prior to developing an energy conservation target, as noted in Section 7.1.

Under the *Green Energy Act*, the government has the ability to require conservation plans from the broader public sector and other prescribed consumers. Such plans would include total energy consumption and could require detailed information at a facility level. The ECO believes the government should use the tools enabled by the *GEA* and others to begin widespread energy benchmarking, to drive improvement, and to inform the establishment of targets.

The ECO recommends that the Ministry of Energy and Infrastructure establish reportable benchmarking by sector. This would assist the government in deciding whether to establish targets to conserve natural gas, oil, propane and transportation fuels, and would make the targets meaningful.

5.7 The Policy Framework Agenda

From the policy review in this report, four issues stand out that the ECO believes should set the energy conservation policy agenda.

1. Develop a comprehensive energy conservation strategy.

The ECO recommends that the Secretary of Cabinet direct the development of a comprehensive energy conservation strategy encompassing all major energy sources used in Ontario. The strategy should be developed with public input.

Several other provinces and Ontario municipalities have energy conservation strategies but Ontario does not. The Ministry of Energy and Infrastructure should make the creation of a comprehensive strategy applicable to all energy sources its first priority.

The strategy should provide a definition of conservation to guide the measurement of progress; it should set objectives and targets as appropriate; and, the strategy should co-ordinate government-wide initiatives. Development of the strategy should incorporate public comment by posting it on the province's Environmental Registry.

2. Stabilize electricity policy, and provide clarity and certainty to that policy.

The ECO recommends that the Ministry of Energy and Infrastructure move quickly to clarify the role of the Integrated Power System Plan and to finalize the key conservation regulations and directives under the *Green Energy and Green Economy Act, 2009*.

The ECO recommends that the Ministry of Energy and Infrastructure commit to a period of policy stability to allow for implementation and evaluation of the *Green Energy and Green Economy Act, 2009*.

There is a need for stability in Ontario's electricity policy in order to consolidate the gains already made and to capture the potential created by the *GEGEA*. This does not mean there should be no further activity. Our report suggests some initiatives to be pursued as the *GEGEA* framework is implemented, but these are mostly refinements of the existing policy as opposed to new departures.

The *GEGEA* has been characterized as a "game-changer". There is a need now, however, to pause, implement, evaluate and adjust. Most of 2009 was devoted to creating the *GEGEA* and implementing its renewable energy provisions. Conservation provisions (regulations and directives) of the *GEGEA* have been slow to emerge, and 2010 may be another year of instability, negatively affecting the energy savings achieved. Organizations tasked with delivering conservation would benefit from a multi-year commitment to the *GEA* policy framework, together with the assurance of stable financing. Such a commitment would allow them to do the assigned job, as well as to be evaluated properly by policy makers and regulators.

The process for approving the proposed IPSP is in hiatus at the time of writing this report. It is essential that the issue of

the proposed IPSP be settled. It must be determined whether the IPSP process will be resumed with revised conservation targets, or whether it will not be used at all, or whether another method will be used, such as a blended policy-making approach using the minister's directive power and IPSP planning.

3. Examine the role of benchmarking and energy targets.

The ECO recommends that the Ministry of Energy and Infrastructure establish targets to reduce provincial electricity consumption. These consumption targets will supplement the province's existing targets to reduce peak electricity demand and fulfill the government's commitment to build a culture of conservation.

The ECO recommends that the Ministry of Energy and Infrastructure establish reportable benchmarking by sector. This would assist the government in deciding whether to establish targets to conserve natural gas, oil, propane and transportation fuels, and would make the targets meaningful.

To date, Ontario's electricity conservation targets have been established using a fairly blunt approach. A provincial target is set for a given year, measured as a reduction in the peak or maximum amount of electricity (in megawatts). The overriding objective of system planning is to ensure that enough electricity is available to meet the highest expected peak demand. This approach places a high value on activities that reduce demand through temporary reductions or shifting the demand to an off-peak time, but may not necessarily reduce the overall consumption of electricity.

Quantitative targets are powerful tools because they provide a simple metric for measuring progress. The ECO believes that the government should review its approach to target setting, given the several targets and goals adopted by the province, and use a more integrated and nuanced approach that reflects all aspects of conservation.

The ECO believes that the government should also implement reportable benchmarking by sector as the *GEA* enables the government to do. Following measurement and benchmarking, MEI should also consider whether reforms to setting natural gas demand-side management targets would be beneficial. It should also determine whether such targets should extend to other fuels (i.e., oil, propane and transportation) not subject to regulatory oversight and, if so, how they would be implemented.

The development of a comprehensive conservation strategy would provide an opportunity to re-evaluate Ontario's use of targets as a policy tool.

4. Ensure accountability, transparency and public input on energy directives.

The ECO recommends that the Ministry of Energy and Infrastructure provide an opportunity for public input in the development of policy directives to electricity sector institutions, as required by the *Environmental Bill of Rights, 1993*.

The ECO recommends that the Ministry of Energy and Infrastructure develop a reporting mechanism to track progress on directives which ensures accountability and transparency.

Accountability, transparency and public participation are essential to maintaining energy consumers' support for conservation. Under the current (and possibly under the future) regulatory framework, it is not clear that meaningful public scrutiny can occur.

In the absence of an approved IPSP, the minister has made extensive use of the directive power to require the Ontario Power Authority to undertake conservation activities without public input. The *GEGEA* expands the minister's directive power over both the OPA and the Ontario Energy Board. This effectively removes a previous restriction on ministerial direction to the OPA: namely that the duration of the minister's directive authority would be limited to the time period leading up to the passage of the IPSP, at which time the minister would relinquish this power. Thus, the lack of public input on conservation that has characterized the period before an approved IPSP will now persist. The minister will be free to set conservation and demand management goals and budgets with little or no public input. The IPSP review process, if it resumes, will not need to consider the merits of initiatives directed by the energy minister.

The extensive use of directives to guide conservation action has also removed accountability for ensuring implementation of the desired actions.

6 Barriers to Conservation

The ECO is looking for assistance in improving our knowledge of both initiatives for, and barriers to, energy conservation in Ontario.

The ECO will use this information to build a better understanding of the possibilities to improve energy conservation in Ontario and to inform our recommendations to policy makers. The ECO will continue to report on barriers and initiatives in future energy conservation reports.

Please visit our website at www.eco.on.ca to contribute to the discussion and share your thoughts on energy conservation barriers and initiatives.

A barrier is anything that stops or impedes energy conservation. Common types of barriers arise from government policy and legislation, business or community practices, financial obstacles, lack of information, and other impediments.

6.1 Policy and Regulatory Barriers

This report has identified several policy barriers to energy conservation in Ontario. These include:

- the lack of a comprehensive multi-fuel energy conservation strategy for Ontario, co-ordinated across government ministries;
- insufficient oversight, accountability and public participation for minister's directives on electricity policy; and
- instability in the electricity conservation framework (as a result of the rules continually changing) that is preventing participants, such as electricity and gas distributors, from taking action.

These are overarching barriers, but their effects trickle down and affect the design of conservation programs and the behaviour of individuals. The effect of barriers can also flow in the other direction. Behavioural or operational barriers unknown to policy makers may prevent an energy conservation initiative from succeeding, no matter how sound the law or policy.

6.2 Other Barriers

The ECO is interested in learning about barriers at all levels. Summarized below are some of the barriers that have been brought to the attention of the ECO. The views presented in this section do not necessarily reflect the opinion of the ECO.

Barriers Identified by Utilities

Local distribution companies (LDCs) informed the ECO of the following barriers.

- There is a lack of regulatory clarity and continuous long-term commitment to energy conservation in government policy.
- There is a need for long-term conservation funding that is independent of short-term program and target-related timelines.
- The government's top-down approach for setting electricity targets acts as a barrier, because some of the opportunities for conservation at the local distributor level are lost.
- There is a lack of information related to energy conservation in the school curriculum. There are missed opportunities to connect with students and teach a large number of individuals the facts related to energy use and conservation techniques.

- There are policy and information barriers related to smart meters and TOU prices. The true or real pricing is not reflected in the TOU rates; and consumers need clear information related to their smart meter so they can get the best value for their energy usage.

Barriers Identified by Buildings Operators

Building owners, operators and the supporting service industries provided the ECO with the following views on barriers.

- A broad consensus believes that a reporting mechanism for measuring energy use is needed. The preferred approach is to establish benchmarks and initially to not focus on the "delta" or difference between inferior to superior performers or the delta of annual improvement in energy consumption that is occurring.
- The lack of implementation of *GEA* regulations and directives on energy conservation is a barrier to motivating activity, particularly in the MUSH sector.
- The OPA's grant funding policy stipulating that it retains ownership of environmental attributes associated with conservation and green buildings is a barrier for building officials using OPA programs.
- Capability in the buildings sector is a barrier. Ontario is not creating the capacity to design, construct and operate green buildings. OPA programs favour resource acquisition over capacity building. Policy makers do not recognize that creating such capability will not only attract manufacturing plants, but involves jobs in building designing, commissioning and retro-commissioning.
- There are administrative barriers to obtaining approvals and securing incentives. A "green concierge" is needed to address this barrier; such a service provider (similar to the government's Renewable Energy Facilitator) could steer building owners through the approvals processes.
- Financial barriers exist to motivating conservation in the broader public sector; the money saved as a result of energy efficiency improvements does not stay in the sector. Public sector managers who lower their operating costs through conservation do not maintain the same operating budget but see their budget lowered. Budget policies that restrict incremental capital spending and do not consider the longer term operating cost savings of efficient buildings are a barrier. The funding formula used by Infrastructure Ontario (an agency of MEI) is an example of this approach: it seeks low capital costs for construction, but ignores the long-term operating costs faced by ministries who operate the building.
- There is insufficient information on energy efficiency available to the building leasing community.

Barriers Identified by Practitioners

Conservation practitioners (energy services companies, architects, engineers, public interest groups, technical and management consultants) informed the ECO of the following barriers.

- There is no government policy requiring performance measurement and reporting of energy use in buildings and facilities.
- The lack of benchmarking and the inability to create standards for energy use in buildings impedes organizations taking action.
- The lack of transparent and publicly available factual information impedes educating the public. A pocket manual or reference guide containing an agreed set of facts endorsed by all stakeholders is needed. It should set out economic and productivity indicators such as: the cost of conservation versus supply; the amount of public funding spent on conservation versus supply; the claimed financial "waste" that occurs in supply versus conservation; and the employment created by conservation versus supply.
- There is no clear set of standardized rules, protocols and procedures set out by government and government agencies for access to data. Simple, hassle-free, open access to utility data does not exist.
- Barriers are contained within the CDM/DSM regulatory framework. The regulatory procedures and protocols encourage contesting submissions. Incentives are equipment-based, rather than reflecting a holistic or systems-based approach that seeks deep energy savings.
- There is no single authoritative organization to advocate for conservation and no central service agency that conservation advocates can approach to resolve issues (as there is with the Renewable Energy Facilitation Office for advocates of renewable energy).
- The mandate of the OPA inherently makes it a conflicted agency. OPA must integrate demand and supply-side solutions, but its planning documents favour supply-side solutions.
- There is a lack of public education of the benefits of conservation. A general unawareness among the public and the belief that conservation is not needed because renewable energy can solve energy supply problems impedes conservation. Conservation is less tangible with no easily identifiable "widgets" that can be used to educate and motivate the public.
- Public sector spending policies de-motivate conservation because a life-cycle cost approach is not used for public sector investments. There is also a split incentive at work, because public sector managers do not retain financial savings in their budget to apply to resolving problems or offering programs in their sector.

Barriers Identified for Oil and Propane Conservation

Propane companies identified the following barrier.

- The government's energy efficiency standards for appliances and equipment are too narrow in scope, focusing mainly on space heating equipment to the exclusion of other equipment. The government should consider regulation of other products, which can affect heating a building.

Barriers Identified for Transportation Fuels Conservation

In the transport sector, various cultural, technological, financial, regulatory and infrastructure barriers affect both passenger and freight transportation.

- Cultural and attitudinal barriers exist in the transport sector, especially related to passenger transport and personal mobility. Several factors have resulted in favouring the use of personal vehicles: the current car-based culture; increased urban sprawl; low urban densification targets of existing urban planning policies; the low cost of fuel; and, the lack of a price on carbon. The moderate transit ridership levels mean that governments must either provide it at a financial loss or at reduced levels of service making transit an unattractive option.
- The development and demonstration phases of technology innovation tend to have restricted access to financing. In an emerging market, such as the market for sustainable transportation technologies, it is financially difficult to bring products to the market without solid demand.
- In freight transport, a barrier to wider adoption of proven technology can occur because of a lack of investment capital. Without financial incentives, fuel efficient technologies can be too costly for fleet managers.
- In truck transport, the regulatory inconsistency on codes and standards between jurisdictions can also act as a barrier. The varying degrees of stringency can make compliance complex and adopting new technologies a risk.
- As alternative fuel vehicles become more readily available, a potential barrier to demand may be the lack of adequate infrastructure to power such vehicles. For example, without adequate infrastructure for charging, the demand for electric vehicles will remain low despite the financial incentives offered.

7 Conservation Initiatives

There are some great success stories out there and the ECO wants to hear about them – energy conservation initiatives that help conserve electricity, natural gas, propane, oil or transportation fuels.

Please visit the ECO website at www.eco.on.ca to contribute to the discussion and share your thoughts on barriers and initiatives to energy conservation.

These could be community projects, pilot projects, in-house programs and practices, innovative technologies, education or awareness activities, or any other initiatives that help conserve or make more efficient use of energy. The ECO is particularly interested in projects that have worked at a small scale and could be scaled up, or initiatives that have worked well in other places that Ontario might want to consider.

7.1 Notable Initiatives

Highlighted below are several innovative initiatives identified by the ECO that provide notable examples of the energy conservation possibilities:

Developing Individual Agents of Change - Community Champion Program (Social Housing Services Corporation)

For conservation programs to succeed, one must not only look to operational or technical solutions. It is equally, if not more important, to change individual attitudes and behaviours. The Community Champion Program educates and enables social housing residents to become agents of change in their own communities. With the support of the housing provider, Community Champions receive training and support on how to promote, communicate, plan and implement conservation programs. Resources (such as presentations, posters, communication tools and an online forum) help participants promote conservation basics to fellow social housing residents and other communities.

Results: Since the program was developed in 2007, 80 social housing organizations and 21 Community Champions have received training on energy conservation.

Breaking Down Financial Barriers to Energy-Efficient High-Rises – TowerWise Green Condo Loan Program (Toronto Atmospheric Fund)

Toronto has more high-rise buildings than any North American city aside from New York. Many more are built each year. Yet the average high-rise is less energy efficient per square foot than a detached home.

One barrier inhibiting the construction of energy efficient high-rise condominiums is the "split incentive" problem – building to high energy efficiency standards increases capital costs for the builder, but the operating savings of these investments are recouped by the condo owner. The TowerWise Green Condo Loan program is an innovative new business model whereby bank loans are advanced to the builder to cover the incremental costs associated with energy efficiency investments, and the loans are paid back over time by condo corporations from subsequent operating savings.

Results: Toronto Atmospheric Fund has partnered with Tridel to leverage more than $5 million in bank loans to fund energy efficiency investment in new buildings, leading to a 30 to 35 per cent energy savings in several major new condo developments.

Utility Innovation Tapping New Conservation Markets – Data Centre Incentive Program (PowerStream, Toronto Hydro)

Information technology data centres – also known as "server farms" – use large amounts of energy to run the computing equipment and keep the equipment at cool operating temperatures. Data centres are one of the fastest growing sources of energy consumption. [51] An estimated reduction of 60 MW of electricity demand can be achieved in Toronto alone through data centre energy efficiency programs.

PowerStream and Toronto Hydro have developed a unique program, targeted at this niche market. The Data Centre Incentive Program provides financial incentives for reducing electricity demand through the implementation of energy efficiency projects (e.g., in the areas of computer systems, server technology, storage devices, power management, and heating and cooling technology). Both utilities have been active in promoting this program to their business customers and the information technology industry.

Results: To date, the two utilities have completed four projects, representing 417 kW of peak demand electricity reduction. An additional 22 projects have been approved or are underway.

Leading by Example – 222 Jarvis Signature Green Building Retrofit (Ontario Realty Corporation)

The Ontario Realty Corporation (property manager for the Ontario government) is undertaking one of North America's largest green building retrofit projects. The Corporation is transforming the 222 Jarvis Street building in Toronto into a state-of-the-art energy efficient, environmentally sustainable 'green' building.

The retrofit will include a green roof and reflective roofing materials, a new heating, ventilating and air conditioning system with advanced automation controls, and daylight and occupancy sensors for optimal lighting control.

The project is part of a larger initiative to retrofit and modernize government buildings across the province. It is an excellent example of the large energy savings that can be achieved through retrofits of existing buildings.

Results: Building energy consumption is expected to drop by more than 70 per cent, with annual savings of approximately $700,000 in energy costs.

Making Municipal Transport Fleets More Efficient – Municipal Fleet Review Program (Fleet Challenge Ontario)

The transportation sector is the largest user of energy in Ontario, and as our report shows, most of the expected growth in the province's future energy consumption comes from this sector.

The Municipal Fleet Review Program is a green fleet optimization program for municipal transportation fleets, based on the E3 green fleet rating system (similar to the LEED© rating system for buildings). Fleet Challenge Ontario works with municipalities to evaluate a broad range of management options that encompass fuel efficiency, vehicle selection, maintenance techniques, asset management, and computer systems, through to the end-of-cycle disposal of surplus vehicles.

Results: In 2008, Fleet Challenge Ontario completed fleet reviews for 12 Ontario municipalities, identifying plans that would collectively reduce greenhouse gases by over 2,500 tonnes and save almost $4 million. The program expanded in 2009 to cover 11 additional organizations/municipalities and welcomes further participation through to 2011. Over 7,000 vehicles of Ontario's municipal fleets have completed the Fleet Review Program.

Targeting Deep Energy Cuts in Commercial Buildings: 20 by '15 Target (REALpac)

The Real Property Association of Canada (REALpac), which represents the property investment industry, has adopted an energy consumption target for office buildings of 20 equivalent kilowatt-hours of total energy use per square foot of building area per year by 2015.

The target is based on extensive analysis of energy consumption in office buildings by the Canada Green Building Council. The analysis revealed a more than 2:1 discrepancy in energy use in buildings, indicating large opportunities for savings, through both capital investments and operational savings.

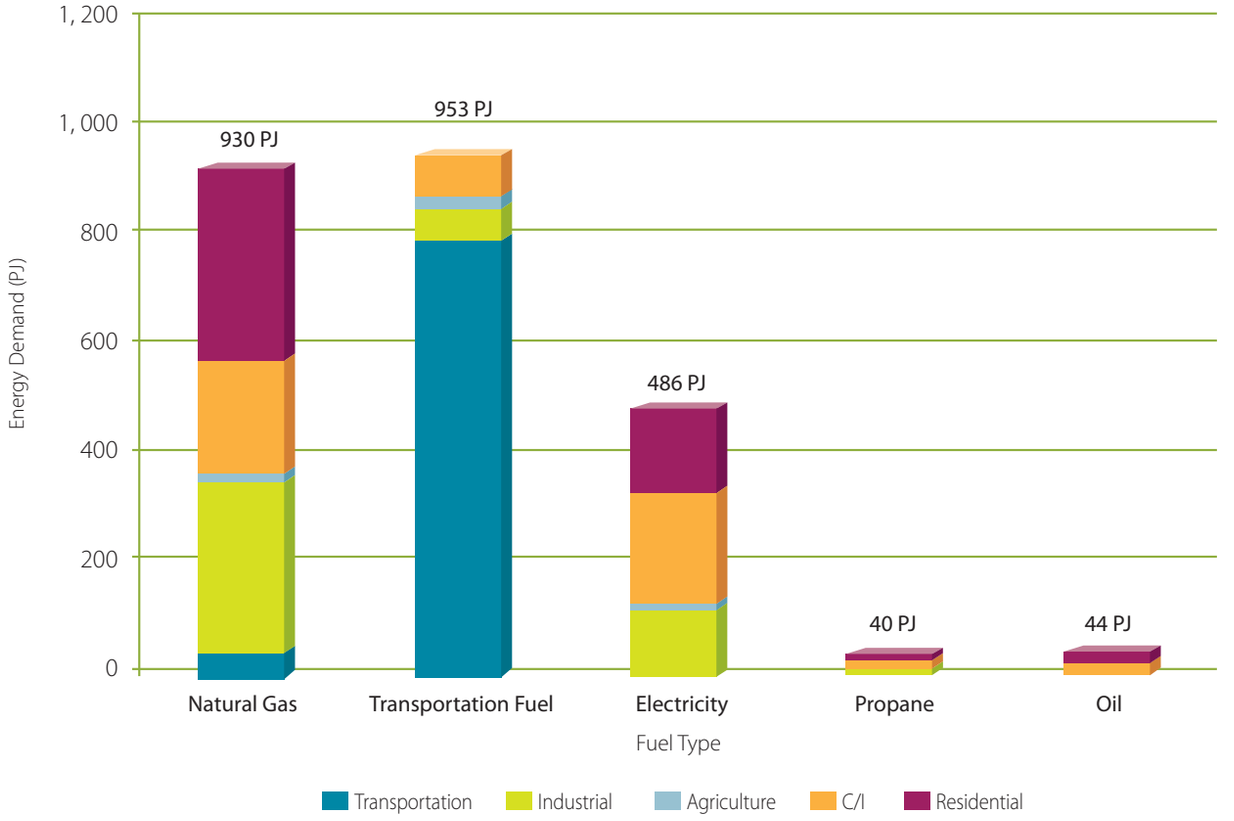
Results: The REALpac target represents almost a 50 per cent reduction compared with the energy use of the median commercial building today.

Appendix A

Appendix A: Ontario's Use of Energy

Figure 5 provides an overview of Ontario's 2007 energy demand by fuel type. Following the figure is a detailed analysis of use by fuel type.

Figure 5
Ontario's 2007 Final Energy Demand by Fuel Type



Source: Statistics Canada – Catalogue no. 57-003-X

Note: Residential demand for on-road transportation fuels is included in the transportation sector.
C/I demand represents demand for Commercial, Institutional, and Public Administration.
Natural Gas, Transportation, Electricity, Propane, and Oil account for 93% of Ontario's 2007 energy demand; other fuel types composing the remaining 7% of demand are not shown in the above figure.
Oil demand is based on kerosene and stove oil, and light fuel oil amounts
Transportation Fuel is based on motor gasoline, diesel fuel oil, heavy fuel oil, aviation gasoline, and aviation turbo fuel amounts. Details of Oil and Transportation Fuels come from Table 4-8 of Statistics Canada's 57-003-X report.

Natural Gas

Natural gas is the dominant fuel used for home heating in Ontario, and the residential sector represents the largest end-use sector (38 per cent of total gas demand in 2007). A significant amount of natural gas is also used for industrial processes.

Transportation Fuels

Transportation fuels refers to a group of petroleum products: motor gasoline, diesel fuel oil, heavy fuel oil, aviation gasoline, and aviation turbo fuel. About 84 per cent of transportation fuels are consumed by the transportation sector, primarily through on-road transportation for passenger movement (i.e., cars, light-duty vehicles, transit, regional rail and air transport) and freight movement (i.e., trucking, rail, shipping and other goods movement).

Petroleum products used off-road in industry and agriculture are a relatively minor share of the demand for transportation fuels in Ontario.

Electricity

In the past, Ontario's demand for electricity was evenly split three ways between residential, industrial and commercial uses. As Figure 5 shows, the commercial/institutional sector is becoming the dominant sector.

It is also a sector where, arguably, the most potential for conservation exists as energy intensity [52] in this sector has not improved as much as other sectors in previous years. The declining use of energy in the industrial sector likely represents the effects of conservation initiatives and structural change in Ontario's economy as the province moves from a resource and manufacturing based economy to one where the service sector plays an increasing role.

Electricity in Homes

Conservation and energy demand initiatives can occur in the home. In terms of electricity usage, Ontario's draft Integrated Power System Plan (IPSP) estimates minor appliances will account for over 27 per cent of electricity demand in Ontario. [53] Typical residential electricity demand, based on IPSP data, is shown in Figure 6 below.

Figure 6
IPSP - Ontario's 2010 Residential Electricity Demand Outlook [54]

End Use	Percent
Space Heating	16.5
Air Conditioning	6.9
Furnace Fan	2.2
Lighting	16.7
Refrigeration and Freezer	9.9
Water Heating	11.2
Dishwasher	1.1
Clothes Washer/Dryer	7.8
Minor Appliances	27.5
Total*	**100**

Note: Due to rounding, the above table is equal to 99.8% of total demand.

Propane

Of the total 39.7 PJ of propane consumed in Ontario, the commercial and institutional sector is the largest consumer of this fuel, followed by an almost equal demand from residential and industrial users.

Oil

The 2007 demand for oil is equal to 43.7 PJ. That figure is based on kerosene and stove oil and light fuel oil amounts, and excludes gasoline and diesel used in the transportation sector for personal mobility and movement of freight which is by far the largest use of oil in Ontario. Like propane, oil is a niche fuel in Ontario. One-half of Ontario's oil demand serves the commercial/institutional sector, followed by oil used in the residential sector, primarily for home heating and domestic hot water.

Appendix B

Appendix B: Energy Units

Figure 7 shows some typical uses of energy, the units in which consumers are billed for the fuels, the work or service that is provided by the unit of energy, and the price. The figure also converts the units in which the fuels are sold into a common unit of "energy currency" – the joule (J) or the larger megajoule (MJ), which is equivalent to one million joules.

Figure 7
Units of Energy

What?	Where?	What can you do with it?	How much does it cost?	How much energy does it contain?
1 litre (L) of gasoline	At the pump	Drive your car 15 km (highway)	$1.00 (pump)	34.7 megajoules
1 kilowatt-hour (kWh) of electricity	On your electricity bill	Run two 60 Watt incandescent light bulbs (or eight equivalent fluorescents) for eight hours	$0.13 [55] ("all-in", including delivery and regulatory charges)	3.6 megajoules
1 cubic metre (m3) of natural gas	On your gas bill	Cook using your gas oven for 3 ½ hours (350 F) [56]	$0.33 [57] ("all-in", including delivery and regulatory charges)	37 megajoules
1 litre (L) of propane [58]	On your fuel supplier's bill (stationary tank) or at the service station (vehicle or portable tank)	Cook using your barbecue for 1 hour [59]	$0.70 (pump) [60]	25.5 megajoules [61]
1 litre (L) of heating oil	On your fuel supplier's bill	Heat your house for several hours (winter)	$0.90 (pump)	38.6 megajoules

Energy Versus Power – Why Power is Important to the Electricity System

Many measurement terms are used in the energy world. You can keep things simple by remembering that most energy units measure one of two things, either:

- Energy, the ability to do work; or
- Power, the rate at which energy is being used.

Consider boiling a pot of water on your stovetop. You could turn the burner to its highest setting and reach a boil in five minutes, or use a lower heat setting and reach a boil in 10 minutes. The amount of energy used to accomplish the task will be the same either way, but the rate of power will be higher in the first case.

From a conservation perspective, we are usually more interested in energy than power, as total energy consumption determines our need for primary energy resources (oil, coal, sunlight, wind, uranium, etc.) and meets our needs by providing a service (lighting our homes, mobility through driving our car, etc.).

However, power is particularly important for the electricity system, because the electricity cannot be easily stored. Consequently, electricity supply needs to equal electricity demand at all times. If too much electricity is supplied compared to demand, the power lines could be damaged. If too little electricity is supplied compared to demand, brownouts (the loss of electricity supply in certain areas of the electricity grid) could occur.

It also means that the grid infrastructure – the total amount of electricity generation capacity that is installed and the capacity of transmission and distribution lines – needs to be sized to meet the maximum power or peak demand that the system may need to supply.

The most common unit for measuring power, particularly in the electricity world, is the watt (W). One watt is equal to using one joule of energy in one second.

Consumption of energy is a measurement of power supplied over time. This is useful to remember when understanding the difference between a power unit, like a kilowatt (kW) and an energy unit, like a kilowatt-hour (kWh).

To convert from power to energy, multiply an appliance's power consumption by the amount of time it runs (e.g., running a 1.5 kilowatt oven for three hours uses 4.5 kilowatt-hours of electrical energy).

A 500 MW power plant operating at its rated capacity 24 hours a day would produce 4,380,000 MWh of energy over the course of one year (500 MW x 8,760 hours in one year).

Figure 8
Units of Power

Power consumed or produced	Typical Activity
15 W	Compact fluorescent light bulb (CFL)
1,000 W (1 kW)	Microwave oven
10,000 W (10 kW)	Total household electricity demand
80,000 W (80 kW)	Car traveling at highway speed [62]
2,000,000 W (2 MW)	Large wind turbine
500,000,000 W (500 MW)	Large thermal power plant unit (coal, nuclear, natural gas)
20,000,000,000 W (20,000 MW)	Typical average electricity demand for province of Ontario

Prefixes

The base units for both energy (joules) and power (watts) represent relatively small quantities. When dealing with the large quantities of energy and power used in the energy sector, prefixes are often used. The most common prefixes are shown in the table below. So, for example one million watts of power can be written as one megawatt or one MW, while one billion joules becomes one gigajoule or one GJ.

Figure 9
International System of Units (SI) Prefixes for Units of Measurement

Prefix	Quantity
kilo (k)	Thousand (1,000 or 10^3)
mega (M)	Million (1,000,000 or 10^6)
giga (G)	Billion (1,000,000,000 or 10^9)
tera (T)	Trillion (1,000,000,000,000 or 10^{12})
peta (P)	Quadrillion (1,000,000,000,000,000 or 10^{15})

Endnotes

[1] To help explain this concept, in the Power Reference by Ontario Power Generation, "demand" means the rate at which electricity or natural gas is delivered to or by a system in a given instant, or averaged over a designated period, usually expressed in m3/hr (natural gas) or kW (electricity); and "energy consumption" means the quantity of energy used, typically expressed as m3 (natural gas) or kWh (electricity).

[2] For a description of the amendments to existing legislation see Bill 150, schedules A to K at www.ontla.on.ca.

[3] For a full description of the amendments, see the *Environmental Bill of Rights*, *1993*, Section 58.1 at www.e-laws.on.ca

Reports on energy conservation

58.1 (1) The Environmental Commissioner shall report annually to the Speaker of the Assembly on the progress of activities in Ontario to reduce the use or make more efficient use of electricity, natural gas, propane, oil and transportation fuels, and the Speaker shall lay the report before the Assembly as soon as reasonably possible. 2009, c. 12, Sched. F, s. 1.

Same

(2) Each report shall,

(a) describe the results of initiatives in Ontario during the year covered by the annual report to reduce the use or make more efficient use of electricity, natural gas, propane, oil and transportation fuels;

(b) describe the progress in meeting targets established by the Government of Ontario for reducing the use or making more efficient use of electricity, natural gas, propane, oil and transportation fuels; and

(c) identify,

(i) any Acts or regulations of Canada or Ontario that result in barriers to the development or implementation of measures to reduce the use or make more efficient use of electricity, natural gas, propane, oil and transportation fuels,

(ii) any by-laws of municipal councils in Ontario that result in barriers to the development or implementation of measures to reduce the use or make more efficient use of electricity, natural gas, propane, oil and trans portation fuels, and

(iii) any policies of the Government of Canada, the Government of Ontario or municipal councils in Ontario that result in barriers to the development or implementation of measures to reduce the use or make more efficient use of electricity, natural gas, propane, oil and transportation fuels. 2009, c. 12, Sched. F, s. 1.

Powers

(3) In addition to his or her powers under section 60, the Environmental Commissioner may, for the purpose of this section, require any of the following persons to prepare and submit to the Commissioner, within such time as is specified by the Commissioner, a report containing such information as is specified by the Commissioner:

1. The Ontario Energy Board.
2. The Ontario Power Authority.
3. The Independent Electricity System Operator.
4. The Smart Metering Entity within the meaning of the Electricity Act, 1998.
5. A generator, transmitter or distributor, as those terms are defined in the Electricity Act, 1998.
6. A gas distributor, gas transmitter, producer or storage company, as those terms are defined in the Ontario Energy Board Act, 1998.
7. Any other prescribed person or class of persons. 2009, c. 12, Sched. F, s. 1.

Same

(4) The first report under subsection (1) shall be submitted before the end of 2010 and shall cover the period beginning on January 1, 2009 and ending on December 31, 2009. 2009, c. 12, Sched. F, s. 1.

[4] For a full list of the persons prescribed under the Act, see the *Environmental Bill of Rights*, *1993* Section 58.1(3) at www.e-laws.on.ca

[5] Source: Statistics Canada 57-003-X Table 2-8 shows Energy Use, Final Demand for Ontario is 2,638.8 petajoules (PJ) for 2007. Energy use, final demand, is the energy demand that represents the "summation of the use in mining and oil and gas extraction, manufacturing, forestry, construction, transportation, agriculture, residential, public administration and commercial and other institutional [sectors]". This does not include feedstock amounts. Note that one petajoule is the amount of energy consumed by a small town of about 3700 people annually for all uses from housing to transportation to local services and industry.

[6] NEB 2009 Reference Case Scenario – Appendices document, Table A2.10: Demand, Reference Case, Ontario. Note: This amount includes end-use demand and feedstocks. NEB 2009 Reference Case Scenario – Appendices document, Table A2.10: Demand, Reference Case, Ontario. Note: Amounts from Table A2.10 include end-use demand and feedstocks. NEB's data for 2008 total secondary energy demand is 3048 PJ, and the increase between 2008 – 2014 is 325 PJ (325/3048*100 = 10.7%).

[7] An externality is an impact (positive or negative) on a third party that is not captured in the market price of a product or service. A classic example of a negative externality is air pollution associated with fossil fuel combustion.

[8] This was done through a directive to the Ontario Power Authority (June 13, 2006), which directed the Ontario Power Authority to develop an Integrated Power System Plan that would include a plan to reduce peak demand on the electricity system through conservation, defining conservation to include "continued use by the government of vehicles such as energy efficiency standards under the Energy Efficiency Act and the Building Code, and should include load reductions of initiatives such as: geothermal heating and cooling; solar heating; fuel switching; small scale (10 MW or less) customer-based electricity generation, including small scale natural gas co-fired generation and trigeneration, and including generation encouraged by the recently finalized net metering regulation."

[9] The *Green Energy and Green Economy Act*, *2009* made "stimulating energy conservation" through programs and policies an explicit objective of the Ministry of Energy and Infrastructure.

[10] In contrast, the government has shown a more coordinated approach in addressing climate change, for example, by establishing a coordinating secretariat to integrate multiple ministries' activities.

[11] This would strengthen the ability of the Climate Change strategy and an energy conservation strategy to reinforce each other's impact. Other governments - like California, Massachusetts and Vermont- have enshrined the loading order in legislation.

[12] Only a few conservation studies were commissioned by or submitted to the committee designing Ontario's electricity market. The committee's market design eschewed a policy approach where conservation is treated as a resource to be acquired similarly to how supply resources are obtained through power purchase agreements. Although the competitive market was short-lived – it operated May to November 2002 at which time policy revisions implemented partial re-regulation of prices, and electricity contracts with generators increasingly replaced acquiring supply through the spot market – little conservation activity occurred.

[13] Resource acquisition programs refers to initiatives and activities undertaken (typically by utilities and governments) to procure conservation through tools such as payments and funding incentives. It treats conservation as a resource, like supply, that is procured and paid for.

[14] http://www.powerauthority.on.ca/Storage/23/1870_IPSP-June13%2C2006.pdf. See also http://www.powerauthority.on.ca/Storage/12/743_Minister_Letter_to_OPA.pdf for a ministerial letter of request, issued prior to the supply directive asked for advice on the targets that should be set. The letter, issued in May 2005, requested the OPA begin development of integrated system planning and asked for its recommendations with respect to conservation targets, renewable energy targets and the appropriate supply mix to meet demand after conservation and renewables were taken into account. The government stated it was seeking OPA advice to assist it prior to issuing directives.

[15] The smart grid is the use of technology (particularly information communications technology) to improve the operation of the electricity grid. Conservation opportunities include providing customers with real-time data on electricity prices and consumption, automating demand response programs, and using system controls to reduce energy losses on the grid. The GEGEA will require LDCs to prepare plans to develop and implement the smart grid on their portion of the electricity transmission and distribution system, and also gives MEI new regulation-making powers regarding smart grid development.

[16] See G. Vegh
http://utorontolaw.typepad.com/faculty_blog/2009/02/the-green-energy-act-green-energy-unbounded.html

[17] The Electricity Restructuring Act, 2004. See: http://www.ontla.on.ca/web/bills/bills_detail.do?locale=en&BillID=99&isCurrent=false&detailPage=bills_detail_the_bill&Intranet=

[18] S. 25.30(4) of the *Electricity Act*, *1998*

[19] Strictly speaking, 8 of the conservation-related directives had associated megawatt (MW) amounts. Our report discusses 6 for the following reasons. One of the directives (issued February 9, 2006) was an addendum to an earlier directive (dated June 15, 2005). The February-dated directive consolidated the former and instructed the OPA to treat the two directives as one. Basically, the amendment changed the MW amount: instead of seeking 250 MW or more of demand response activities, the OPA was to seek up to 500 MW of demand response.
Another directive (dated March 24, 2005) was for a very small amount of demand response (10 MW) and originates from a Request for Proposal process for clean generation and conservation that was administered by the Ministry of Energy before the OPA was created and then transferred to the OPA by the Ministry.

[20] The directives requested OPA provision of specific conservation programs targeted at end users like commercial office towers, residential consumers, low-income households or savings from particular end-use technologies, for example, lighting. In some of the six directives, the OPA was instructed to build upon programs begun by the Ministry of Energy and Infrastructure and this moved responsibility for continuation of these activities from the ministry to the government's electricity agency.

[21] Under the current regulatory framework, the minister's power to approve the OPA's Business Plan and the OEB's power to approve its revenue requirements have not been used as a means of enforcing accountability for conservation. In fairness, the primary function of the Business Plan is to seek approval of the administrative costs of the OPA's operations and not its program spending or achieved energy savings. The OPA does seek comments from the public on its Business Plan but not at a detailed level and access to the Plan in a draft form is not provided. With the IPSP approval process suspended, there currently is no venue where conservation programs and spending are being publicly reviewed. There is no acknowledgment in the minister's letter of approval of the OPA's Business Plan that the government is satisfied with the performance of OPA programs in achieving results. Parts of the Business Plans are either opaque or described in such general terms that it is difficult to envisage how they could serve as a baseline for conservation results against which accountability can be determined.

The OEB cannot exert any meaningful control over the OPA's program performance through approval of the Business Plan since program activity is approved as part of the IPSP or is deemed approved in minister's directives. For the Business Plan, the OEB approves OPA "fees" but does not approve OPA "charges". Charges are the costs associated with the programs and conservation funds that the OPA delivers, and the OEB has no role in approving the OPA's charges.

[22] On December 8, 2009, the Ministry of Energy and Infrastructure authorized an additional $50M in spending, to allow existing programs to continue to operate until the new conservation framework established through the Green Energy and Green Economy Act is in place. This funding will be accessible until December 31, 2010.

[23] See *OEB Act*, Conservation directives

> 27.1 (1) The Minister may issue, and the Board shall implement, directives that have been approved by the Lieutenant Governor in Council that require the Board to take steps specified in the directives to promote energy conservation, energy efficiency, load management or the use of cleaner energy sources, including alternative and renewable energy sources. 2002, c. 23, s. 4 (4).
>
> Publication
> (2) A directive issued under this section shall be published in The Ontario Gazette. 2002, c. 23, s. 4 (4).
>
> Directives re conservation and demand management targets
> 27.2 (1) The Minister may issue, and the Board shall implement, directives that have been approved by the Lieutenant Governor in Council that require the Board to take steps specified in the directive to establish conservation and demand management targets to be met by distributors and other licensees.
>
> Directives, specified targets
> (2) To promote conservation and demand management, a directive may require the Board to specify, as a condition of a licence,

the conservation targets associated with those specified in the directive, and the targets shall be apportioned by the Board between distributors and other licensees in accordance with the directive.

Same
(3) A directive made under subsection (2) may require the OPA to provide information to the Board or to the Ministry about the conservation targets referred to in subsection (2) or the contracts referred to in subsection (5).

Directives re distributors
(4) Subject to subsection (7), a directive may require the Board to specify, as a condition of a licence, that a distributor may meet, at its discretion, any portion of its conservation target by seeking the approval of the Board for the conservation and demand management programs to be offered in its service area.

Directives, contracting with the OPA
(5) A directive may require the Board to specify, as a condition of a licence, that a distributor meet, at its discretion, any portion of its conservation target by contracting with the OPA to meet the target through province-wide programs offered by the OPA.

Public reporting
(6) To promote a culture of conservation and demand management, a directive may require the Board to specify, as a condi tion of a licence, that the licensee make public, by such means and at such time as specified in the directive, the steps that the licensee has taken to meet its targets and the results that have been achieved in meeting those targets.

Hearings
(7) A directive may specify whether the Board is to hold a hearing, the circumstances under which a hearing may or may not be held and, if a hearing is to be held, the type of hearing to be held.

Publication
(8) A directive issued under this section shall be published in The Ontario Gazette.

Target setting is expected to possibly works as follows. The OPA will derive an aggregated LDC target of the projected savings for the 2011-15 period from the province-wide conservation target contained in the IPSP. A disaggregated target will be assigned by the OEB to each of Ontario's LDCs based on the distributor's load profile – the total annual volume throughput of the LDC. The target includes conservation from all rate classes (residential, commercial, industrial) and demand response. The Board will also be responsible for: approving LDCs' CDM program portfolios; establishing (with OPA assistance) a standardized evaluation, measurement and verification (E,M&V) framework; requiring LDCs to provide verified CDM program results annually; establishing a tiered set of programs with appropriate funding sources, establishing an incentive payment structure and compensation to LDCs for lost revenue resulting from CDM.

[24] To date, the OEB has not allowed incentive mechanisms, like the shared savings mechanism, for jointly delivered OPA-LDC programs as it views the OPA-LDC contract as the correct vehicle for incenting and monitoring LDC success.

[25] The GEA implements a feed-in-tariff (FIT) program administered by the OPA. The program offers two different streams based on the size of the renewable energy project. The FIT stream applies to renewable energy projects generating more than 10 kilowatts of electricity, and the microFIT stream applies to small renewable power projects generating 10 kilowatts or less of electricity. Renewable fuel sources that qualify for the program include: bioenergy (biogas, biomass, and landfill gas), solar photovoltaic, waterpower, and wind. The different streams have different rules that a renewable energy project must meet to qualify. If a project does qualify, the program offers a guaranteed pricing structure and provides long-term contracts for the renewable energy generation. The program is designed to encourage and accelerate the adoption of renewable energy sources. See: http://fit.powerauthority.on.ca/Page.asp?PageID=1115&SiteNodeID=1052

[26] Critical peak pricing involves charging very high prices on certain peak days or for certain hours when most or all available generation resources are needed to meet electricity demand.

[27] Customers under retail contract typically account for about 15 per cent of all residential consumers and about 12 per cent of lower demand (under 50 kilowatts [kW]) general service customers like small businesses. Source: information request from ECO to the OEB, Sept. 24, 2009.

[28] http://www.ontla.on.ca/bills/bills-files/39_Parliament/Session1/b235.pdf. See Section 9 and Clause 34(3)(f). See Section 9 and Clause 34 (3) (F).

[29] The OEB approval of the plans is governed by regulatory rules that have been refined over the years. First, open public consultations are held where parties intervening to comment on DSM plans are reimbursed for their cost of participation. Second, a body of past decisions is continually built up to which OEB members and staff can refer in making decisions. Third, a decoupling mechanism exists that de-links the gas distributors' role of providing both gas supply and gas conservation. Gas distributors earn revenue by distributing or delivering gas to homes and businesses, charging a volumetric rate (for example 20 cents per cubic meter of gas) for delivery. The regulatory tool of decoupling financially compensates distributors for their lower volume of gas and hence lower revenues earned when consumers conserve natural gas. Its intent is that pursuit of gas conservation by companies who sell gas is not discouraged. And fourthly, a mechanism called shared savings exists to encourage gas distributors to meet the DSM targets contained in the OEB-approved plans. The companies can retain, as shareholder profit, a percentage of the revenues associated with the gas they would have sold. The Board's August 25, 2006 decision in EBO-2006-0021 generic proceeding dealt with a large number of issues relating to DSM. A rules-based and framework approach was established where appropriate and practical, which the Board expected would result in significant regulatory savings for the parties, the Board and, ultimately, for ratepayers. Below is a list of the broader matters that were agreed by stakeholders and decided by the Board in that decision.

- A three-year term for the first DSM plan
- Processes for adjustments during the term of the plan
- Formulaic approaches for DSM targets, budgets, and distributor incentives
- Determination of how costs should be allocated to rate classes
- A framework for determining savings
- A framework and process for evaluation and audit
- The role of distributors in electric conservation and demand management activities and initiatives.

[30] See EBO 2008-0150 and EB-2008-0346. http://www.oeb.gov.on.ca/OEB/Industry/Regulatory+Proceedings/Policy+Initiatives+and+Consultations/DSM+Guidelines+for+Gas+Distributors

http://www.rds.oeb.gov.on.ca/webdrawer/webdrawer.dll/webdrawer/rec/88311/view/Board_ltr_Consultation_DSM_20081031.PDF

[31] Under consideration were matters like: assumptions related to the performance of efficient technologies (these assumptions are used as inputs to model the benefit-cost of DSM activities); adjustment factors used when reporting energy savings and modelling benefit-cost; the calculation of payment of incentives to the distribution companies for achieving forecast financial and energy savings from their DSM programs; revenue recovery, and, refinements to how the companies evaluate their programs and provide annual reports on program success to the OEB.

[32] See M. Winfield and T. Koveshnikova
http://www.yorku.ca/fes/research/docs/TotalResourceCostTest.pdf

[33] This draft regulation will align Canada with the US program developed by the EPA under the Clean Air Act.

[34] Long Combination Vehicles (LCVs) - In the summer of 2009, MTO started a pilot program of up to 100 LCV transport trucks (two full sized trailers) on designated highways over a one-year period. According to MTO, by using less fuel to carry goods, LCVs reduce the greenhouse gas emissions associated with shipping goods by approximately one-third.

Mandatory Truck Speed Limiters - Starting January 1, 2009, most large trucks in Ontario were required to use electronic speed limiters that cap their speed at a maximum of 105 kilometres per hour. According to MTO, speed limiters will result in lower fuel consumption that will reduce greenhouse gas emissions, save money on fuel purchases and reduces the risk of collision.

Green Procurement - The Ontario government is committing $416.3 million to support the City of Toronto's purchase of 204 replacement streetcars. The new streetcars will use 10-20% less power than the existing streetcars. The first streetcars will be in service in 2012.

Other Ongoing MTO Programs:

The Ontario Transportation Demand Management (TDM) Municipal Grant Program: A Program to Encourage Cycling, Walking, Transit, and Trip Reduction - MTO provides financial assistance to municipalities for the development and implementation of TDM plans, programs, and services that promote alternatives to driving alone.

The MoveOntario 2020 plan - Announced on June 2007, it is an $11.5 billion, 12 year plan with 52 rapid transit projects in the GTAH, most of the projects have been incorporated into the Big Move or are being carried out by Metrolinx. The 2010 Ontario Budget indicated that Ontario will delay payment of $4 billion of this funding.

The Green Commercial Vehicle Program - Provides grants to companies for the purchase of hybrid and alternative-fuel vehicles and retrofit heavy-duty vehicles with anti-idling technologies.

The Ontario Bus Replacement Program (OBRP) - Provides long-term funding for municipalities to replace conventional and specialized transit buses. According to MTO, "newer buses, with improvements in design and technology, coupled with improved fuel technology, produce fewer emissions." The 2010 Ontario Budget cancelled funding for this program.

The Ontario Public Service Green Fleet Strategy - Will reduce fuel consumption and GHG emissions in the OPS fleet by 10% by the end of 2011/12 by: reducing the fleet size; reducing the median age of fleet vehicles; increasing the number of hybrid vehicles; and achieving a 5% reduction in idling time through the Green Fleet Awareness Campaign and telematics to track vehicle performance data.

[35] Source: Ontario Ministry of Transportation, *Ontario Road Safety Annual Report 1993-2006*.

[36] The annual average increase for passenger transportation is 1.4 percent and for freight transportation is about 2.9 per cent. Source: Natural Resources Canada, Historical Database, Transportation Sector, Ontario Secondary Energy Use by Energy Sources. Annual Percent Change derrived from Table 7. Ottawa, Office of Energy Efficiency, 2008.

[37] *Annual Greenhouse Gas Progress Report 2008/2009*, p. 4, 17

[38] On April 1, 2010, the Government of Canada announced that it is moving forward with proposed regulations to require an average renewable fuel content of five per cent in gasoline by September 2010. (Environment Canada Press Release).

[39] The value of the rebate is dependent on the vehicle's battery capacity.

[40] Use of HOV lanes is for a limited time (5 years) starting after 2010. (Employer, e.g., the University of Toronto and private companies such as Walmart Canada) will designate priority parking spots for vehicles with green plates. *A Plan For Ontario: 1 In 20 By 2020*. July 15, 2009. http://news.ontario.ca/mto/en/2009/07/a-plan-for-ontario-1-in-20-by-2020.html

[41] "Efficient Vehicles Versus Efficient Transportation: Comparing Transportation Energy Conservation Strategies." Todd Litman Victoria Transport Policy Institute. 26 August 2009 Published in *Transport Policy*, Volume 12, Issue 2, March 2005, Pages 121-129.

[42] MTO and MEI also assisted other ministries on transportation energy efficiency, for example, assisting the Ministry of Finance to develop fiscal policy like fuel consumption taxes and rebates for alternate fuel vehicles, and aiding the Ministry of the Environment to implement Ontario's Drive Clean program for passenger vehicles.

[43] The program was sponsored by the Ontario Ministry of Energy, which provided funding and policy direction. The Ministry of Transportation was largely responsible for program delivery. Advisory committees were established in the principal areas to provide user perspectives on program content and best means to communicate with user groups.
DriveSave was established to review options available to light duty vehicle drivers, including both personal transportation and light duty fleets. The steering committee was struck in consultation with the National Association of Fleet Administrators, which represents managers of fleets such as Nestles or Xerox. This group was also influential in the marketing side of Drive Propane, which sought to increase the use of propane as an automotive fuel.
The Trucksave program looked at actions open to the heavy vehicle sector, and drew its advisory committee members from the Ontario

Trucking Association. It considered actions such as air deflectors, progressive shifting, and the impact of tire pressure.
The municipal component reviewed programs available to municipal fleets (drawing on the Trucksave and DriveSave programs) and also considered actions open to municipalities such as enhanced traffic signal timing and use of four-way stop signs. The advisory committee consisted of senior managers from the public works side.

[44] In October 2009, MTO posted a policy proposal notice for a Sustainability Strategy on the Environmental Registry. It described the development of a corporate sustainability strategy to provide a basis for integrating sustainability into MTO's policies, programs, business practices, and decision-making. The strategy, which is an internal guidance document, is designed to make MTO's work and decision-making sustainable and by extension make Ontario's transportation system sustainable. It identifies seven long-term goals which are applicable to transportation system planning and policy decisions across the ministry. It promotes transportation demand management through such measures as land use planning, efficient use of modes of transport, trip reduction and others, although there is no explicit goal for energy conservation.

Specific commitments to accomplish the goals are expected to be published in an implementation plan that will be updated on a three-year cycle and will also report on progress in meeting commitments from previous plans. The strategy is expected to be made publicly available in 2010 and the release of the first sustainability implementation plan will be in 2011. The ECO will evaluate it in a future report.

[45] The *GEGEA* adds the ability for the Ministry to also require conservation plans from additional "prescribed consumers". It is not known which groups this is intended to apply to.

[46] See amendments 9 and 10.
http://oee.nrcan.gc.ca/regulations/amendments.cfm?attr=0

[47] See EBR Registry number 010-2994
http://www.ebr.gov.on.ca/ERS-WEB-External/displaynoticecontent.do?noticeId=MTAyOTkw&statusId=MTUzOTQx&language=en

[48] http://www.mei.gov.on.ca/en/energy/gea/

[49] The US government, in a February 2010 report to Congress, indicated it was considering new standards for small electric motors, lamps, ballasts, microwave ovens, clothes dryers, commercial refrigeration equipment and other products.

[50] The federal government, in contrast, issued a bulletin on March 22, 2010 and is proposing amendments to add a labeling requirement for televisions by July 1, 2011. The proposed EnerGuide label will introduce and display the annual operating cost in addition to the traditional annual energy consumption (kWh), and will compare TVs of the same screen size.

[51] A report by the U.S. Environmental Protection Agency ("Report to Congress on Server and Data Center Energy Efficiency, Public Law 109-431", 2007) notes that electricity consumption in U.S. data centres doubled between 2000 and 2006. The trend in Canada is likely to be similar.

[52] Energy Intensity refers to the amount of energy used per measure of output, for example, kWh per unit of GDP or kWh per square meter in buildings or MJ per passenger-kilometre travelled.

[53] IPSP document - *4861_D-1-1_corrected_071019 - OPA-IPSP-Exhibit D tab 1 Schedule 1*

[54] Source: OPA IPSP document named: 4861_D-1-1_corrected_071019 - OPA-IPSP-Exhibit D tab 1 Schedule 1

[55] Based on OEB calculator: http://www.oeb.gov.on.ca/OEB/Consumers/Electricity/Your+Electricity+Utility. Calculation performed for Toronto Hydro, for a customer on fixed-rate pricing, consuming 800 kWh per month. Figure is "all-in", including delivery charge, regulatory charge, DRC, and GST.

[56] Based on estimate from Consumer Guide to Home Energy Savings that cooking at 350 F for 1 hour in a typical gas oven uses 0.112 therm: http://www.consumerenergycenter.org/home/appliances/ranges.html

[57] Based on Enbridge rates as of January 1, 2010: https://portal-plumprod.cgc.enbridge.com/enbridge/files/Enbridge_rate1.pdf. Figure is

"all-in", including supply+adjustment, transportation, delivery, customer charge and GST.

[58] Unlike fixed tanks or vehicles, refill of small portable propane tanks may be charged by weight, not volume. The standard barbecue tank holds 20 lb of propane - approximately 17.8 L.

[59] 50 000 BTU barbecue operating at half power.

[60] Natural Resources Canada, Average Retail Fuel Prices in Toronto for week of March 9, 2010: http://www2.nrcan.gc.ca/eneene/sources/pripri/prices_byfuel_e.cfm?LocationID=17#Glance. Price data for heating oil also comes from this page.

[61] Federal House in Order *Annual Report on Emissions Reductions from Federal Operations*, Government of Canada. Energy data for heating oil also comes from this page.

[62] Assumes 30% efficiency, and 24 horsepower output.

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