



Environmental
Commissioner
of Ontario

RESTORING BALANCE

A Review of the First Three Years of the Green Energy Act

Annual Energy Conservation Progress Report – 2011 (Volume One)



LIST OF ACRONYMS

ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers	IPSP	Integrated Power System Plan
BAPs	Ontario Energy Board-Approved Programs	LDC	Local Distribution Company
BPS	Broader Public Sector	LEED®	Leadership in Energy and Environmental Design
BTU	British Thermal Unit	LTEP	Long-Term Energy Plan
CDM	Conservation and Demand Management	MOI	Ministry of Infrastructure
CSA	Canadian Standards Association	MMAH	Ministry of Municipal Affairs and Housing
DOE	U.S. Department of Energy	MTO	Ministry of Transportation
DSM	Demand-Side Management	NRCan	Natural Resources Canada
<i>EBR</i>	<i>Environmental Bill of Rights, 1993</i>	OBC	Ontario Building Code
<i>ECLA</i>	<i>Energy Conservation Leadership Act, 2006</i>	OEB	Ontario Energy Board
ECO	Environmental Commissioner of Ontario	OPA	Ontario Power Authority
EDA	Electricity Distributors Association	OPS	Ontario Public Service
<i>EISA</i>	<i>Energy Independence and Security Act, 2007</i>	PCP	Partners for Climate Protection
ERS	EnerGuide Rating System	RFI	Request for Information
FIT	Feed-in Tariff	SB-10	Supplementary Standard SB-10 (related to the Ontario Building Code)
<i>GEA</i>	<i>Green Energy Act, 2009¹</i>	SB-12	Supplementary Standard SB-12 (related to the Ontario Building Code)
<i>GEGEA</i>	<i>Green Energy and Green Economy Act, 2009</i>	SCT	Social Cost Test
HERS	Home Energy Rating System	TRC	Total Resource Cost
HESP	Home Energy Savings Plan	W	Watt
HVAC	Heating, Ventilation, and Air Conditioning		
IESO	Independent Electricity System Operator		

1 Throughout this report, the terms “Green Energy Act” or “GEA” (without italics) are used as shorthand to refer to any element of Bill 150 and its related policy or regulatory provisions. Bill 150, the *Green Energy and Green Economy Act, 2009* was an omnibus bill which created the *Green Energy Act, 2009* and amended 11 other Acts. While the *Green Energy Act, 2009* houses many of the bill’s conservation-related elements, some key changes related to conservation are contained in the other amended statutes. Where there is a need to refer specifically to the *Green Energy Act, 2009* or another Act amended by Bill 150, the italicized version is used.

Environmental
Commissioner
of Ontario



Commissaire à
l'environnement
de l'Ontario

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

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

June 2012

The Honourable Dave Levac
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 to you Volume One of the Annual Energy Conservation Progress Report – 2011 of the Environmental Commissioner of Ontario for your submission to the Legislative Assembly of Ontario.

The Annual Energy Conservation Progress Report – 2011 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,

A handwritten signature in black ink, appearing to read 'Gord Miller', with a long horizontal flourish extending to the right.

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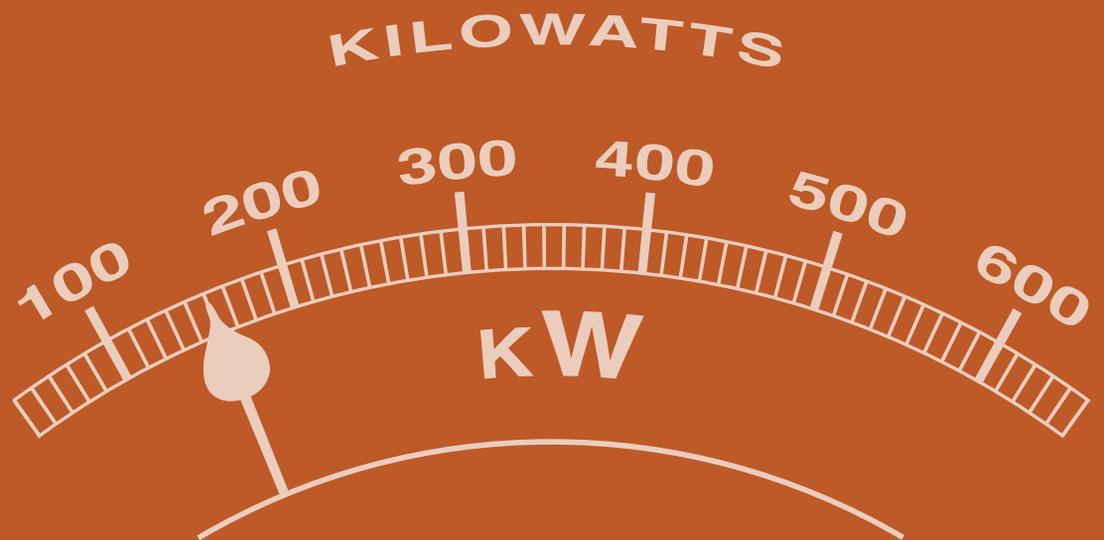
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EXECUTIVE SUMMARY



Under the *Environmental Bill of Rights, 1993*, the Environmental Commissioner of Ontario (ECO) reports annually to the Legislative Assembly of Ontario on the province's progress in energy conservation.

This report is Volume One of the 2011 annual energy report and reviews policy development. It has been three years since the *Green Energy Act, 2009* (GEA) took effect in May 2009. There has been much activity since then related to the renewable generation provisions of the Act, as is evident by the creation and refinement of the province's Feed-in Tariff (FIT). In the ECO's view, much less effort has been directed at the conservation-related provisions and policies of the Act.

The report focuses on four key energy conservation policy commitments made to develop a culture of conservation, which accompanied the government's release of the GEA. Overall, three years in, the ECO believes that the conservation promises of the GEA remain unfulfilled and possibly still years away from completion.

COMMITMENT ONE

"North American leading energy efficiency standards (Energy Star) for household appliances, including efficient use of water"

There is little evidence that the Ontario government has given product energy efficiency standards a high priority since 2009. Energy efficiency standards set a minimum energy efficiency level that a product must meet to be legally sold. Over time, as technology improves and products become more energy-efficient, the bar is typically raised by increasing minimum efficiency standards. None of the regulatory changes Ontario has proposed to date would set efficiency levels for major appliances that are higher than Canadian or U.S. requirements.

The ECO believes that minimum efficiency standards can and should play an important role in reducing energy consumption and greenhouse gas emissions in Ontario, complementing conservation programs. The ECO believes that the Ministry of Energy missed an opportunity to save Ontarians energy and money, shortly after passage of the GEA, by not acting to implement the ENERGY STAR® standard as the minimum performance standard for certain products. The Ministry of Energy should lead an analysis to identify which products offer the most promising opportunities for saving energy in Ontario. For these products, Ontario should work with the federal government to strengthen national standards. If unsuccessful, the province should act alone.

The ECO recommends that the Ministry of Energy set North American-leading energy efficiency standards for key products with the greatest potential for Ontario to save energy.

COMMITMENT TWO**“Mandatory home energy audits prior to sale of homes”**

The intent of this commitment was to make the energy efficiency of a home transparent through a rating provided prior to the sale. This helps buyers understand a home’s energy use and on-going operating costs – what is sometimes referred to as the “second bill” of a home purchase. During consultation, both strong support and opposition for this commitment was expressed by stakeholders, and the Act was amended prior to passage to accommodate the diverse views. Although the *Green Energy Act* was passed in May 2009, the section related to mandatory home energy efficiency disclosure has not yet been proclaimed into force, and no action appears forthcoming.

The ECO believes that the public interest is being harmed by the government’s inaction on mandatory home energy audits. Society no longer tolerates a lack of disclosure for the energy performance of products, such as vehicles and appliances, and it should be no different for home ownership – the largest economic commitment most people make in their lives.

The ECO recommends that the government proclaim and implement the provision for mandatory home energy efficiency disclosure in the *Green Energy Act, 2009*.

COMMITMENT THREE**“Making energy efficiency a central tenet of Ontario’s Building Code”**

Ontario’s Building Code is a regulation that sets mandatory requirements that must be met by all new buildings and certain types of renovations. The Code’s primary and original purpose was to ensure public health and safety, but it has also been used to advance other social priorities, including barrier-free access for Ontarians with disabilities and conservation of resources. The Code is one of the most important conservation tools available to the Ontario government because it affects the energy consumption of all new buildings.

Since the passage of the GEA, the government has established an advisory committee on energy efficiency in buildings, successfully implemented higher efficiency requirements in 2012, and proposed even higher standards for the next edition of the Code (although these changes have not been finalized). The ECO believes the government has met the original intent of its commitment. However, the ECO is concerned that the five-year review of the Code’s energy efficiency provisions is inadequate given the pace of development occurring in some parts of the province.

The ECO recommends that the Ministry of Municipal Affairs and Housing review energy conservation amendments to the Ontario Building Code more frequently than the current five-year cycle.

COMMITMENT FOUR

“Green Ontario government and broader public sector buildings; including the development of conservation plans”

Public sector buildings are large users of electricity and natural gas, and greening these buildings can reduce energy consumption of both fuels. Commendably, the government passed a regulation requiring annual reporting of energy consumption, as well as the creation of energy conservation plans by municipalities, municipal service boards, post-secondary educational institutions, public hospitals, and school boards. The ECO believes that the annual reporting template (which has yet to be finalized) should allow other energy use information, such as fleets and street lighting, to be voluntarily submitted by public agencies. Tracking and reporting on these forms of energy consumption would drive additional conservation efforts.

The ECO recommends that the Ministry of Energy expand the annual energy reporting requirements for the Broader Public Sector to include fleets and other key energy-consuming operations.

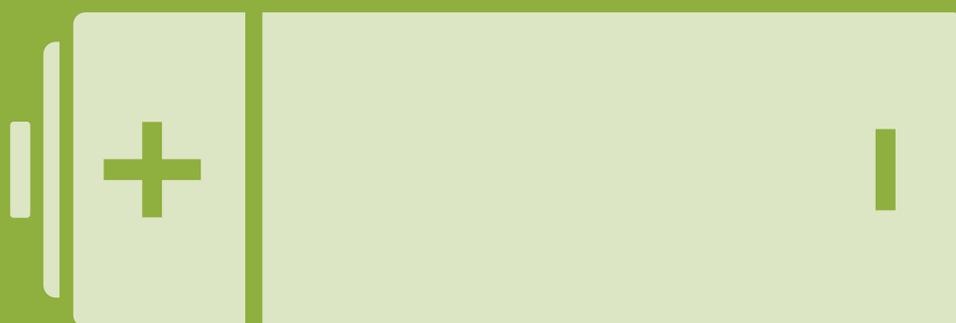
The ECO urges the government, through its directive power, to require comparable action for Ontario government facilities. A strong conservation plan could make the government a leader and serve as a model for the Broader Public Sector.

The ECO recommends that the Minister of Infrastructure issue a directive requiring annual, public reports of energy consumption for all government ministries and an energy conservation plan for the Ontario government by the end of 2012.

To aid the public sector with estimating its carbon footprint, the ECO also believes the greenhouse gas emissions factors for Ontario's electricity generation should be made available on an hourly basis. This promotes electricity use when demand is lower, thereby avoiding construction and use of fossil-fueled peaking power plants.

The ECO recommends that the Independent Electricity System Operator make publicly available the estimated greenhouse gas emissions factors for Ontario's electricity consumption on an hourly basis.

1 INTRODUCTION



1.1 THE ECO'S REPORTING MANDATE AND APPROACH

The Environmental Commissioner of Ontario (ECO) is required under the *Environmental Bill of Rights, 1993 (EBR)* to report annually to the Speaker of the Legislative Assembly of Ontario on the province's progress in energy conservation. Our reporting mandate is to: review progress in reducing or making more efficient use of transportation fuels, oil, propane, natural gas and electricity; measure the achievement of government-established energy conservation targets; and, assess barriers to conservation and efficiency. Reports are issued bi-annually as volume one and two for each year. This report, the Annual Energy Conservation Progress Report – 2011 (Volume One), reviews major policy developments. Volume Two, to be released later in 2012, is data focused and analyzes conservation programs, reviews initiatives undertaken and measures progress towards targets.¹

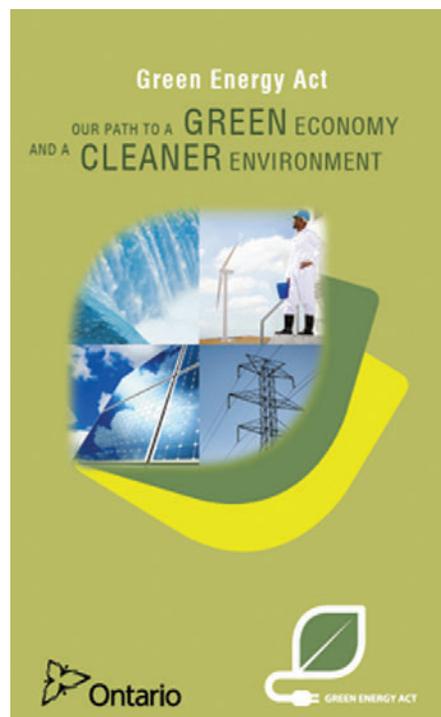
1.2 CONTEXT OF THE REPORT – THE YEAR IN PERSPECTIVE

In comparison to previous reporting years, the government was relatively subdued in 2011 in terms of initiating new policy related to the five sources of energy on which the ECO is mandated to report. This is perhaps a reflection of the more cautious approach sometimes followed by incumbent governments in election years. However, energy agencies, boards and utilities developed new and amended existing policies, either on their own initiative or upon direction from the Minister of Energy. For example, the Independent Electricity System Operator (IESO) developed a new policy for short-term market operational issues, and the Ontario Energy Board (OEB) issued a natural gas conservation policy that it had begun earlier. In contrast to 2011, 2012 may prove to be a more active year for energy policy in Ontario given the government's intention to merge the IESO and the Ontario Power Authority (OPA).

For Volume One of our 2011 report, the ECO has chosen to review progress on the signature energy policy produced by this government, the Green Energy Act. To simplify matters for the reader, we have adopted the following naming convention when referring to the government's legislation. Throughout this report, we use the terms "Green Energy Act" or "GEA" (without italics) as shorthand to refer to any element of Bill 150 and its related policy or regulatory provisions. Bill 150, the *Green Energy and Green Economy Act, 2009* was an omnibus bill which created the *Green Energy Act, 2009* and amended 11 other Acts. While the *Green Energy Act, 2009* houses many of the bill's conservation-related elements, some key changes related to conservation are contained in the other amended statutes. Where there is a need to refer specifically to the *Green Energy Act, 2009* or another Act amended by Bill 150, the italicized version is used.

There are two reasons for this focus on the Green Energy Act: the relative dearth of new policy initiated by the government for electricity and other energy sources; and, the fact that the Green Energy Act is now three years old which provides sufficient time to measure progress.

A summary of the year's other energy policy developments, unrelated to the GEA, is provided in Section 7. There has been little or no policy development for three of the energy sources the ECO is mandated to report on – transportation fuels, oil and propane. There were policies of relatively minor significance produced by the Ministry of Transportation related to transit and sustainability, and no policy activity by the government on conservation of oil and propane. The Ministry of Infrastructure released Ontario's long-term infrastructure plan. Major changes to the regulatory framework that governs natural gas conservation were made by the OEB, and several policy documents related to power system planning and electricity market operations were issued in 2011. These are reviewed in more detail in Sections 6 and 7.



1.3 POLICY OF THE GREEN ENERGY ACT

It has been three years since the *Green Energy and Green Economy Act, 2009* received Royal Assent in May 2009. There has been much activity since then related to the renewable generation provisions of the GEA, as is evident by the creation and refinement of the province's Feed-in Tariff (FIT). In the ECO's view, much less effort has been directed at the conservation-related provisions and policies of the Act.

Building the Culture of Conservation

The government's news release announcing the GEA described it in the following ambitious terms:

"The proposed GEA is a bold series of coordinated actions with two equally important thrusts:

1. making it easier to bring renewable energy projects to life, and
2. fostering a culture of conservation by assisting homeowners, government, schools and industrial employers to transition to lower energy use."²

The government enumerated the items below as the most notable elements of these two equal purposes, and indicated that regulatory changes and policies would flow from these elements.

Table 1: Notable Elements of the Green Energy Act

More Renewables	Culture of Conservation
<ol style="list-style-type: none"> 1. Creating a new attractive feed-in tariff regime - a pricing system for renewable energy - that will guarantee rates and help spark new investment in renewable energy generation, increase investor confidence and access to financing. 2. Establishing the "right to connect" to the electricity grid for renewable projects. 3. Establishing a streamlined approvals process, including providing service guarantees for renewable energy projects and a Renewable Energy Facilitator. 	<ol style="list-style-type: none"> 1. North American leading energy efficiency standards (Energy Star) for household appliances, including efficient use of water. 2. Mandatory home energy audits prior to sale of homes. 3. Making energy efficiency a central tenet of Ontario's Building Code. 4. Green Ontario government and broader public sector buildings; including the development of conservation plans.

Source: Ontario Ministry of Energy, "Ontario's Bold New Plan for a Green Economy," News Release, February 23, 2009.

The GEA was billed as Ontario's bold new plan for a green economy that was "created to expand renewable energy generation, encourage energy conservation and promote the creation of clean energy jobs."³ Through legislation, the GEA provided the ability to make the concept of the conservation culture a reality.

Our report considers, primarily, the elements of the GEA designed to encourage energy conservation and does not concentrate on the GEA provisions related to expanding renewable energy generation. The government's commitment to carbon-free generation has been commendable and there has been much progress made on this aspect of the GEA.

Overall, three years in, the ECO believes that the conservation promises of the GEA remain unfulfilled and possibly still years away from completion. Some commitments — like taking a leadership role in appliance efficiency standards or requiring disclosure of home energy use through efficiency ratings — appear to have been quietly abandoned. Considering the GEA's stated purpose to "encourage energy conservation," the bold new plan has given way to caution and timidity. Given this state of affairs the government should issue a status update containing firm dates for the delivery of the conservation elements of the GEA from the ministers of energy and infrastructure. This would confirm the government's intentions to build a culture of conservation and set the stage for the completion of the conservation commitments of the GEA. Action is needed to restore the balance of the GEA's twin purposes, advancing conservation as forcefully and effectively as the province has promoted and supported renewable energy generation.



After rebalancing, there is an opportunity to enhance the bold vision and incorporate additional policies – conservation has not stood still in other jurisdictions in the three years since the GEA’s passage.⁴ Much remains to be done, not only to complete the GEA and restore its balance but to promote conservation in areas where the province’s policy is either non-existent (e.g., oil, propane and transportation fuels) or faltering (e.g., codes that facilitate

electricity conservation targets) or contradictory (e.g., electricity price rebates for low-volume consumers that blunt the effect of conservation programs).

Sections 2 through 5 of our report review the notable elements of the GEA, outlined in Table 1 above, as identified in the government’s communications when the Act was proposed. For each element, the report examines the government’s commitment, provides background context on the associated technical and policy issues, and evaluates the action to date. Section 6 reviews progress on several GEA provisions that were included in the legislation but which were not identified by the government as one of the statute’s notable elements.

2 LEADING ENERGY EFFICIENCY PRODUCT STANDARDS

"North American leading energy efficiency standards (Energy Star) for household appliance, including efficient use of water"



2.1 THE COMMITMENT

“NORTH AMERICAN LEADING ENERGY EFFICIENCY STANDARDS (ENERGY STAR) FOR HOUSEHOLD APPLIANCES, INCLUDING EFFICIENT USE OF WATER”

The *Green Energy Act, 2009* recreated the legislative authority to set product energy efficiency standards that had previously been found in Ontario's *Energy Efficiency Act* (which the GEA repealed). The old and new laws differ in two particulars. First, the GEA added a new power – the ability to set standards based on a product's water efficiency (in addition to its energy efficiency). Second, the GEA removed enforcement provisions that had been in the *Energy Efficiency Act*. These provisions had included inspection powers and financial penalties for non-compliance. The ECO has previously commented on how the removal of enforcement provisions weakens the government's ability to make Ontario a conservation leader.⁵

Historically, efficiency standards for specific products have been set through regulation, not legislation. Presumably, the government's commitment to increase product efficiency standards was intended to be accomplished through future regulatory changes.

2.2 BACKGROUND

Role of Efficiency Standards

Energy efficiency standards set a minimum energy efficiency level that a product must meet to be legally sold. The effect of standards is to remove the least efficient models in a product category from the market. The historical justification behind energy efficiency standards has been consumer protection. For products that consume a large amount of energy, the “second price tag” that comes in the form of ongoing energy costs may be higher than the initial purchase cost. The need for standards is especially great in circumstances where the purchaser is not the person who will pay the ongoing energy bills, such as the energy bills for appliances in rental housing.

Over time, as technology improves and products become more energy-efficient, the bar is typically raised by increasing minimum efficiency standards. Historically, standards have usually been set relatively conservatively, such that most products sold in the market meet the new standard. However, this has not always been the case. When the United States Department of Energy (DOE) announced in 2001 that a new efficiency standard for air conditioners would take effect in 2006, only 13 per cent of the units sold in 2001 were qualified to meet the new standard.⁶ “Stretch” standards like this, typically announced well in advance to allow manufacturers time to improve their models, help move the market to new levels of efficiency.

Premium product labels, such as ENERGY STAR®, complement efficiency standards. A joint voluntary program of the DOE and the U.S. Environmental Protection Agency, the ENERGY STAR® program labels products that exceed the minimum efficiency standards by a significant amount. The ENERGY STAR® program thus rewards producers of more efficient products by providing a trusted symbol of premium efficiency that consumers can use to assist in their purchasing decisions. Over time, as technology improves and the market share of ENERGY STAR® products increases, minimum legal standards are often raised to match the old ENERGY STAR® efficiency levels; in turn, the ENERGY STAR® levels are raised to a new level of premium efficiency. Both legal standards and premium product labels have helped to improve product energy efficiency over the past two decades. Perhaps the most impressive efficiency gains have been

in the energy efficiencies of major appliances. As shown in Figure 1, the average set of major household appliances purchased in 2009 consumed roughly half the energy of a similar set purchased in 1990.

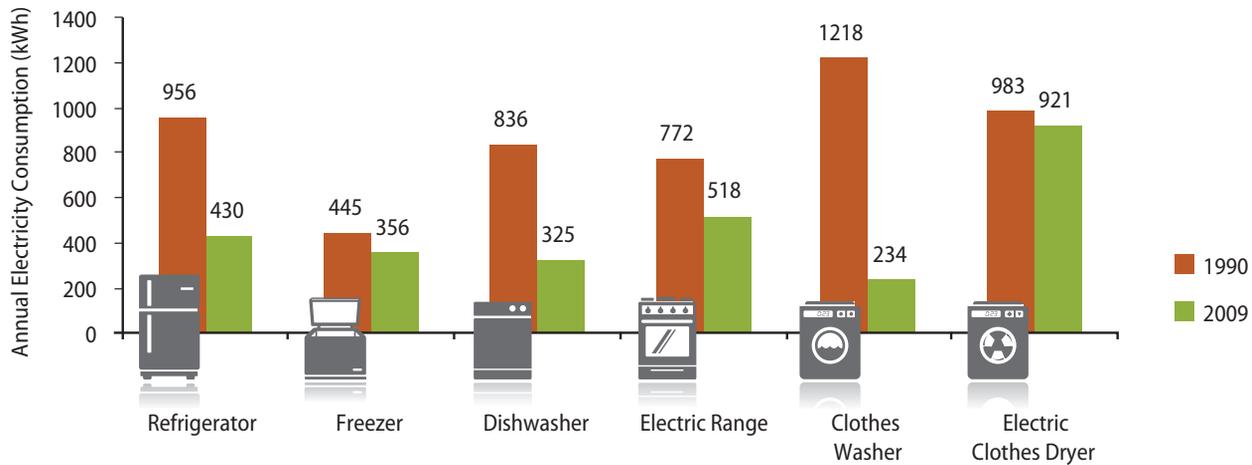


Figure 1: Average Annual Unit Electricity Consumption of Major Appliances, 1990 and 2009

Note: Figure 1 shows the average annual electricity consumption in each product category, based on a weighted average of all models sold, not the annual consumption of the lowest-performing models that just met the minimum standard. Data shown for freezers is for 1991, and data for clothes dryers is for 1992, due to incomplete data for 1990.

Source: Natural Resources Canada, *Improving Energy Performance in Canada – Report to Parliament Under the Energy Efficiency Act For the Fiscal Year 2009-2010* (2011), 15.

How Standards Work In Canada

In Canada, product energy efficiency is regulated at both the federal and provincial level. Products imported into Canada or shipped between provinces must comply with the minimum energy efficiency levels set under the authority of the federal *Energy Efficiency Act*, while all products sold in Ontario (regardless of their place of origin) must comply with the minimum energy efficiency levels set in O. Reg. 82/95 under the authority of the *GEA*. The product categories covered by the two Acts, and the minimum energy efficiency levels for the regulated products, are harmonized to a large degree, but not in all cases.

Regulation of product energy efficiency began in Ontario in 1988 and in Canada in 1995, and the universe of products covered by energy efficiency standards continues to expand. The primary focus has been on those products that are responsible for the largest share of energy consumption. Most heating and cooling equipment, lighting, refrigeration equipment, major appliances and motors are now covered by some form of energy efficiency standard. Electronics are not well covered by energy efficiency standards (although this is slowly changing) and transportation products are not covered at all by the energy efficiency regulations.⁷ Natural Resources Canada estimates that federal energy efficiency standards are or soon will be in place for products that together use approximately 80 per cent of the energy consumed in the residential and commercial/institutional sectors.⁸ The development of standards for electronics is becoming increasingly important for conservation. As the ECO has previously noted, the aggregate energy consumption of minor appliances increased by 140 per cent from 1990 to 2008, due to the proliferation of small electronic devices.⁹

The Canadian Standards Association (CSA), a not-for-profit membership-based association, plays an important role in the development of Canadian energy efficiency standards. Through a consensus-based process, CSA committees perform much of the necessary technical work required before minimum efficiency levels can be set, such as defining the scope of products covered by the standard, and specifying an accurate and reproducible test method to calculate a product's energy consumption. While most final CSA standards do specify minimum efficiency levels, governments do not always adopt these minimum efficiency levels in their regulations, opting for more or less stringent levels. Both the Canadian and Ontario governments provide funding to the CSA and participate in the CSA's standards development work.



Scan this QR code with your mobile device and watch a video of the Environmental Commissioner discussing product standards.

Taking the Lead – What Can Ontario Do?

The United States has its own standards development process, which Canada and Ontario have very little ability to influence. Once a U.S. standard is set, Canada and Ontario often harmonize their standards with the U.S. standard. Even if harmonization does not take place, a U.S. standard may have the impact of removing less efficient products from the Canadian market, as manufacturers see no point in continuing to produce less efficient products that cannot be sold in the U.S. Under this model, the U.S. (and specifically the DOE) becomes the true leader in standards development for many products.

In theory, a smaller jurisdiction can still act aggressively to promote energy efficiency through standards development, either by setting higher energy efficiency standards than the U.S. government, or by setting standards for products where no federal standard exists.¹⁰ California has been the most active jurisdiction in raising the bar for energy efficiency standards, introducing standards for many products back in the 1970s, more than a decade before the introduction of federal efficiency standards. California has continued to push the envelope in recent years, introducing state standards for new products such as televisions, battery chargers and audio/video equipment.¹¹

The actions of California have helped to reduce energy consumption across North America. Product manufacturers have improved the energy efficiency of their products to ensure that they can continue to sell in the large California market. In turn, other states and provinces may adopt California standards. These changes make it easier for the U.S. and Canadian governments to then introduce nation-wide efficiency standards for these products.

It is an open question as to whether premium energy efficiency standards in Ontario could have a similar transformative effect. With only one-third of the population of California, it is unclear whether manufacturers (most of which are U.S. or internationally based and serve multiple markets) would find the Ontario market profitable enough to justify design of unique products with higher efficiencies. The impact would likely depend on the type of product. Major appliances, in particular, are designed for a single North American market – in 2006, 90 per cent of appliances sold in Canada were imported, and Ontario represents only 4 per cent of the North American appliance market.¹² It is doubtful that higher Ontario standards would lead to changes in appliance design. However, Ontario could still reap the near-term benefits by introducing a higher efficiency standard that excludes poor performing models – typically saving customers money through reduced energy costs and reducing overall energy consumption. This would come at the possible cost of a reduced product selection for Ontario customers.

British Columbia provides a Canadian example of a jurisdiction that has given a high priority to advancing energy efficiency standards. In recent years, B.C. has taken the following actions that go beyond national standards in order to save energy:

- Implemented the new efficiency standards for 75 watt (W) and 100 W equivalent bulbs (but not 40 W and 60 W equivalents) in January 2011, three years in advance of the Ontario and Canadian governments (see Section 2.3.1 “Banning the Bulb”);
- Introduced energy efficiency standards for televisions (similar to but more comprehensive than California, and not matched by Ontario or Canada);
- Increased the energy efficiency standards for certain types of refrigerators, well in advance of the Government of Canada; and
- Introduced efficiency standards for windows in low-rise and high-rise buildings.



ENERGY STAR® For Appliances

The Ontario government's specific GEA commitment to premium standards was to raise minimum standards for major appliances to ENERGY STAR® levels. The three appliances where higher standards would have had the most effect are refrigerators, clothes washers and dishwashers.

Table 2: Market Share and Energy Performance of Selected ENERGY STAR® Appliances (2009)

Appliance	Market Share of ENERGY STAR® Products (2009)*	Energy Saved By ENERGY STAR® Products (compared to minimum standard, 2009)
Refrigerators	56%	20%
Washing Machines	73%	36%
Dishwashers	89%	41%

Note: *Market share is averaged across all product sub-classes. For example, there are many different sizes of refrigerators.

Source: Natural Resources Canada, Energy Consumption of Major Household Appliances Shipped in Canada, Summary Report Trends For 1990-2009 (2011).

The data in Table 2 demonstrate several points. First, the market share of these ENERGY STAR® products had passed the tipping point where they became the default choice for most consumers, suggesting that the cost premium for ENERGY STAR® products was small. Second, significant energy efficiency differences existed between minimum standards and ENERGY STAR® products. It is likely that some of the non-ENERGY STAR® products purchased in 2009 were purchased by consumers who were not aware of the higher energy costs that these products would incur, or were not directly responsible for paying these energy costs (e.g., landlords or builders).

Several years after the passage of the GEA, improvement to minimum standards for these products is now coming about through the action of the U.S. government. In September 2011 and May 2012, the U.S. DOE finalized new standards for refrigerators, washing machines, and dishwashers (to take effect beginning in 2013 for dishwashers, and in 2014 for refrigerators and washing machines). All three of these standards will tighten energy efficiency levels significantly, to levels similar to 2009 ENERGY STAR® levels, and will likely be adopted by Ontario.¹³

2.3 ACTION TO DATE

Development of energy efficiency standards has proceeded at a rapid pace in recent years, although the Ontario government has played only a marginal role. Beginning with the passage of the *Energy Independence and Security Act, 2007 (EISA)*, the U.S. DOE has given a higher priority to standards development and raised energy efficiency standards for many products.¹⁴ Many of its new standards have been subsequently harmonized by the Canadian government.

The Canadian government has also been very active. Amendments 10 and 11 to the federal *Energy Efficiency Regulations*, made in December 2008 and October 2011, respectively, introduced or increased the energy performance standards for a large number of products. Some significant changes included an increase in the efficiency requirement for gas furnaces from 78 to 90 per cent (more than three years before this efficiency level became a requirement in the northern U.S.), an intention to raise the minimum efficiency level for general service lighting (screw in bulbs, for more information see 2.3.1 "Banning the Bulb"), maximum stand-by power limits for audio/video products, and minimum energy performance standards for external power supplies. A further amendment is also in the planning stages.



2.3.1 BANNING THE BULB

Converting most of its energy into heat instead of light, the classic incandescent bulb is now widely recognized as an inefficient technology that has been superseded by newer lighting technologies. These energy efficient alternatives have come down in price and improved in performance in recent years. In April 2007, the Government of Ontario committed to banning the sale of “inefficient” light bulbs by 2012.¹⁵

In December 2007, the U.S. passed the *Energy Independence and Security Act, 2007 (EISA)*, which requires that general service lights be approximately 25 per cent more efficient than the standard incandescent bulb. This standard can be met by several technologies, including fluorescent bulbs and modified halogen bulbs that look and perform similarly to typical incandescents. The *EISA* requirements come into force between January 1, 2012, and January 1, 2014, depending on the bulb wattage.¹⁶ A further tightening of the standard, to efficiency levels similar to fluorescent bulbs (75 per cent more efficient than typical incandescents), is planned sometime after 2014. Due to the enormous number of light bulbs in use, even the modest improvement in energy efficiency mandated by the new standard will have a large impact. The U.S. Department of Energy estimated that almost half of the energy savings and more than 60 per cent of the cost savings associated with a package of 10 new *EISA* standards could be attributed solely to the new lighting standard.¹⁷

Both the Canadian and Ontario governments originally had proposed to harmonize with the energy performance requirements of the U.S. law, but intended to bring the new requirements into force sooner than in the U.S. (see Table 3, below). However, in October 2011, the Canadian government changed direction and moved back the date of implementation by two years, making Canada a laggard to the U.S. instead of a leader. The stated reason for the change was to allow more time to inform Canadians of alternative lighting options and to allay concerns over the potential health impacts of mercury in fluorescent lights. The Canadian government’s decision noted that the two-year delay in implementing the standard would cost Canadians \$300 million (primarily through higher energy costs), as well as increase energy consumption and greenhouse gas emissions.¹⁸

Ontario followed the Government of Canada’s lead and delayed the implementation of the new light bulb standards in Ontario, through an amendment in February 2012 to O. Reg. 82/95 under the *Green Energy Act, 2009*.

Table 3: Date of Implementation of New Energy Efficiency Standards for General Service Light Bulbs

Bulb Equivalent	Date of U.S. implementation	Date of Canada/Ontario implementation (original proposal)	Date of Canada/Ontario implementation (revised)
100 W	January 1, 2012	January 1, 2012	January 1, 2014
75 W	January 1, 2013	January 1, 2012	January 1, 2014
60 W	January 1, 2014	December 31, 2012	December 31, 2014
40 W	January 1, 2014	December 31, 2012	December 31, 2014

Since the passage of the GEA, Ontario has continued to participate in standards development through the CSA, but has made only one legal change to Ontario’s energy efficiency regulations, the new efficiency standard for general lighting. Unfortunately, this regulation had the effect of delaying Ontario’s implementation of the new standard, failing to achieve Ontario’s original promise of banning inefficient lighting by 2012.

Ontario has posted two proposals on the Environmental Registry (#010-9765 and #011-1908) for additional regulatory amendments that would address a much larger range of products, but these proposals have yet to become law. Since most of the proposed changes would harmonize with existing Canadian or U.S. requirements, they would have little practical impact. One proposed change that would have an impact is the proposal to set minimum energy efficiency levels for windows. Neither Canada nor the U.S. regulates window efficiency levels. Another potential change of significance was the proposal to introduce a minimum water efficiency level for toilets. However, neither of these changes has been approved yet, and with the passage of the *Water Opportunities and Water Conservation Act, 2010*, the ability to set water efficiency requirements for products has been moved from the Ministry of Energy to the Ministry of the Environment.¹⁹

On the specific GEA commitment of introducing ENERGY STAR® standards for household appliances, the government has backed away from this intention. None of the regulatory changes Ontario has proposed would set efficiency levels for major appliances that are higher than Canadian or U.S. requirements.

Ontario apparently still sees an important role for standards in contributing to the achievement of its conservation goals, at least for the electricity sector. The OPA has estimated that up to 50 to 60 per cent of the 2030 energy conservation target in the Long-Term Energy Plan will be met through codes and standards (including both product standards and the Building Code).²⁰ However, most of the expected near-term energy savings from products reflect changes to Canadian or U.S. regulations, and would be achieved without any action from the Ontario government.

ECO Comment

There is little evidence that the Ontario government has given energy efficiency standards a high priority in the years since the GEA was passed. The delayed implementation date for improved lighting standards, the lack of action on raising efficiency levels for appliances, and the inability to keep Ontario's energy efficiency regulations updated all speak to this point.

The ECO believes that minimum efficiency standards can and should play an important role in reducing energy consumption and greenhouse gas emissions in Ontario, complementing conservation programs. Below, the ECO offers some suggestions, on both the general approach Ontario should take regarding efficiency standards and on specific products.



General Approach

The ECO believes that Ontario's first course of action should be to work with the federal government to develop harmonized national performance standards that are set at appropriately aggressive energy efficiency levels. This reduces duplication of resources and ensures product manufacturers a larger market for efficient products that meet Canadian standards. However, in cases where the final national standards do not satisfy Ontario's commitment to a strong culture of conservation, Ontario should act alone (as British Columbia has), or in concert with other leading provincial jurisdictions, to introduce higher performance standards.

The ECO supports the Ministry of Energy's work in funding and participating in the development of technical standards through the CSA. However, when it comes to setting the minimum performance levels that are adopted as Canadian law, Ontario's Minister of Energy needs to participate in the policy-making process, publicly supporting federal proposals that set aggressive targets and opposing federal proposals that do not go far enough. One forum for this action is the Council of Energy and Mines Ministers, which includes the federal, provincial, and territorial energy ministers.

A recent example demonstrates how Ontario missed an opportunity to express its support for strong national standards. In 2010, the Canadian government proposed new national standards that would phase in very high efficiency levels for two products that are major consumers of energy – water heaters and boilers. These proposals were truly transformative and would have eliminated many lower-efficiency products, exactly the kind of measure Ontario would be expected to support. However, Ontario did not express support publicly for these proposals, or signal an intention to harmonize its own energy efficiency regulations. The Canadian government has recently retreated from its original proposals, suggesting that the new requirements will not be as stringent as originally planned.²¹

Specific Products

The ECO believes that the Ministry of Energy missed an opportunity to save Ontarians energy and money by not following through on its intention to raise minimum standards for major appliances to ENERGY STAR® levels shortly after the passage of the GEA.

As ENERGY STAR® products for refrigerators, dishwashers and washing machines had already captured a majority of market share by 2009, raising Ontario's minimum standards to ENERGY STAR® levels would have yielded energy savings while doing little to restrict consumer choice or raise initial costs. As noted, British Columbia acted independently to raise standards for certain types of

refrigerators. However, now that improved DOE standards for refrigerators, dishwashers, and washing machines that are similar to previous ENERGY STAR® levels have finally been established and will be coming into force soon, there may be little point in Ontario introducing premium standards for these products at this late date.

Given the large gains already made in the efficiency of major appliances, other products may offer greater opportunities for Ontario to advance the standards-setting agenda. Considering Canada's colder climate, stricter standards than the U.S. for heating equipment are often justified. A specific opportunity may exist for furnace fans/air handlers, which circulate conditioned air through the house. Furnace fans are large users of electricity, and efficient technology (electronically commutated motors) can cut energy use by up to 60 per cent in heating mode and 35 per cent in cooling mode. The higher cost of the more efficient technology is recovered through lower energy bills in approximately three years.²² Ontario and Canada have both proposed introducing a test method to assess the consumption of furnace fans, but not a minimum energy performance standard. However, Ontario has proposed requiring electronically commutated motors in new buildings through the Building Code, as of 2015.²³ The ECO encourages the Ministry of Energy to examine whether minimum energy performance standards should also be set for furnace fans through the *Green Energy Act, 2009*, so that they also apply to replacement purchases.

Furnace fans are only one example, but they illustrate that opportunities still exist where Canadian and Ontario standards that are stronger than U.S. standards may be justified. Consumer electronics is another area that should be examined. The Ministry of Energy should lead an analysis to identify which products offer the most promising opportunities for saving energy in Ontario by raising or introducing minimum energy performance standards. For these products, Ontario should attempt to work with the federal government to strengthen national standards, and, if unsuccessful, act alone.



The ECO recommends that the Ministry of Energy set North American-leading energy efficiency standards for key products with the greatest potential for Ontario to save energy.

3 HOME ENERGY AUDITS

"Mandatory home energy audits prior to sale of homes"



3.1 THE COMMITMENT

“MANDATORY HOME ENERGY AUDITS PRIOR TO SALE OF HOMES”

One of the most controversial elements of the GEA, as demonstrated by the amount of media coverage it generated, was the government’s proposal to require home energy audits at the time of sale or lease of a property. In the original version of the *GEA* (prior to amendment) any offer to sell or lease real property would be required to include “information, reports or ratings...relating to energy consumption and efficiency.”²⁴ This section of the Act was broadly worded with the intention that details would be provided later in regulation.

3.2 BACKGROUND

For the past five years, Ontario has explored the use of mandatory home energy audits as a way to value energy-efficient homes in the market and provide home buyers with the necessary information to make an informed decision. The *Energy Conservation Leadership Act, 2006 (ECLA)* provided the government with the power to enact a regulation that would require persons selling, leasing or transferring property to provide energy-related information. The policy was renewed with a 2008 private member’s bill (Bill 101, *Home Energy Rating Act, 2008*), which proposed mandating a “Home Energy Rating Report” be provided to persons who sell or lease houses and low rise multi-unit residential buildings.

The Proposal

In 2009, building on all-party support for Bill 101, the GEA repealed the *ECLA* and included a provision that would require information, reports or ratings at the time of sale or lease. The intent of this provision was to provide energy disclosure. The energy efficiency of a home would be made transparent through a rating provided prior to the sale. This helps buyers understand the home’s energy use and on-going operating costs – what is sometimes referred to as the “second bill” of a home purchase. The requirement would also provide motivation for sellers or buyers to undertake retrofit actions that would reduce household energy consumption.

The Outcome

Public input received through the Environmental Registry and during the review by the Standing Committee on General Government revealed both significant support for and opposition to the provision. In response to some of the concerns raised, amendments were made prior to the passage of the Act that:

- Allowed home buyers to waive, in writing, the right to receive information, reports or ratings;²⁵
- Narrowed the scope to exclude leased properties; and²⁶
- Removed the inspection and enforcement provisions related to home energy audits and minimum efficiency standards.²⁷



3.2.1 THE ENERGY USE OF ONTARIO'S HOUSING STOCK

In Ontario, the average energy consumption per household fell by 21 per cent between 1990 and 2009. However, due to smaller household sizes and a growing population, total residential energy use over the same period has continued to rise.²⁸ Another significant factor affecting energy use in the residential sector is the age of Ontario's housing stock. More than half the existing homes in the province were built before 1983.²⁹ This means most homes were built before any meaningful energy efficiency requirements were incorporated into the Ontario Building Code (see Section 4, Strengthening the Building Code). Since the Building Code only applies to new construction and major renovations, improvements in building standards do not affect the existing housing stock.³⁰ Furthermore, poorer home energy performance is embedded in the housing stock and locked-in for decades. Newer, more efficient homes do not entirely replace the older, inefficient ones.³¹ Unless significant efforts are made to increase the energy efficiency of existing homes, a large portion of Ontario's housing stock will likely remain inefficient well into the future.

Mandatory Home Energy Information

In 2009, the residential sector accounted for 21 per cent of the total energy use, as shown in Figure 2.³² Since the majority of homes in Ontario were built before energy efficiency requirements were included in the Building Code, improving the energy efficiency of the existing housing stock has the potential to deliver significant savings in energy use and greenhouse gas emissions. A mandatory energy disclosure policy can be an important tool in improving the existing housing stock by transforming the real estate market to valuing energy efficiency. Given the potential, several jurisdictions have already adopted mandatory energy disclosure policies (see Section 3.2.2, International Mandatory Home Energy Disclosure Policies).

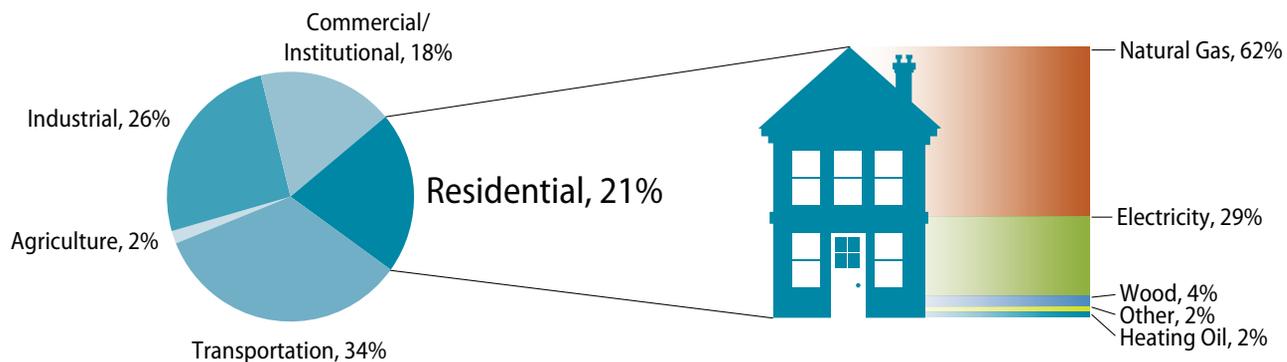


Figure 2: Ontario Total Energy Use and Residential Fuel Mix, 2009

Note: Other includes coal and propane.

Source: Natural Resources Canada, *Comprehensive Energy Use Database Tables, 1990 to 2009*

The underlying premise of time of sale mandatory disclosure policies is that access to energy consumption information will change real estate transactions by integrating environmental protection and home operating costs into property values. When owners must disclose meaningful information about a home's energy performance, it enables the prospective home buyer to consider energy efficiency in their purchasing decision. Armed with this information, some consumers will prefer more energy efficient homes, allowing markets to value energy performance and provide a greater return on investment for energy efficient upgrades.

Currently, home buyers have limited access to information about the energy consumption of a prospective home. Unlike size, location, comfort, or other factors that determine a home's value, the energy efficiency of a home is more intangible. As environmental awareness and energy costs continue to rise, energy efficiency is an increasingly important factor in deciding to purchase a particular home. For example, a 2009 EnerQuality Survey reported nearly nine out of ten Ontario home buyers believe energy efficiency is an important consideration when making new home purchase decisions.³³ Requiring sellers to disclose the energy label of the home would provide a credible way for home buyers to understand and evaluate the energy performance of a home.



Scan this QR code with your mobile device and watch a video of the Environmental Commissioner discussing home energy audits.

Energy labels are already required on consumer products such as appliances and vehicles, where the energy operating costs over the product's life time may exceed the initial purchase price. Although housing is the single biggest investment most people make, and incurs substantially greater energy expenditures than a home appliance or vehicle, there is no equivalent consumer protection available for home buyers. Adding a further level of complexity is that, unlike appliances and vehicles where consumers have developed a general familiarity with energy consumption, most consumers are unfamiliar with the structural components of a house and how they affect energy use. Furthermore, energy consumption varies among houses much more than among most other products, making the need for information greater. A mandatory home energy audit at time of sale, as intended in the GEA, would offer home buyers protection from higher than anticipated energy bills, discomfort or unplanned renovation needs.³⁴ This is particularly important now that both the Ontario and the federal governments have removed support for home retrofit programs. Unanticipated post-sale retrofits will now be more expensive for the new homeowner.

3.2.2 INTERNATIONAL MANDATORY HOME ENERGY DISCLOSURE POLICIES

Although mandatory home energy disclosure policies are not a new idea, these policies have proliferated in the past few years as governments around the world set ambitious energy saving and greenhouse gas emissions reduction targets.

Mandatory disclosure was first adopted at a comprehensive level by Denmark in 1997, which required all homes to obtain an energy label at time of sale and commercial buildings on a yearly basis. A study commissioned by the Danish Energy Authority conducted during June 2000 and February 2001 found that 70 per cent of single family homes were labelled at time of sale, 20 per cent of all single-family homes were labelled within the first 6.5 years, and new home owners planning renovations were more likely to integrate efficiency measures into their plans if their home had received an energy label.³⁵ Other studies have argued that additional factors, besides energy information, motivate home renovations that improve efficiency.³⁶ Inspired by the Danish experience, in 2003 the European Union adopted legislation requiring all Member States to create national mandatory energy labelling and disclosure laws.

In 1999, the capital region of Australia required mandatory energy disclosure for all existing homes at the time of sale (and at the time of rental if the home had already obtained a rating due to a sale). A proposal is currently being considered at the national level to require disclosure of energy, water and greenhouse gas performance information when selling or leasing an existing home.

Several U.S. states and cities have adopted various types of home energy efficiency disclosure policies. In 2009, Austin, Texas enacted the first audit-based disclosure policy in the U.S. for both the residential (at time of sale) and commercial (at 10 years or older) sector. Some regions have opted to only mandate disclosure at time of sale for new homes. For example, Kansas and South Dakota require energy efficiency disclosure forms and Santa Fe, New Mexico requires a confirmed Home Energy Rating System (HERS) index be posted. Another type of disclosure policy, aside from labels and audits, is to require the seller to supply utility bills. As an example, Montgomery County, Maryland requires home sellers to provide 12 months of utility bills along with standard information on the benefits of home energy audits and retrofits. Some regions have gone a step further, implementing mandatory upgrade policies at time of sale to ensure buildings meet minimum energy efficiency standards. For over 25 years, the cities of San Francisco and Berkeley, California have implemented residential energy conservation ordinances requiring mandatory upgrades for homes at time of sale or renovation. Minimum energy efficiency standards at time of sale for rental housing have also been implemented in Wisconsin and Burlington, Vermont.

3.3 ACTION TO DATE

Although the *GEA* was passed in May 2009, the provision for mandatory energy efficiency disclosure (section 3 of the *GEA*) requires proclamation to come into force. This remains the only provision of the Act that has yet to be proclaimed in force.

In the last three years, very little activity has occurred to bring the provision for mandatory home energy disclosure into force. In response to an information request, the Ministry of Energy noted its actions to date consisted of "stakeholder sessions on the development of a regulation with government ministries, agencies, utilities, associations and delivery and service providers."³⁷ The ministry also noted it, along with other jurisdictions, consults with the federal government on the next generation EnerGuide rating and provides advice "to encourage its potential use [as] a suitable home label as contemplated by the provisions of the *GEA*."³⁸

The ministry indicated little to no activity can be expected in the near future. The Ministry of Energy's response to the ECO states: "At this time, the Ministry is not intending to bring section 3 of the *Green Energy Act* into force or develop the regulation to implement mandatory home energy efficiency disclosure. However, the ministry will continue to consider this section and continue to hold discussions with key stakeholders."³⁹

Until section 3 of the Act is proclaimed, home labelling remains a voluntary program through the federal government's EnerGuide Rating System (ERS) (see Section 3.3.1, The EnerGuide Rating System). Due to the success of the federal government's ecoENERGY Retrofit – Homes incentive program, and the complementary provincial programs (Home Energy Savings Program and Home Energy Audit Program), many Ontarians are



familiar with the ERS and recognize the rating as a credible energy evaluation of a home. As a result of these popular programs, more than 500,000 homes in Ontario have received an EnerGuide rating label and about 90 per cent of audited homes were retrofitted between 2007 and 2012. This represents 10 per cent of the existing housing stock. Despite their success, the federal and provincial programs ended in March 2012 with no replacements in place. The only other planned activity in this area is a voluntary home labelling program currently being developed by Enbridge Gas Distribution for implementation in 2013.⁴⁰ Union Gas has included a potential home labelling program in its research plan for future conservation programs.⁴¹

In contrast, much more activity has occurred to increase the efficiency of new home construction. In addition to improved energy efficiency requirements in the Building Code, (see Section 4, Strengthening the Building Code), the cities of East Gwillimbury and Vaughan have required new home constructions to meet ENERGY STAR® standards. There are also some incentive programs available to encourage building higher efficiency standards in new construction.⁴² Although these programs are a step in the right direction, they are unable to affect the large portion of existing, inefficient housing stock. New construction takes time to impact the aggregate housing stock. Meanwhile, Ontario's housing stock is aging.

3.3.1 THE ENERGUIDE RATING SYSTEM

The most widely adopted rating system in Canada is the EnerGuide Rating System (ERS) developed by Natural Resources Canada (NRCan). The ERS provides a rating (a number on a scale from least efficient to most efficient) of the home's level of energy efficiency. The energy performance of a house depends on how the components within it work together. For example, a home's efficiency is much improved with weather-stripping around windows and doors and sufficient insulation in the walls and attic. In order to accurately rate the energy efficiency of a home, the ERS requires a home energy audit. In 2010, NRCan launched a consultation to restructure the ERS. Among other improvements, NRCan is proposing a new scale based on energy use in gigajoules per year where the most efficient rating will be "0" (representing a "net zero home").

The ERS should not be confused with energy labels used to certify that a new home was built to a premium construction standard – that is beyond minimum requirements in the Building Code. Premium labels include ENERGY STAR® for New Homes,⁴³ LEED® Canada for homes, and R-2000.

ECO Comment

The ECO believes that the public interest is not being served by the government's inaction on mandatory home energy audits. The interests of homeowners are harmed by the lack of transparency related to energy use in the home. As a society, we no longer tolerate a lack of disclosure with respect to the energy performance of other products, for example, vehicles and appliances. It should be no different for home ownership, the largest economic commitment most people make in their lives.

Accordingly, the ECO is disappointed with the lack of progress the Ministry of Energy has demonstrated to bring into force the provision for mandatory energy audits at time of sale of a property. Despite years of voluntary programs, the real estate market has failed to serve the public interest by providing needed information on a home's energy use. The ECO believes mandatory home energy labels are necessary to increase residential energy awareness and provide home buyers with the necessary information to factor environmental and operating energy costs into an assessment of a home's value.

Currently, home buyers do not have access to adequate energy information and are thus denied the ability to make an informed decision regarding the energy efficiency of a home. The ECO acknowledges there are other alternatives to energy disclosure policies that are less costly than an energy audit; however, the ECO does not believe they would provide the level of detail required to make an informed decision. For example, utility bills do not provide meaningful information on a home's efficiency. Utility bills characterize the energy use of the home as it is used by occupants and cannot be used for a performance comparison among homes. In contrast, an energy audit characterizes the relative energy use of the home based on its physical characteristics under standardized operating assumptions and can be used for performance comparison among homes. A mandatory requirement to disclose an energy rating would allow for a common point of comparison for energy consumption irrespective of the behaviour of the current owner. Using the *GEA* to mandate home energy audits would not only correct the market's failure to inform consumers and value energy efficiency, but would also provide environmental and economic benefits.

The commitment to mandate home energy audits was intended to foster a culture of conservation by increasing awareness about energy use among homeowners and buyers. The ECO is concerned with the Ministry of Energy's lack of action to uphold the original intent of this section of the *GEA*. By including the provision in the Act, the government committed to energy efficiency disclosure at time of sale as a policy objective. However, in the three years since the Act was passed, the ministry has not demonstrated any significant efforts to bring the provision in to force.

As long as the provision is not proclaimed in force, the government's commitment to foster a culture of conservation, as intended with the *GEA*, will remain incomplete. The ECO urges the Ministry of Energy to reaffirm its commitment to conservation in the residential sector and ensure potential home buyers are provided the information and protection as proposed in the *GEA*.

The ECO recommends that the government proclaim and implement the provision for mandatory home energy efficiency disclosure in the *Green Energy Act, 2009*.

4 STRENGTHENING THE BUILDING CODE

"Making energy efficiency a central tenet of Ontario's Building Code"



4.1 THE COMMITMENT

“MAKING ENERGY EFFICIENCY A CENTRAL TENET OF ONTARIO’S BUILDING CODE”

The GEA included the following legislative amendments related to the Ontario Building Code (OBC or “the Code”):⁴⁴

- Energy and water conservation were listed as purposes for which regulations could be developed;
- The Minister of Municipal Affairs and Housing was required to initiate a review of the energy conservation standards in the OBC within six months (and every five years thereafter); and
- The Minister was required to establish a Building Code Energy Advisory Council to provide advice on the building code standards for energy conservation.

4.2 BACKGROUND

The Ontario Building Code is a regulation (O. Reg. 350/06) under the *Building Code Act, 1992*, which sets mandatory provisions that must be met by all new buildings (certain types of renovation and building change of use are also covered). The Code’s original (and still its primary) purpose is to ensure public health and safety, but this was expanded in 1990 to include requirements related to energy efficiency. The Code has also been used to advance other social priorities, including barrier-free access for Ontarians with disabilities. The intent of the Code’s energy efficiency provisions was to help building occupants avoid high ongoing operating costs for energy. Subsequent energy-related amendments over the past 20 years have mostly strengthened and expanded the energy efficiency requirements of the Code. Premium voluntary energy efficiency programs such as ENERGY STAR® have played a role in improving the Code over time. These programs can bring down the cost and demonstrate the effectiveness of new energy efficiency products and techniques, transforming the market to the point that these practices become suitable for all buildings and ready for mandatory implementation through the Code.

Compared with other jurisdictions, Ontario has been a leader in embedding energy conservation in its building code. Since it affects the energy consumption of all new buildings, the OBC is one of the most important conservation tools available to the Ontario government.

Building Energy Efficiency Requirements Prior to the GEA

The energy efficiency requirements that were in force in the Code in 2009 before the GEA, for small and large buildings (small buildings are primarily residential buildings, 3 storeys or less, with a footprint smaller than 600 square meters), are described below.

The requirements for residential buildings included minimum insulation levels for building components (including walls, roofs, floors, foundations, windows and doors), minimum efficiency requirements for furnaces, and construction measures intended to limit the loss of heat from a building due to thermal bridging (heat transfer through highly conductive construction materials). Insulation requirements were higher for buildings in colder parts of Ontario and for buildings using electric space heating, reflecting the higher operating energy costs for these buildings and the importance of better insulated buildings.

Requirements for larger buildings were more complex, but essentially required compliance (with certain modifications) with one of two more detailed sets of standards. The two options were:

- The 2004 version of the ASHRAE 90.1 standard, a design standard established by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) that is familiar to engineers, architects and builders; or
- The Model National Energy Code for Buildings, a model energy code that was developed by the Canadian federal government in 1997, but has not been widely adopted.

Additional energy efficiency requirements were contained in the 2006 Code, but were not scheduled to come into force until January 1, 2012. While this regulatory change predates the GEA, its implementation was undertaken post-GEA, and is described in Section 4.3, “Action to Date.”

4.3 ACTION TO DATE

A great deal of activity has taken place in the three years since the passage of the GEA.

Advisory Council

The Ministry of Municipal Affairs and Housing (MMAH) has established a Building Code Energy Advisory Council that is composed of experts familiar with energy efficiency and building construction in large and small buildings. The Council first met in February 2010 and has met regularly since then. The Council’s advice played a major role in shaping the energy efficiency proposals proposed by MMAH for the next generation of the Building Code (see “The Next Generation of the Code”). The Council has recently been given a broader mandate to examine water conservation in buildings as well, following the passage of the *Water Opportunities and Water Conservation Act, 2010*.



Implementing the 2006 Code

Prior to passage of the GEA, the 2006 Building Code had established higher energy performance levels for both small and large buildings, with the requirements not coming into force until January 1, 2012. For building permit applications submitted after this date:

- Residential buildings must meet energy performance levels equivalent to a rating of 80 on the EnerGuide rating scale (see Section 3.3.1); and
- Large buildings must meet energy performance levels 25 per cent higher than the 1997 Model National Energy Code for Buildings.

These requirements represented a conceptual change, as they are based on an entire building's energy performance, rather than simply mandating specific practices or technologies for certain elements of a building's construction. Meeting these requirements would require large jumps in energy efficiency.

4.3.1 UNDERSTANDING BUILDING CODE DATES

Code dates can be confusing. Major updates to the Ontario Building Code (OBC) are traditionally made on a five-year cycle, timed to coincide with the update cycle for the (federal) National Building Code, which serves as a basis for the OBC. The version of the OBC in force at the time of writing our report is known as the 2006 Code because that is when the regulation introducing the last round of major changes was made. The government has recently consulted on the next major round of updates to the Code. In this article, we are referring to this as the "2012 Code." The quotation marks are a reminder that this version of the Code remains hypothetical at this time, as the government has not made a decision on the proposed changes.

Further complicating matters, elements of the Code may not come into force until a future date. For example, the whole-building energy performance requirements described in this report (e.g., EnerGuide 80) were a part of the 2006 Code, but did not come into effect until January 1, 2012. Similarly, many of the proposals for the "2012 Code" would not come into effect until 2017. The long lead time allows engineers, architects and builders time to adjust their business practices to meet the new requirements.

To help builders comply with the new requirements for houses, MMAH introduced a supplementary standard (SB-12), which sets out a range of compliance packages from which builders can choose. These prescriptive packages set required efficiency levels for wall, attic and basement insulation, windows, and space and water heating equipment. All prescriptive packages are deemed to be in compliance with the Code since they should, on average, lead to houses that have an energy performance level equivalent to EnerGuide 80. Builders also have the option of not using the compliance packages and demonstrating to building officials (through testing or modelling) that they have met the overall energy performance requirements of the Code.

The key difference between the prescriptive packages and testing (as done through the official EnerGuide procedure) is that EnerGuide requires a blower door test, which measures the rate of air leakage from a house, a key determinant of its energy consumption. To ensure that air leakage is kept at a reasonably low level, the Code mandates specific construction practices to address air leakage. Therefore, MMAH's prescriptive compliance packages allow builders to be in compliance with the Code by installing the appropriate list of measures without the expense (typically several hundred dollars) of a blower door test.

For larger buildings, MMAH intended to develop a compliance pathway that used the ASHRAE 90.1 standard already referenced in the Code. It had originally been thought that simply updating to the newest version (2010) of the ASHRAE 90.1 standard would achieve the Code's energy efficiency goal of 25 per cent higher performance than the Model National Energy Code for Buildings. However, MMAH's analysis suggested that buildings in minimal compliance with the ASHRAE 90.1 (2010) standard would fall slightly short of this goal. Therefore, MMAH amended a supplementary standard (SB-10) that built on the ASHRAE 90.1 standard, but slightly strengthened its energy efficiency levels.

Actual achievement of the new energy performance requirements in the Code requires builders to have the skills to build to Code, and inspectors to be qualified to detect non-compliance. The Ontario Home Builders' Association has been working with service providers to deliver energy efficiency skills training for builders. The Ontario Building Officials Association has been delivering skills training for inspectors, as well as working with industry to design a summary energy efficiency form that builders can submit to inspectors, simplifying an inspector's job of assessing compliance.

The Next Generation of the Code

At the same time that MMAH was working to implement the energy performance provisions from the 2006 Code, it also released for public comment a discussion paper that proposed changes for the next edition of the Code (the "2012 Code").⁴⁵

The discussion paper proposed another round of improvements in overall building energy performance levels, and sought comments on the proposed new levels for houses and larger buildings. Three options were tabled for houses – a 10, 15 or 20 per cent improvement over 2012 levels. Two options were tabled for larger buildings – a 10 or 13 per cent improvement over 2012 levels. The higher efficiency requirements would come into effect at the beginning of 2017, giving the building industry a five-year window to prepare.



In addition to the overall building energy performance objectives, several specific new requirements were proposed for houses, including requirements for programmable thermostats, duct sealing, more efficient furnace motors, low-flow showerheads, and pipe insulation for hot water systems. All of these proposals are “low-hanging fruit,” delivering energy savings at relatively low cost. The time at which each of these proposals would come into force varies.

More controversially, MMAH proposed a requirement that houses be built “solar-ready,” with a conduit from the rooftop to the utility room that could easily accommodate piping or wires for a future solar hot water or solar electricity system. Exceptions would be allowed for houses with site restrictions that would receive low levels of sunlight due to shading.

Finally, the discussion paper proposed expanding the scope of the Code to include the reduction of greenhouse gas emissions and peak electrical demand, and introducing caps on greenhouse gas emissions and peak demand for large buildings. While these caps have no practical impact at this time (any building that met the proposed building energy performance requirement would also meet the greenhouse gas emissions and peak electrical demand requirements), the proposed changes would open the door to future Code measures that could specifically target reduction of greenhouse gas emissions or peak demand.

Public consultation on these changes closed on April 1, 2011, and was followed by a review by a technical advisory committee. At the time of writing our report, the government has not announced a decision on the proposed changes.

ECO Comment

The ECO is generally pleased with progress on the Building Code and believes that the government has met the original intent of this GEA promise.

The ECO commends MMAH for the smooth implementation of the higher building energy efficiency requirements that took effect in 2012, and for not retreating from the original energy goals. In particular, the ECO notes that compliance with the energy goal for large buildings required MMAH to add additional requirements to the generally accepted standard (ASHRAE 90.1 – 2010), and commends MMAH for doing this. The new requirements ensure that Ontario continues to be a North American leader in its Code energy efficiency requirements.

The ECO supports the intention in the “2012 Code” proposals to continue improving building energy efficiency, and encourages MMAH to move forward with a decision in a timely fashion.

The GEA requires a review of the Code’s energy efficiency provisions every five years. The ECO is concerned that this period between Code updates is too long. An example of the problems with the long review cycle is presented in Section 4.3.2.

The ECO recommends that the Ministry of Municipal Affairs and Housing review energy conservation amendments to the Ontario Building Code more frequently than the current five-year cycle.

4.3.2 GLASS BOXES

The Toronto skyline has seen an explosion in the development of large towers in recent years, primarily condominiums. This boom shows no sign of ending. Toronto led all North American cities with 132 new high-rise buildings under construction in September 2011.⁴⁶ This development is generally welcome from an environmental perspective, as the densification of the city can reduce the need for new housing on previously undeveloped land and also reduce emissions and energy consumption from transportation.

Unfortunately, many of these buildings have been built with very high levels of glazing (“glass boxes”) and are poor energy performers, providing little protection against heat loss in the winter, while also being susceptible to overheating on sunny days.⁴⁷ Increased energy consumption by the building’s Heating, Ventilation, and Air Conditioning (HVAC) system to compensate for these design flaws in the building envelope is the inevitable result.

The City of Toronto has addressed the inefficiency of these buildings through the Toronto Green Standard. As part of a larger set of measures intended to reduce the environmental impacts of development, the Toronto Green Standard, introduced in 2006, included a reference to increased energy efficiency for new buildings. The Toronto Green Standard began as a voluntary measure, while the City of Toronto reviewed its legal options for making the requirements mandatory. The City requested that the province permit Toronto to fast track the 2012 energy efficiency requirements of the OBC, but the province took no action on this request.⁴⁸ However, the City determined that it had the legal authority to require a higher energy efficiency building design at the time of site plan submission using its approval powers under the *Planning Act*. The City subsequently acted to make the increased energy efficiency design requirements in the Toronto Green Standard mandatory for new development under certain circumstances as of January 1, 2010, two years before identical energy efficiency requirements became law province-wide.



The new provincial energy efficiency requirements for large buildings should help eliminate the worst-performing “glass box” designs.⁴⁹ However, it is unfortunate that this change took so long and first required the City of Toronto to act on its own. The large number of high-rises designed before 2010 in Toronto and before 2012 in the rest of the province will be locked into lower energy performance for decades to come. MMAH has expressed a preference for consistent building standards across the province, yet this example shows why municipalities have been compelled to seek work-arounds with stricter requirements, outside of the framework of the Building Code. In the ECO’s view, this episode illustrates the need for a quicker turnaround time on energy efficiency updates to the Building Code.

Future Code Developments

Below the ECO offers some additional suggestions for future Code developments on the subjects of measuring performance, encouraging wise behaviour, and avoiding lost opportunities.

Measuring Performance

The ECO suggests that MMAH work with selected municipalities to have an independent energy auditor assess the “as-built” energy performance of a representative sample of large and small buildings built under the Code requirements that came into effect at the beginning of 2012. The intent would not be to retroactively penalize underperforming buildings, but to gain an understanding of how well the new rules are working, and to determine whether the Code’s energy performance goals are being met. This work would help inform MMAH as to whether changes are needed in the current operation of the Code (e.g., additional training for builders or inspectors, or changes to the prescriptive packages), and would also inform the design of future versions of the Code.

Encouraging Wise Behaviour

Even the best-designed building can be a poor energy performer if it is operated inefficiently. While the Code can only do so much to address occupant behaviour, it can at times guide occupants in the right direction. The proposal in the Code to require programmable thermostats in new houses is an example – the thermostat does not guarantee better energy performance, but it provides the occupant with a tool to reduce energy use. For larger buildings, commissioning (testing of building systems) and data collection and measurement of energy use can help an operator ensure that a building is functioning as intended and prevent its performance from degrading over time. The current Code now requires large buildings to commission Heating, Ventilation, and Air Conditioning (HVAC) systems and daylighting systems. Some additional ideas worth examining are to be found in the green model code, ASHRAE 189.1, which expands the commissioning requirements, and requires sub-metering of a building's key energy loads, the collection and storage of energy consumption data, and a plan to track and measure ongoing energy performance.⁵⁰ The ECO encourages MMAH to assess opportunities to increase a building's energy performance through wise operational practices.

Avoiding Lost Opportunities

The ECO supports the proposed change to the Building Code to require a conduit to facilitate the future use of solar energy. This proposal is similar to a regulation that has been passed by the British Columbia government although, unlike in Ontario, local governments choose whether or not to adopt this regulation (36 have adopted it to date).⁵¹ The proposed change recognizes the importance of reducing

greenhouse gas emissions and avoids a lost opportunity – a measure that is substantially more expensive to install at a later date than at the time of building construction. The ECO encourages MMAH to examine whether there are other lost opportunities for energy efficiency or emissions reductions that should be addressed through the Code.



5 GREENING THE ONTARIO GOVERNMENT AND BROADER PUBLIC SECTOR

"Green Ontario government and broader public sector buildings; including the development of conservation plans"



5.1 THE COMMITMENT

“GREEN ONTARIO GOVERNMENT AND BROADER PUBLIC SECTOR BUILDINGS; INCLUDING THE DEVELOPMENT OF CONSERVATION PLANS”

Under the *Green Energy Act, 2009 (GEA)*, public agencies, which include ministries of the Government of Ontario as well as the Broader Public Sector, can be regulated to:

- Achieve set energy conservation and demand targets, while meeting environmental and energy standards;
- Consider energy conservation and efficiency when making capital investments or acquiring goods and services; and
- Prepare energy conservation and demand management plans. Two or more public agencies can prepare, publish and implement joint plans.

Guiding principles related to the construction, operation, and maintenance of government facilities were in the *GEA*. These include: clear and transparent reporting of energy, greenhouse gas emissions and water use within facilities; planning and designing government facilities to ensure the efficient use of energy and water; making environmentally and financially responsible investments; and using renewable energy sources to provide energy for government facilities.

The *GEA* also provides the Minister of Infrastructure the authority to issue directives to:

- Require ministries responsible for the operation of government facilities to report on energy consumption and greenhouse gas emissions associated with facilities; and
- Require energy and environmental standards to be established as minimum standards for new construction and major renovations of government facilities, including specifying requirements relating to energy conservation, energy efficiency and the adoption of renewable technologies, where appropriate.

5.2 BACKGROUND

Two groups are affected by this commitment, the Ontario government and Ontario's Broader Public Sector (BPS). Ontario government buildings are those used by the Ontario Public Service (OPS) to perform work for government ministries. Ontario's BPS includes: municipalities; post-secondary institutions; schools boards; and health care providers.⁵²

Combined, BPS and OPS facilities represent an enormous opportunity for energy conservation. The OPS currently includes over twenty ministries and occupies approximately 4.4 million square metres (47 million square feet) of floor space across the province.⁵³ In 2010, over 448 gigawatt-hours of electricity and over 1,500 billion BTU of natural gas were consumed in government-owned facilities.⁵⁴ The BPS includes many different agencies. Municipalities alone have over 26,000 electricity accounts and meters for their buildings, are estimated to comprise approximately 4 per cent of total provincial electricity consumption, and have electricity costs equalling approximately \$680 million per year.⁵⁵ Similarly, school boards are estimated to have over 25 million square metres (270 million square feet) of floor space, with total annual electricity and natural gas costs equalling roughly \$240 million and \$120 million, respectively.⁵⁶

Monitoring of energy use across all public agencies, however, is inconsistent. The Ministry of Infrastructure (MOI) is responsible for tracking the aggregate energy use for OPS facilities, based on information reported by Infrastructure Ontario (a Crown corporation that manages property occupied by the Ontario government on behalf of many ministries) and a small number of ministries.⁵⁷ Meanwhile, the BPS is composed of a variety of different organizations. Ontario has over 400 municipalities,⁵⁸ over 70 district school boards,⁵⁹ over 200 hospital sites,⁶⁰ over 20 colleges,⁶¹ and over 20 universities.⁶² As a result of the multiple agencies involved, monitoring of energy use within BPS facilities is not as co-ordinated as that of the OPS.

5.3 ACTION TO DATE

Broader Public Sector Regulation

On August 23, 2011, the provincial government filed O. Reg. 397/11, *Energy Conservation and Demand Management Plans*, under the *GEA*. The regulation applies to various public agencies (but not government ministries) and outlines the energy consumption and greenhouse gas emissions reporting requirements. Table 4 is adapted from the regulation and provides an overview of the affected public agencies and their relevant operations covered by the regulation.



Table 4: Regulated Operations by Public Agencies under O. Reg. 397/11

Public Agency	Operation
Municipalities	1. Administrative offices and related facilities, including municipal council chambers
	2. Public libraries
	3. Cultural facilities, indoor recreational facilities and community centres, including art galleries, performing arts facilities, auditoriums, indoor sports arenas, indoor ice rinks, indoor swimming pools, gyms and indoor courts for playing tennis, basketball or other sports
	4. Ambulance stations and associated offices and facilities
	5. Fire stations and associated offices and facilities
	6. Police stations and associated offices and facilities
	7. Storage facilities where equipment or vehicles are maintained, repaired or stored
	8. Buildings or facilities related to the treatment or pumping of water or sewage
	9. Parking garages
Municipal service boards	1. Buildings or facilities related to the treatment or pumping of water or sewage
Post-secondary educational institutions	1. Administrative offices and related facilities
	2. Classrooms and related facilities
	3. Laboratories
	4. Student residences that have more than three storeys or a building area of more than 600 square metres
	5. Student recreational facilities and athletic facilities
	6. Libraries
	7. Parking garages
School boards	1. Schools
	2. Administrative offices and related facilities
	3. Parking garages
Public hospitals	1. Facilities used for hospital purposes
	2. Administrative offices and related facilities

Source: Ontario Regulation 397/11

These public agencies must prepare annual energy consumption and greenhouse gas emissions summaries, and they must also create energy conservation and demand management plans. A discussion of the summaries and plans is provided below. Both documents are to be publicly available and the Ministry of Energy is currently developing web-based tools to guide public agencies with completing the requirements under the regulation.⁶³

Requirement 1:

Summary of Annual Energy Consumption and Greenhouse Gas Emissions

By July 2013, all public agencies must begin reporting annually on energy consumption and greenhouse gas emissions related to facilities outlined in Table 4. Essentially, most buildings that are heated or cooled or provide water or sewage treatment services are covered by the regulation. The Energy Consumption and Greenhouse Gas Emissions Template will be available from the Ministry of Energy. This is a standard template for public agencies to use for producing annual summaries. The template will convert all forms of energy into a common unit and calculate the greenhouse gas emissions using information entered directly from the utility bills. Any conversion factors contained in the template will be provided by the ministry. The template also requires information on the

facility type, operating characteristics and size. Together, these requirements can provide the base data for energy benchmarking – identifying the average amount of energy used per unit area for different types of facilities, as well as the range between the best and worst performers. There is a two-year delay in reporting, so reports submitted in 2013 will provide energy and greenhouse gas emissions information for the calendar year 2011.



**Requirement 2:
Energy Conservation and Demand Management Plans**

The *GEA* enabled the government to produce regulations requiring energy conservation and demand management plans for public agencies. The contents and publication of such plans, outlined in general terms in the *GEA*, will require a summary of energy consumption, a description of future activities to conserve energy, and the expected energy savings of these activities. Through O. Reg. 397/11, these plans will be required for the Broader Public Sector.

No specified template for these plans is mentioned in the regulation; however, the regulation provides details of the information that must be included in the plans:

- A summary of the annual energy consumption and greenhouse gas emissions for operations outlined in Table 4;
- A description of previous, current and proposed measures for conserving and reducing energy consumption;
- Information on the estimated costs and savings for the plan;
- A description of renewable energy projects planned or in place, including energy generation from ground source heat pumps, and solar thermal technology; and
- The proposed time that conservation and demand management activities will be in place.

Plans may be prepared, published and implemented jointly by two or more public agencies, and require approval by each public agency's senior management. Although operations outlined in Table 4 must be covered by the plans, public agencies can also publish information with respect to any other operation that it conducts. No targets for reductions in energy consumption or demand are mandated at this time; however, public agencies must provide information on their goals and objectives for their conservation plans. All regulated public agencies must complete their energy conservation and demand management plans by July 2014. Subsequent plans are to be submitted every five years. If energy conservation work was initiated prior to 2014, public agencies can include information on the results of those measures in the first plan. The second plan (due in 2019) will require a report of the results achieved through the first plan.

5.3.1 LESSONS LEARNED FROM PREVIOUS GOVERNMENT ACTION

The concept of greening the public sector did not originate with the GEA. Earlier efforts include the government's target to reduce electricity consumption within its facilities by 20 per cent between 2003 and 2012. The Government of Ontario believes it will achieve 75 per cent of the 2012 target. When this commitment was made, central tracking of energy consumption in government facilities was not conducted and extensive verification work was undertaken to determine the government's progress towards meeting this target. Lessons were learned and twelve⁶⁴ suggestions and recommendations were developed for government operations based on the verification work. Some of these recommendations may be applicable to the BPS and should be relayed to public agencies regulated under O. Reg. 397/11. Examples of these suggestions and recommendations include setting standards for recording utility account information in a database and recording changes made to meters or account numbers. A discussion of the government's efforts towards this commitment is provided in Section 2.3.2 of the ECO's Annual Energy Conservation Progress Report – 2010 (Volume Two).

Ontario Public Service

Energy Reporting

The GEA provides the Minister of Infrastructure with the directive power to require government ministries to report on energy consumption, greenhouse gas emissions, and water use within government owned or occupied buildings, properties and facilities.

In response to an ECO information request, MOI indicated that the directive is expected to be in place by the fall of 2012, with energy reporting of government facilities to be publicly provided on an annual basis.⁶⁵ Annual reports will include the consumption of all energy types and water used on a facility-by-facility basis for each involved ministry. The first report is expected in the winter of 2012 and it will include energy consumption data from 2006 to 2011.

Although MOI continues to inform the ECO that it will issue this directive, the ECO notes that the ministry originally indicated its intent to post the directive on the Environmental Registry in the spring/summer of 2010.⁶⁶

The MOI has worked with another agency of the OPS, Ontario Shared Services, to change the way that energy consumption information is tracked by the government. This should facilitate ministry compliance with the directive. Central tracking of energy consumption by ministries was implemented on March 1, 2012. Ministries that are responsible for their own energy consumption are now able to view and track this information and report the results to MOI.⁶⁷

Energy and Environmental Standards

MOI advised the ECO that all new major construction projects since 2008 have been built to Leadership in Energy and Environmental Design (LEED®) Silver or higher certification.⁶⁸ This policy has not applied to renovations to date. For comparative purposes, about 70 per cent of the government's capital investment spending since 2009 has been on new construction, with the other 30 per cent for renovation.⁶⁹ MOI has informed the ECO that it intends to formalize this policy by issuing a directive that would set minimum energy and environmental standards for both new construction and major renovation of government facilities. At a later date, the intention is to extend similar standards to the BPS, through a regulation that would require the BPS to consider energy efficiency in capital investments.⁷⁰



ECO Comment

Unlike some other energy conservation promises made in the GEA, with some exceptions, the government has clearly made measurable progress on its commitment to green government and Broader Public Sector operations.

Broader Public Sector

The ECO commends the action taken by the Ministry of Energy in passing O. Reg. 397/11 and strongly supports the decision to make the annual reports and five-year plans public. Based on pilot projects completed among schools and hospitals, energy intensity data for these buildings show variability of as much as five-to-one between best and worst performers.⁷¹ Requiring public reporting of annual consumption data will provide *de facto* benchmarking. Currently, this is not possible due to the lack of publicly available data.

Reporting Publicly

Publicly reporting the amount of energy consumed and comparing consumption rates among facilities may encourage action to be taken by lagging public agencies. This could provide further incentives for compliance and benchmarking to occur within this sector.⁷²

One of the weaknesses of the GEA was the removal of enforcement provisions during legislative review of the Act. Consequently, the Ministry of Energy has a limited ability to enforce compliance with the regulation. In fact, to encourage compliance, the ministry is considering posting an on-line list of organizations that do not submit summaries. Further information on the lack of enforcement provisions has been discussed in Section 5.5 of the ECO's Annual Energy Conservation Progress Report – 2009 (Volume One), and Section 2 of this report also notes the lack of enforcement with respect to codes and standards.

Benchmarking and Target Setting

During the consultation with stakeholders, the Ministry of Energy was told that the BPS was not ready for provincially set targets. As a result of this feedback, and due to insufficient data on energy consumption within BPS operations, the ministry chose not to set energy conservation targets at this time. Instead, it has required agencies to set goals and objectives within their energy conservation and demand management plans. The typical first step for energy performance benchmarking and target setting is the gathering and tracking of data related to energy use within a facility,⁷³ and the ECO believes that this should occur because of O. Reg. 397/11.

Opportunity for Additional Information

The ECO believes that the annual reporting template (which has yet to be finalized) should allow other energy use information, such as fleets and street lighting, to be voluntarily submitted by public agencies. (The opportunity to voluntarily provide additional information already exists for the energy conservation and demand management plans; however, these are submitted on a five-year basis.)⁷⁴ Upon completing the first conservation and demand management plans in 2014, the ECO believes the BPS will be positioned to incorporate other energy consumption into their annual reports on a mandatory basis. Tracking and reporting on these forms of energy consumption would drive additional conservation efforts.

The ECO recommends that the Ministry of Energy expand the annual energy reporting requirements for the Broader Public Sector to include fleets and other key energy-consuming operations.

Guidance Documents

Consistency across organizations for the information reported under this regulation is necessary to evaluate energy performance, especially if benchmarking and conservation targets are set in the future. A template alone does not guarantee a standardized approach will be used by each organization and, without this, the usefulness of the information can be compromised. The ECO urges a guidance document to accompany the template be made available for reporting under O. Reg. 397/11. The ECO suggests that any web-based tools and guidance documents developed by the Ministry of Energy to assist with reporting requirements be available sooner, rather than later, to avoid any reporting inconsistencies.⁷⁵

Ontario Public Service

The ECO commends the government for meeting LEED® Silver or higher in all new construction and many renovation projects since the GEA was implemented, and resolving issues of data tracking and co-ordination among ministries that were delaying issuance of the directive. However, the ECO is concerned with other aspects of greening the OPS.

Issuing the Directive

With energy consumption being tracked centrally within government facilities, there is no apparent reason to delay issuing a directive requiring annual, public reports of energy consumption for all government ministries. This is especially true given the recent passage of O. Reg. 397/11. With this regulation in place for the BPS before the government has implemented its own directive, the government is no longer leading by example. The directive power under the *GEA* provided the government with the opportunity to expedite energy conservation plans for the Ontario Public Service. An aggressive government conservation plan can serve as a useful model for the Broader Public Sector, if the directive is issued this year (as indicated by the Ministry of Infrastructure). The energy conservation plan that is developed for the OPS would need to be released well in advance of reporting requirements for the BPS (which is required by June, 2014).

Based on the reporting requirements contained in the regulation for the BPS, the ECO believes similar requirements for the OPS would be desirable. This includes monitoring of all facilities where the OPS is responsible for making payments for energy consumption related to heating or cooling (including owned and leased facilities). The ECO also anticipates annual, public reporting of energy consumption.

The ECO recommends that the Minister of Infrastructure issue a directive requiring annual, public reports of energy consumption for all government ministries and an energy conservation plan for the Ontario government by the end of 2012.

Gathering Timely Data

Ontario's electricity supply mix varies throughout the year and, based on the different energy generation sources, the amount of greenhouse gases being released also varies. The Ontario government has previously worked with the Independent Electricity System Operator (IESO) to obtain greenhouse gas emissions factors for electricity consumption in a timely manner, notably with respect to the elimination of Ontario's coal-fired power plants.⁷⁶ This helps accurately estimate greenhouse gas emissions and avoid any multi-year time delay that could occur when waiting for federally published emissions factors. The ECO values the accuracy of a greenhouse gas emissions database and feels that regular estimates, perhaps monthly or at least quarterly, would improve the accuracy of the greenhouse gas emissions estimates for Ontario's public agencies. As well, the tracking of real-time data could further enhance the ability for the Ontario Public Service and Broader Public Sector to ultimately increase load shifting and reduce peak energy demand. The ECO encourages the Ministry of Infrastructure to examine whether it can use real-time data tracking internally to develop more accurate emissions estimates and encourage more load shifting by OPS facilities.

Furthermore, with the IESO's knowledge of Ontario's electricity generation sources and the link between electricity generation and greenhouse gas emissions, Ontario's estimated greenhouse gas emissions factors for its electricity supply could be published on an hourly basis. This will engage all interested electricity consumers, including the BPS, with estimating their carbon footprints, and promote load shifting and load reduction across the province to avoid the construction and use of fossil-fuel peaking power plants.

The ECO recommends that the Independent Electricity System Operator make publicly available the estimated greenhouse gas emissions factors for Ontario's electricity consumption on an hourly basis.

6 OTHER CONSERVATION ELEMENTS IN THE GREEN ENERGY ACT



Besides the government's notable conservation-related GEA commitments described in previous Sections of this report, the *Green Energy and Green Economy Act, 2009 (GEGEA)* included several other legislative amendments to the *Ontario Energy Board Act, 1998* and the *Electricity Act, 1998* intended to promote and sustain energy conservation. Below is a summary and update of the other energy conservation elements of the *GEGEA*.

6.1 PROMOTING CONSERVATION THROUGH THE ONTARIO ENERGY BOARD

The OEB's objectives were amended to explicitly include the promotion of electricity and natural gas conservation in a manner consistent with the policies of the Government of Ontario, including having regard to the consumer's economic circumstances.⁷⁷

The OEB has a role in conservation by overseeing the spending of ratepayer funds by electricity and natural gas utilities for conservation activities. Its key policy documents related to this promotional role are conservation codes and guidelines developed for natural gas and electricity distributors, complemented by the decisions and orders issued by the Board.

Action to Date

Natural Gas Demand-Side Management Guidelines

The Board issued draft Natural Gas Demand-Side Management (DSM) guidelines for comment but, during the review process, in March 2011, issued a letter stating conservation budgets for natural gas utilities would be frozen at current levels for the next three years. This letter was reviewed in Section 6.1 of the ECO's Annual Energy Conservation Progress Report – 2010 (Volume One). The OEB issued the final Demand Side Management Guidelines for Natural Gas Utilities in June 2011 (case # EB-2008-0346). Some features of the Board's decision may encourage distributors to pursue larger amounts of energy savings that accumulate over a longer term, but it is too early to judge whether this will occur. What is striking about the Board's decision is its rejection of several proposals suggested by stakeholders and supported by Board staff that would have promoted conservation. The Board opted for a more restrictive approach to conservation, similar to its approach in recent decisions that have limited electricity conservation.



6.1.1 THE NEW RULES FOR NATURAL GAS DEMAND-SIDE MANAGEMENT

The Demand-Side Management (DSM) Guidelines provide direction on three key issues that affect the delivery of conservation: (1) programs offered and budgets; (2) the cost-effectiveness tests and other factors considered when approving programs; and (3) measuring and rewarding utilities for successful energy savings.

Program offerings and budgets

The Guidelines froze utility DSM budgets at 2011 levels for three years (with an allowed escalation for inflation),⁷⁸ but permitted a minor budget increase of up to 10 per cent over the three-year period if the extra funds are spent on low-income programs. Subsequently, both utilities filed 2012 – 2014 DSM plans requesting a 10 per cent increase that were approved. Previously, both utilities had been obligated to offer programs to all classes of customers – residential, commercial and industrial. The new Guidelines mean that there is no mandatory requirement that Enbridge and Union offer DSM programs to large industrial consumers. However, they can propose such programs for Ontario Energy Board (OEB) consideration, and both utilities' 2012 – 2014 DSM plans voluntarily proposed such programs, which were approved by the OEB.⁷⁹

Program approval

The Guidelines determined two key matters affecting utilities' cost-effectiveness screening of programs for approval by the Board: the test used would continue to be a cost-effectiveness test known as the Total Resource Cost (TRC) test,⁸⁰ which compares the lifetime costs and benefits of a program; also, direction on the discount rate⁸¹ used in the TRC test was provided.

In establishing the Guidelines, the Board rejected proposals from stakeholders and Board staff to adopt alternative tests or a modified TRC test. This would have factored the avoided environmental damage into program benefits, enabling approval of programs with higher initial costs that deliver sizeable long-term energy savings. Particularly, a modified TRC test would have attributed a small benefit to avoided greenhouse gas emissions when considering the costs and benefits of a program. The decision to not price carbon may limit program offerings over the long term.

As set out in the Guidelines, the discount rate used in the TRC test will continue to be the utilities' weighted average cost of capital. Board staff felt that the use of a lower discount rate would be consistent with emphasizing measures that have deep savings (i.e., larger long-term savings), which was an approach that was broadly supported by many participants. The Board's decision to reject this suggestion means that programs with high upfront costs, which target deep savings and deliver greater savings over the long term, will be disadvantaged and may make it more difficult for them to pass the cost-effectiveness hurdle.

Measuring and rewarding successful program delivery

The incentive system that the utilities previously operated under rewarded them with payments based on financial savings resulting from DSM programs – that is, on the basis of the total amount that DSM programs lowered customer bills as determined by TRC test. This test will no longer be used to determine incentives (although, as noted above, the TRC test was retained for the purpose of cost-effectiveness screening and program approval). In the new Guidelines, a scorecard metric that includes lifetime cubic metres of gas saved by a program, program dollars spent per cubic metre of gas saved, and other factors replaces the TRC test. The OEB's decision is likely a positive step that will encourage utilities not to focus exclusively on low-cost measures.

Enbridge Gas Distribution's and Union Gas' 2012 – 2014 Demand-Side Management Plans

Subsequent to the release of the DSM Guidelines, Enbridge and Union submitted their 2012 – 2014 DSM plans in the fall of 2011, and the Board approved them in February 2012. Encouragingly, the plans are not mere extensions of previous years' offerings but innovate by including new programs. There is an increased focus on deep residential retrofits. Commercial and industrial sector programs offered by both companies are similar to previous years (a number of prescriptive and custom measures are offered), but there is an increased emphasis on benchmarking, process and operational savings.⁸²

Conservation and Demand Management Code and Guidelines for Electricity Distributors

The OEB finalized the Conservation and Demand Management (CDM) Code in September 2010 in response to a Minister's directive.⁸³ In late 2010 and early 2011, using the CDM Code, Hydro One and Toronto Hydro applied for approval of Board-Approved Conservation and Demand Management Programs (BAPs). Both distributors withdrew their applications following unfavourable OEB decisions.⁸⁴ Essentially, the Board ruled that the applications were incomplete or programs submitted for approval duplicated those offered by the OPA. A full description of the Board's decision is contained in Section 2.4.1 of the ECO's Annual Energy Conservation Progress Report – 2010 (Volume Two). Since then, no other distributor has applied for BAPs, and Hydro One and Toronto Hydro have not resubmitted their application – effectively no innovative distributor-led program activity has occurred since the Board's ruling.

The OEB issued draft Guidelines in January 2012 that provide more specific guidance on provisions in the CDM Code and the information to be filed by distributors to support an application for BAPs. The Electricity Distributors' Association (EDA) commented that the draft CDM Guidelines are restrictive and "do not provide any avenues for LDCs [Local Distribution Companies] to pursue the successful development, approval and delivery of Board-approved CDM programs [BAPs]."⁸⁵ The Guidelines were finalized in April 2012 and contained no material changes from the draft document.

ECO Comment

As a result of the Board's action, both gas and electricity distributors are being deterred or restricted from promoting conservation to its full potential, and consequently hurting the public good. As the ECO has previously stated, the recent rulings have been indifferent and even hostile towards conservation, the opposite of what the government intended when the Board's objectives were amended. For example, the CDM Guidelines will likely limit the development of BAPs.

In both the natural gas and electricity framework, the Ontario Energy Board has shown a focus on ratepayer costs in the short term, at the expense of the long-term system benefits of conservation, the financial savings for those who conserve, and the harmful consequences for the environment. The ECO stands by and reiterates its previous recommendation that the Ministry of Energy amend the *Ontario Energy Board Act, 1998* to include having regard to the environmental costs associated with energy consumption as one of the Board's objectives.⁸⁶

6.2 CONSERVATION TARGETS FOR ELECTRICITY DISTRIBUTORS

The GEA added a new provision to the *Ontario Energy Board Act, 1998* that enables the Minister of Energy, with Cabinet approval, to issue directives to the Ontario Energy Board requiring it to set conservation targets for electricity distributors as a licence condition.

Action to Date

On March 31, 2010, the Minister of Energy issued the directive to the OEB outlining electricity consumption and peak demand targets that distributors must meet by December 31, 2014. In November 2010, the OEB issued the specific targets for each distributor. See Section 2.4.1 of the ECO's Annual Energy Conservation Progress Report – 2010 (Volume Two) for a full discussion.

ECO Comment

As noted in the ECO's Annual Energy Conservation Progress Report – 2010 (Volume Two), the ECO is uncertain that the distributor targets will be achieved.⁸⁷ Both consumption and peak demand targets are dependent on distributors implementing the OPA-Contracted Province-Wide programs and BAPs. The ECO notes with discouragement that the OEB's decisions on duplication and its need to issue CDM Guidelines mean that almost half way through the 2014 target period, no BAPs are approved and LDCs only now have a complete set of rules within which to develop programs.

6.3 RATEPAYER FUNDING FOR GOVERNMENT CONSERVATION PROGRAMS

The *Ontario Energy Board Act, 1998* was also amended to require the OEB to issue assessments against electricity and natural gas distributors that would recover the costs associated with the Ministry of Energy's energy conservation and renewable energy programs. The assessment amount has sometimes been referred to as the "special purpose charge."

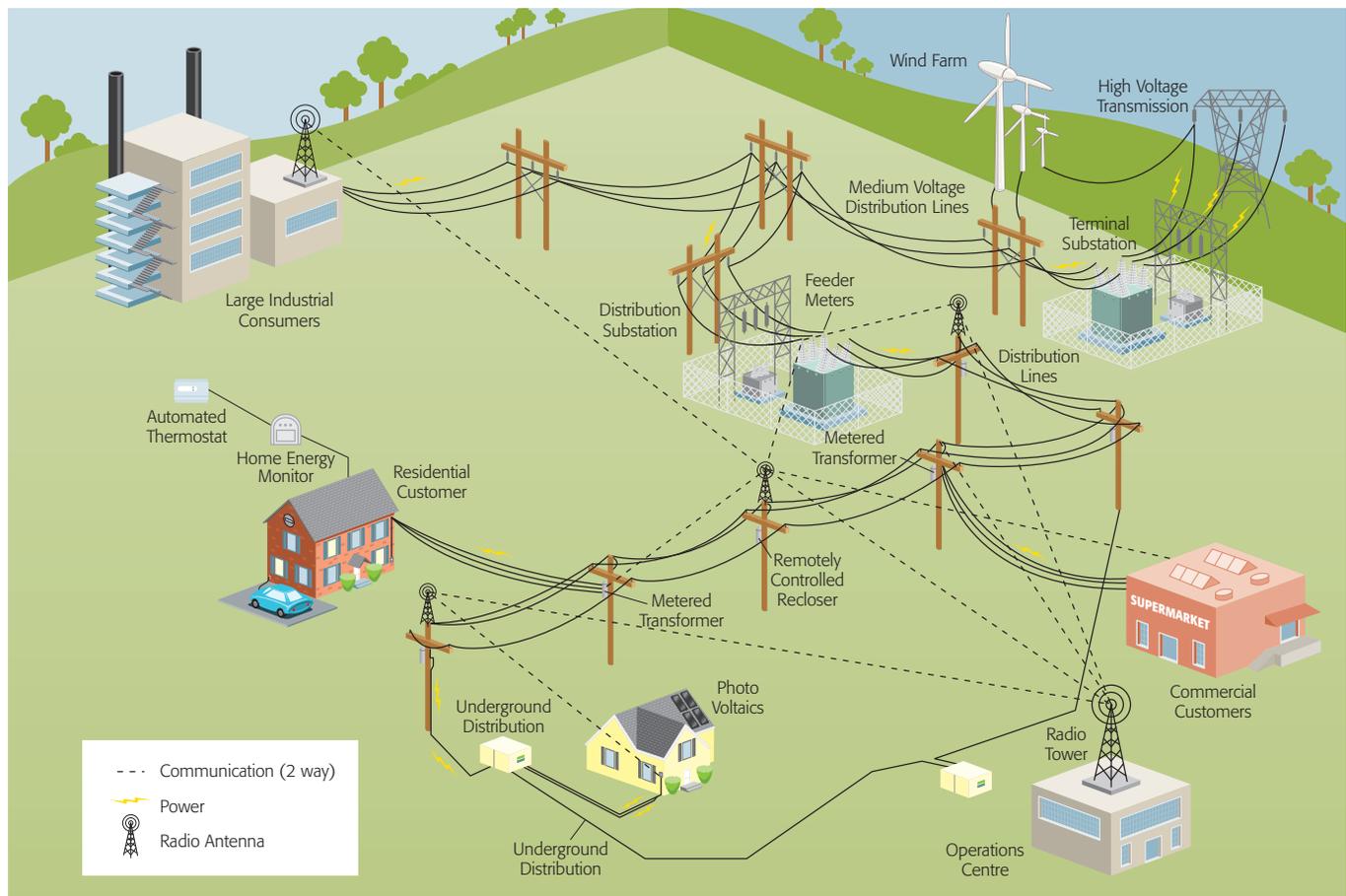
Action to Date

The government passed a regulation (O. Reg. 66/10, made under the *Ontario Energy Board Act, 1998*) which set the assessment amount at almost \$54 million from electricity ratepayers for the fiscal year 2009/10. The funds collected recovered the costs of two provincial energy efficiency programs, the Home Energy Savings Program (HESP) and the Ontario Solar Thermal Heating Initiative, where the programs reduced electricity consumption. In April 2010, the OEB issued the assessment to all electricity distributors and the IESO. The Ministry of Energy has stated it is not planning to reintroduce the assessment for electricity or introduce a similar regulation for natural gas ratepayers.⁸⁸

ECO Comment

Government conservation programs, such as HESP, filled a unique niche by targeting conservation of more than one fuel (e.g., funding any action that would save gas, oil, propane or electricity within a home). Ontario Regulation 66/10 enabled the government to fund these multi-fuel conservation programs largely through natural gas and electricity rates, in proportion to the program benefits (in the form of reduced energy costs) that would go to those ratepayers. Unfortunately, the Ontario government has subsequently terminated all of its own conservation programs, meaning that there is no need to use this regulatory power at the current time. In the absence of government programs, greater co-operation between natural gas and electric utilities will be necessary, and residents with other heating fuels such as propane, wood or oil will have no programs to assist in reducing their energy bills.

6.4 THE SMART GRID



As a result of GEA amendments to the *Electricity Act, 1998*, a definition of the smart grid was introduced into legislation and the Cabinet was given the power to make regulations governing the smart grid, including the timeframe for development, assigning roles and responsibilities, and prescribing standards. The GEA also made several amendments to the *Ontario Energy Board Act, 1998* related to the smart grid:

- A new objective for the OEB was added to facilitate the implementation of a smart grid in Ontario;
- The Minister of Energy was empowered to issue directives to the OEB to establish, implement or promote Ontario's smart grid, which the Board must consider when reviewing smart grid plans; and
- The OEB's licencing authority was amended so that as a license condition, transmitters and distributors are required to provide plans and make investments for the development and implementation of the smart grid.

Action to Date

In November 2010, the Minister of Energy issued a directive to the OEB requiring it to take steps to establish, implement and promote a smart grid by providing guidance to distributors, transmitters and other regulated entities. It set out the government's ten policy objectives, as well as customer, technical and operational objectives.⁸⁹ In particular, guidance from the OEB was to include preparation of smart grid plans and evaluation criteria for the plans. In response, the OEB established a Smart Grid Working Group to provide technical advice, and an OEB staff discussion paper was issued in November 2011.⁹⁰ The paper is in the process of a broader consultation, and a stakeholder conference took place at the end of March 2012.⁹¹ Some electricity distributors have submitted plans to the OEB, which include the implementation of smart grid technologies, (e.g., electric vehicles, in-home displays). At the time of writing this report, the guidance to LDCs to establish, implement and promote a smart grid has not been finalized through a Board decision.

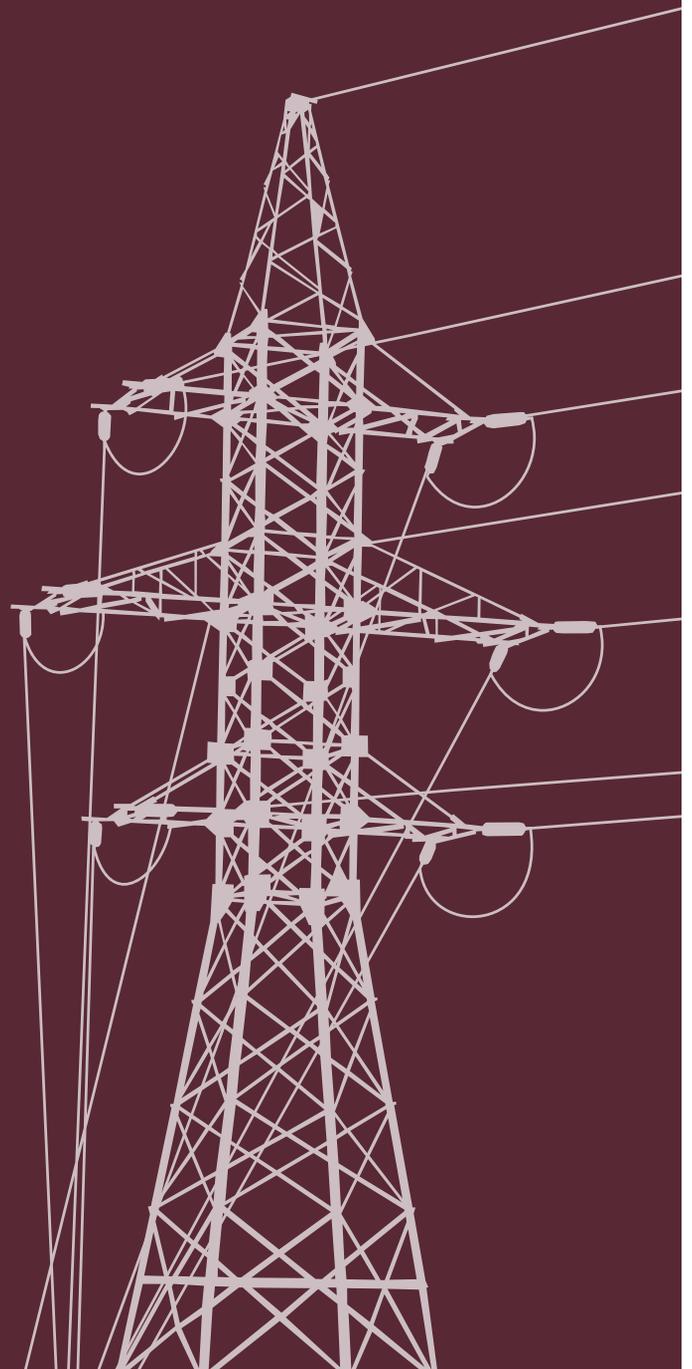
Also, in January 2011, the Ministry of Energy issued a Request for Information (RFI) related to a smart grid research and development fund that was announced in the 2009 Ontario budget. In April 2011, the Ministry of Energy announced a \$50 million Smart Grid Fund, offering financial support for projects that advance the commercialization of smart grid products and services.

ECO Comment

A smart grid involves monitoring and controlling the electrical grid to ensure it remains balanced and reliable. This will allow Ontario to adopt newer and greener technologies, such as increasing customer-based generation, and allowing smart homes to become a reality. The ECO reiterates a concern mentioned in previous ECO reports, that there is still a missing policy element of the smart grid: leadership.⁹² Leadership is necessary given the diverse agencies involved: the OEB's role of the banker that ensures prudent investment; the manufacturers' role to supply innovative technology; the distributors' role to identify and adopt needed technology; the IESO's role to integrate renewable energy; and the OPA's role to incorporate demand management, price response and load control into power system planning.

With respect to the Smart Grid Fund, despite the April 2011 launch, submissions for funding are still under review as of April 2012 and no projects have been announced, two years after the fund was announced and more than a year following an RFI for what is a relatively small value research and development program. As above, the ECO is concerned with the lack of an integrated plan with clear leadership focused on producing timely results.

7 THE YEAR-IN-REVIEW – A SUMMARY OF OTHER POLICY DEVELOPMENTS



Other energy conservation policy developments in 2011, unrelated to the GEA, are summarized below. The Ministry of Transportation unveiled policies related to transit and the sustainability of its operations. The Ministry of Infrastructure released Ontario's long-term infrastructure plan. There was no policy activity by the government on conservation of oil and propane. Major changes to the regulatory framework that governs natural gas conservation, as well as policy documents related to power system planning and electricity market operations, were issued in 2011.

7.1 TRANSPORTATION FUELS

At the provincial level, some minor policy development related to transportation demand management was evident. In January 2011, the Ministry of Transportation (MTO) posted a policy proposal notice on the Environmental Registry (#011-329) indicating it was updating the province's Transit-Supportive Guidelines, first published in 1992. The guidelines provide tools and best practices that help municipalities make local infrastructure decisions that incorporate transportation operational practices, land use planning and urban design. The purpose is to support and make travel by transit more attractive to commuters. Supporting transit clearly promotes energy efficiency and limits the impacts of transportation fuels on the environment. In early 2012, MTO posted its decision notice for this policy proposal, and the ECO will review this in the 2011/2012 Annual Report.⁹³

In March 2011, MTO released *Sustainability inSight*,⁹⁴ the ministry's sustainability strategy. The purpose of the strategy is to integrate the principle of sustainability into the policies, programs, day-to-day business practices, and decision-making processes of the ministry. Key to putting the strategy into practice, and still under development, is the ministry's first Sustainability Implementation Plan. To be released on a three-year cycle, these plans will outline targets and the specific actions that are to be taken to meet the goals articulated in the strategy. One of the goals of the strategy is to integrate transportation and land-use planning, which will indirectly influence Ontario's consumption of transportation energy. The ECO will review the strategy in the 2011/2012 Annual Report.

In June 2011, the Ministry of Infrastructure released *Building Together: Jobs & Prosperity for Ontarians*, a 10-year plan for infrastructure development across the province. While much of the plan focuses on building new health care and educational facilities, a significant portion is also devoted to transportation infrastructure, such as highways and public transit networks. As well, along with further highway development, the plan reiterates the government's 2007 commitment to move forward with its long-term high-occupancy-vehicle lane strategy. The plan's transportation initiatives will have some effect on transportation demand management and future transportation fuel consumption.

7.2 OIL AND PROPANE

As was the case in previous years, there was no discernible provincial policy development related to the conservation of oil and propane in 2011.

7.3 ELECTRICITY

In comparison to other fuels, as in previous years, electricity again dominated policy efforts in the province. Activity on some initiatives consisted of developmental work that may lead to new policies and regulations, while hesitant progress was made on other files.

Power System Planning

In February 2011, the Minister of Energy issued a Supply Mix Directive (replacing previous Supply Mix Directives of 2006 and 2008) directing the OPA to prepare an updated Integrated Power System Plan (IPSP). In a February 2011 letter, the Minister of Energy indicated he anticipated that the Plan would be delivered to the Board later in 2011.⁹⁵ At the time of writing our report, the IPSP had still not been filed with the OEB.



The years of delay in producing an IPSP raises the question of whether it is still relevant. Effectively, the long-term plan for the electricity sector has been put in place through a series of ministerial directives for conservation, transmission and generation issued during the past few years. Essentially, the Minister of Energy, in his capacity to require electricity agencies and the OEB to carry out government instruction under direction, has replaced the process of Board-approval of an IPSP. Unless the current or future energy ministers intend to repeal some of these directives, the electricity policy is now established and known.

The delay in producing the IPSP raises another question: whether the IPSP approval process is ill suited to respond to Ontario's changing electricity needs? With no approved IPSP, and its legally required three-year update to reflect changing circumstances, observers of electricity sector policy must rely on the government's Long-Term Energy Plan (LTEP), which is the only publicly available plan. However, the LTEP is of questionable value. Several of its key assumptions – which were never explained in detail – now appear inaccurate. With reduced demand and excess generation capacity now a feature of Ontario's electricity sector, the LTEP's key elements (e.g., a medium load-growth forecast, the need for additional generation capacity, near-term conservation targets) are likely no longer relevant, at least in the short term.

The planning process (or lack thereof), as it has unfolded since the first Supply Mix Directive of 2006, appears too cumbersome to respond to changing conditions. A more nimble approach with attention to localized load growth and closer alignment of conservation targets with annual results and demand growth would better serve the province – effectively a new short-term contingency plan for electricity is needed. Some of the work undertaken by the IESO's Electricity Market Forum (see below) addresses these contingencies.

It is also troubling that there was limited opportunity for public input. The lack of consultation on many of the directives, no Board-approved IPSP, and the few details provided for the LTEP assumptions points to the continuing problem of a lack of transparency in electricity sector planning, noted in previous ECO reports.⁹⁶

Note: In April 2012, the government introduced Bill 75, *Ontario Electricity System Operator Act, 2012*. This Bill, if passed, would merge the IESO and the OPA, and change the policy framework for energy planning. All mandatory power system planning requirements would be removed and the primary responsibility for any energy planning that occurs would fall to the Minister of Energy. At the time of writing, this Bill was still before the Legislature.

Electricity Market Forum

As the electricity market has evolved since opening in 2002, and as conditions have changed recently (e.g., demand growth trending even lower than the LTEP's low-growth scenario, the need for flexible load-following generation, and a potential generation capacity shortfall around 2018), its operation has revealed areas for improvement in market design, contracting for generation and conservation resources, and rules related to regulated assets. In response, the IESO established the Electricity Market Forum and, throughout 2011, led a stakeholder consultation that focused on improving system operations, market efficiency and the engagement of market participants.

In December 2011, the report of the forum was delivered containing 12 recommendations and a roadmap forward.⁹⁷ It is a clearly presented technical document targeted at an industry audience which addresses many of the short-term (to 2014) challenges mentioned above in relation to the IPSP process, such as the current reduced demand and global oversupply of electricity. The report recommends various actions be taken, for example, to:

- Eliminate pricing distortions and enhance the real-time price signal;
- Review components of the global adjustment to encourage greater consumer response to the costs it recovers;
- Examine whether new ancillary services⁹⁸ could be provided by generators and loads (i.e., consumers of electricity, particularly large industrial and commercial customers) to provide more flexibility for the system operator;
- Have the IESO consult such loads on how to reduce barriers to increased demand-side participation in the market; and
- Optimize the OPA's supply procurement process to ensure, among other objectives, demand forecasts are strongly reflected.

Time-of-Use Prices

The OEB initiated a hearing in 2010 (case # EB-2010-0364) to review the structure and price setting methodology for time-of-use prices, and commissioned a study examining whether greater on-peak to off-peak price differentials could encourage greater peak demand reduction. As noted in a previous ECO report, the Board decided in March 2011 that it was premature to make changes and that it would collect data to support further analysis.⁹⁹

ENDNOTES

ENDNOTES

1. For a full description of the reporting mandate and approach, see the following report:
Environmental Commissioner of Ontario, *Annual Energy Conservation Progress Report – 2009 (Volume One), Rethinking Energy Conservation in Ontario* (Toronto, Ontario: 2010), 6.
2. Ontario Ministry of Energy, “Ontario’s Bold New Plan for a Green Economy”, News Release, February 23, 2009. <http://news.ontario.ca/mei/en/2009/02/ontarios-bold-new-plan-for-a-green-economy.html>
3. Ontario Ministry of Energy, “Green Energy Act,” <http://www.energy.gov.on.ca/en/green-energy-act/> (accessed April 27, 2012).
4. Examples of policies, some of which have been introduced in other jurisdictions, that could be implemented to expand renewables, create clean energy jobs, and build an even more robust conservation culture are: passing a regulation for a carbon neutral public sector; placing a levy on consumption of oil and propane to fund conservation programs for these fuels; passing legislation to enable the use of property taxes and local charges for financing conservation; regulating a low-carbon fuel standard; and, amending electricity codes to reduce system losses. Clean technology policy could be enhanced to provide a renewable thermal energy feed-in tariff where it is advantageous or more cost-effective than a feed-in tariff for generation; and making a smart grid economic development strategy a prominent feature of the province’s proposed Clean Economic Development Strategy.
5. Environmental Commissioner of Ontario, *Annual Energy Conservation Progress Report – 2009 (Volume One): Rethinking Energy Conservation in Ontario* (Toronto, Ontario: 2010), 40.
6. American Council For an Energy-Efficient Economy, *Ka-Boom!: The Power of Appliance Standards* (2009), 14.
7. Efficiency levels for some transportation products such as passenger vehicles are set under separate authority by the federal government.
8. Natural Resources Canada, *Improving Energy Performance in Canada – Report to Parliament Under the Energy Efficiency Act For the Fiscal Year 2009-2010* (2011), 23.
9. Environmental Commissioner of Ontario, *Annual Energy Conservation Progress Report – 2010 (Volume Two), Managing a Complex Energy System - Results* (Toronto, Ontario: 2011), 58.
10. US states cannot impose higher performance standards for products if a national standard exists (no such restriction exists in Canada). Therefore, US states have been limited to introducing state standards for products where a federal standard does not yet exist, or moving forward the date at which a national standard takes effect. See Alexandra B. Klass, “State Standards for Nationwide Products Revisited: Federalism, Green Building Codes, and Appliance Efficiency Standards”, *Harvard Environmental Law Review* 36 (2010): 336.
11. California Energy Commission, *Energy Efficiency Standards in CA* (2012) (factsheet); California Energy Commission, *2010 Appliance Efficiency Regulations (CEC-400-2010-012)* (2010).
12. Canadian Appliance Manufacturers Association/Electro-Federation Canada, “Residential Appliances & Energy Efficiency: A Presentation to the Ontario Ministry of Energy & Infrastructure Re: Bill 150 – The Green Energy Act”, 3 (presented March 20, 2009).
13. Ontario Ministry of Energy, information provided to the ECO in response to ECO inquiry, March 16, 2012.
ENERGY STAR® efficiency requirements for dishwashers, refrigerators, and washing machines have also subsequently increased from 2009 levels.
14. United States Department of Energy, *Multi-Year Program Plan - Building Regulatory Programs* (2010).
15. Ontario Ministry of Energy, “McGuinty Government To Ban Inefficient Light Bulbs By 2012”, News Release, April 18, 2007.
16. United States, Department of Energy, *Impact of EISA 2007 on General Service Incandescent Lamps: Fact Sheet* (undated).
17. United States Department of Energy, *Technical Support Document: Impacts on the Nation of the Energy Independence and Security Act of 2007* (2009), 25 & 31.

18. Government of Canada, *Regulations Amending the Energy Efficiency Regulations SOR/2011-228, 21/10/11, Regulatory Impact Analysis Statement*.
19. For a fuller discussion of the *Water Opportunities and Water Conservation Act, 2010*, see: Environmental Commissioner of Ontario, *Annual Report 2010/11: Engaging Solutions* (Toronto, Ontario: 2011), 98-100.
20. Ontario Power Authority, "IPSP 2011 Stakeholder Consultation: Conservation", 23 (presented on May 26, 2011).
21. Natural Resources Canada, "Energy Efficiency Regulations, Regulatory Update, November 2011," <http://oe.nrcan.gc.ca/regulations/bulletins/17839> (accessed March 29, 2012).

The Canadian Gas Association raised concerns with the proposed higher energy efficiency requirements for gas water heaters in the Canadian government's original proposal, commenting that these requirements could lead customers to switch to electrical water heating, and that more time was needed to transform the market by improving product selection and reducing the costs of higher-efficiency products. However, the original Canadian government proposal would have allowed more than five years before the higher efficiency requirements became law, a sufficient amount of time for market transformation initiatives, in the ECO's view.

22. American Council for an Energy-Efficient Economy, *The Efficiency Boom: Cashing In On Savings From Appliance Standards* (2012), 24.
23. Ontario Ministry of Municipal Affairs and Housing, *Potential Changes for the Next Edition of the Building Code: Second Round of Consultation (February – April 2011)* (Toronto, Queen's Printer for Ontario: 2011), 25.
24. Bill 150, *Green Energy and Green Economy Act, 2009* (1st Reading), Section 2(1).
25. The intention was to avoid unnecessarily imposing the requirement in situations where the information obtained from the audit would not be needed, such as homes purchased for major renovations or demolition.
26. The provision was changed from "mandatory conservation and energy efficiency practices" to "mandatory home efficiency disclosure," which effectively narrowed the scope of the provision from residences and other buildings and classes of residence [e.g., commercial properties, multi-unit condominiums and tenancies] to detached single family homes.
27. The inspection and enforcement provisions for disclosure of building energy information was originally contained in the *Energy Conservation Leadership Act, 2006* and was subsequently adopted in the *Green Energy Act, 2009* (Part IV s.15(2)). In the final version of the bill, all inspection and enforcement powers related to the Act were removed.
28. Natural Resources Canada, *Comprehensive Energy Use Database Tables, 1990 to 2009*.

In 2006, the average Canadian family size was 3.0 persons, down from 3.1 in 1991, and 3.7 in 1971 while the total number of families in 2006 was 8,859,100, an increase from 7,482,100 in 1991 and 5,042,600 in 1971.

Statistics Canada, *Catalogue no. 91-213-X, Census families, number and average size*.

29. Natural Resources Canada, *Comprehensive Energy Use Database Tables, 1990 to 2009*.
30. The Ministry of Municipal Affairs and Housing is undertaking a study which will look at possible revisions to the Building Code for requiring energy efficiency measures that would need to be undertaken when a building is renovated.
31. In Ontario, for every five new homes that are currently built, only one pre-1983 home is removed.
Canadian Home Builders' Association, *Energy Use and Greenhouse Gas Emission Performance in Canadian Homes Since 1990, 1990 - 2008 Update*, (May 2011) 8.
32. Natural Resources Canada, *Comprehensive Energy Use Database Tables, 1990 to 2009*.
33. Other recent surveys indicate energy efficiency is an important factor for home buyers and sellers:
 - 2007 Royal LePage Eco Home Survey, 72% reported they will look for a green-improved property in their next home purchase.
 - 2008 survey by the Appraisal Institute of Canada, energy efficient upgrades were most frequently cited as increasing the home's resale value.
34. Dunsy Energy Consulting, *Valuing Building Energy Efficiency Through Disclosure and Upgrade Policies, A Roadmap of the Northeast U.S.* (November 2009), 12.

35. Other results from the study:

- Despite the mandatory nature of the policy, non-compliance was fairly high. 50-60% of small buildings were registered with wide variation in compliance between geographic areas (20-50%).
- Less than half of the interviewed building owners were aware of the labelling scheme. Convincing home owners to invest money was difficult even if the energy or water improvements made sound financial sense and had short payback periods.

Dunsky Energy Consulting, *Valuing Building Energy Efficiency Through Disclosure and Upgrade Policies, A Roadmap of the Northeast U.S.* (November 2009), 62.

36. A 2009 independent analysis found high levels of non-compliance (almost 50% during the period 1999-2002) and found no difference in energy use between complying and non-complying homes in post-sale use. which supported a previous evaluation conducted in 2001 by Madsen, Ramlau and Perderson. However, the study did not analyze the impact of mandatory labelling on pre-sale improvements by owners, which is where the impact of the disclosure policies would likely be.

Vibeke Hansen Kjærbye, "Does Energy Labelling on Residential Housing Cause Energy Savings?" AKF, Danish Institute of Governmental Research (2008).

Another study compared the experiences of 10 households in Belgium (voluntary energy assessment) and 10 households in Denmark (mandatory energy label) Although there seemed to be a general acceptance that energy advice for house owners is needed, the authors found following the energy advice was prioritized against other interests, such as aesthetic and convenience, which may be viewed as more relevant than energy savings and simple payback time is not a motivating factor for home owners. The authors conclude "This does however not mean that the energy labels on buildings are a bad idea but they should be seen as one input among others to people's own knowledge and communication about their house and its renovation."

Kirsten Gram-Hanssen, Françoise Bartiaux, Ole Michael Jensen, Madeleine Cantaert, "Do home owners use energy labels? A comparison between Denmark and Belgium," *Energy Policy* 35(5): 2879-2888.

37. Ontario Ministry of Energy, information provided to the ECO in response to ECO inquiry, March 16, 2012.

38. Ontario Ministry of Energy, information provided to the ECO in response to ECO inquiry, March 16, 2012.

39. Ontario Ministry of Energy, information provided to the ECO in response to ECO inquiry, March 16, 2012.

40. Enbridge Gas Distribution, *2012-2014 Demand Side Management ("DSM") Plan, EB-2011-0295, Exhibit B, Tab 1, Schedule 4.*

41. Union Gas Limited, *2012-2014 Demand Side Management ("DSM") Plan, EB-2011-0327, Appendix D - Summary of Changes made to Union DSM Plan due to Stakeholder Feedback.*

42. For example, the Ontario Power Authority's New Home Construction Program and High Performance New Construction programs and the Toronto Green Standard offered by the City of Toronto.

43. Subsequent to the recent Building Code revisions, the performance level required by ENERGY STAR® for New Homes is equivalent to the minimum requirements of the Building Code. However, it is likely the performance level for ENERGY STAR® for New Homes will be raised in the future.

44. *Green Energy and Green Economy Act, 2009, Schedule J.*

45. Ontario Ministry of Municipal Affairs and Housing, *Potential Changes for the Next Edition of the Building Code: Second Round of Consultation (February – April 2011)* (Toronto, Queen's Printer for Ontario: 2011).

46. City of Toronto, "Economic Dashboard,"¹⁵ (presented to Economic Development Committee, October 7, 2011). <http://www.toronto.ca/legdocs/mmis/2011/ed/bgrd/backgroundfile-41174.pdf> (accessed April 27, 2012).

For comparison, the Canadian city with the second-highest number of new high-rises under construction was Calgary, with only 8 high-rises under construction.

47. John Straube, "BSI-006: Can Highly Glazed Building Façades Be Green?" <http://www.buildingscience.com/documents/insights/bsi-006-can-fully-glazed-curtainwalls-be-green> (accessed April 27, 2012).

48. City of Toronto Staff Report, "Toronto Green Standard Update: Performance Measures for Sustainable Development," (October 30, 2008).

49. Enermodal Engineering, *New Efficiency Goals: Ontario Building Code Updates and the Race to Reduce* (December 2011 newsletter).
50. See sections 7.33 and 10.3 of *ANSI/ASHRAE/USGBC/IES Standard 189.1-2009, Standard for the Design of High-Performance Green Buildings, Except Low-Rise Residential Buildings* (2009).
51. B.C. Reg. 101/2011 – Solar Hot Water Ready Regulation, made under the *Local Government Act*. In addition to requiring solar conduits, the B.C. regulation requires that suitable roof area be set aside for solar collectors, and that the roof be strong enough to support the increased load from the collectors.
52. The term “public agencies” is defined in Ontario Regulation 397/11 to include every municipality, every municipal service board, every post-secondary educational institution, every public hospital, and every school board.
53. Ontario Ministry of Infrastructure, information provided to the ECO in response to ECO inquiry, March 30, 2012.
54. Ontario Ministry of Infrastructure, information provided to the ECO in response to ECO inquiry, March 30, 2012.
55. Power Application Group Inc., *Ontario Municipalities: An Electricity Profile*, Prepared on behalf of the Independent Electricity System Operator (2008), 8.
56. Ontario Ministry of Education, “Ministry of Education: Energy Management and Conservation Initiative,” slide 2 (presentation from the Green Leaders: Sharing Success Stories event, Toronto, Ontario on March 6, 2012).
57. Most of these facilities are managed by Infrastructure Ontario. Infrastructure Ontario also reports energy consumption directly to the Minister of Infrastructure. However, not all ministries have their energy managed by Infrastructure Ontario. These other ministries are responsible for managing their own energy consumption and for reporting energy consumed to the Ministry of Infrastructure.
58. Ontario Ministry of Municipal Affairs and Housing, “List of Ontario Municipalities,” <http://www.mah.gov.on.ca/Page1591.aspx> (accessed April 26, 2012).
59. Ontario Ministry of Education, “Ministry of Education: Energy Management and Conservation Initiative,” slide 2 (presentation from the Green Leaders: Sharing Success Stories event, Toronto, Ontario on March 6, 2012).
60. Ontario Ministry of Health and Long-Term Care, “Public Information: Hospitals,” http://www.health.gov.on.ca/english/public/contact/hosp/hosp_mn.html (accessed April 26, 2012).
61. Ontario Ministry of Training, Colleges and Universities, “Find a School: Colleges,” <http://www.tcu.gov.on.ca/eng/postsecondary/schoolsprograms/college/index.html#findschool> (accessed April 26, 2012).
62. Ontario Ministry of Training, Colleges and Universities, “Find a School: Universities,” <http://www.tcu.gov.on.ca/eng/postsecondary/schoolsprograms/university/index.html#findschool> (accessed April 26, 2012).
63. Ontario Ministry of Energy, information provided to the ECO in response to ECO inquiry, March 16, 2012.
64. Ontario Ministry of Infrastructure, information provided to the ECO in response to ECO inquiry, March 24, 2011.
65. Ontario Ministry of Infrastructure, information provided to the ECO in response to ECO inquiry, March 16, 2012.
66. Ontario Ministry of Energy and Infrastructure, information provided to the ECO in response to ECO inquiry, February 24, 2010.
67. Ontario Ministry of Infrastructure, information provided to the ECO in response to ECO inquiry, March 16, 2012.
68. Ontario Ministry of Infrastructure, information provided to the ECO in response to ECO inquiry, March 16, 2012.
69. Ontario Ministry of Infrastructure, information provided to the ECO in response to ECO inquiry, March 30, 2012.
70. Ontario Ministry of Infrastructure, information provided to the ECO in response to ECO inquiry, March 30, 2012.
71. Enerlife Consulting, “*Saving our Energy for Education: The Enerlife 2009 List of Top Energy Performing Schools*,” News Release, May 2011.
Enerlife Consulting, *2010 Greening Health Care Annual Report*, (undated), 1.
72. Ontario Ministry of Energy, information provided to the ECO in response to ECO inquiry, March 16, 2012.

73. Natural Resources Canada, "Benchmarking," <http://oee.nrcan.gc.ca/industrial/technical-info/benchmarking/4377> (accessed April 26, 2012).

74. Some public agencies may already be tracking energy consumed for operations other than those listed in Table 4. Therefore, providing the BPS with the opportunity to voluntarily report such information on an annual basis would ultimately increase the level of information available for energy consumption within this sector, and allow for benchmarking of these operations.

For example, across Canada various municipal governments have committed to reduce greenhouse gas emissions and have joined the Partners for Climate Protection (PCP) program. Local governments that adopt the PCP model resolution voluntarily commit to achieving milestones. One of these milestones calls for the creation of a greenhouse gas inventory and forecast. Greenhouse gas and energy use inventories under this milestone must be developed for: buildings; outdoor lighting (e.g., streetlights, traffic signals); wastewater and potable water; vehicle fleets; and solid waste collected at facilities owned and operated by the local government. The program encourages its members to track and monitor emissions, and update inventories on an annual basis, or at least in three- to five-year intervals.

FCM-ICLEI (ICLEI – Local Governments for Sustainability) Partners for Climate Protection, *Developing Inventories for Greenhouse Gas Emissions and Energy Consumption: A Guidance Document for Partners for Climate Protection in Canada*, (undated), 3.

75. A template alone does not guarantee a standardized approach will be used by each organization. Without a standardized approach, the usefulness of the information can be compromised. Experience under the aforementioned PCP program highlights the importance of such guidance documents. Spreadsheets were originally made available to local governments to provide a basic level of inventory support for PCP members. However, as reports were submitted to the program, there was a lack of consistency between municipalities, as well as a lack of references to the data and the corresponding methodologies used. This made it difficult for inventories to be evaluated and for municipalities to receive feedback from the program. As a result of these issues, the PCP program developed a handbook to act as a standards and guidance document for local governments.

FCM-ICLEI (ICLEI – Local Governments for Sustainability) Partners for Climate Protection, *Developing Inventories for Greenhouse Gas Emissions and Energy Consumption: A Guidance Document for Partners for Climate Protection in Canada*, (undated), 4

76. Ontario Ministry of Energy and Infrastructure, information provided to the ECO in response to ECO inquiry, February 24, 2010.

77. *Green Energy and Green Economy Act, 2009*, Schedule D

78. Environmental Commissioner of Ontario, *Annual Energy Conservation Progress Report – 2010 (Volume One), Managing a Complex Energy System* (Toronto, Ontario: 2011), 40.

79. Environmental Commissioner of Ontario, *Annual Energy Conservation Progress Report – 2010 (Volume Two), Managing a Complex Energy System - Results* (Toronto, Ontario: 2011), 38.

80. Through past OEB decisions, the Board has directed gas utilities to use the TRC test as the test to evaluate the cost effectiveness of programs and decide whether they will be included in the DSM programs submitted for approval.

In the TRC test, the benefits are the avoided energy costs (i.e., marginal cost of natural gas [system and customer] and avoided delivery costs [e.g., distribution pipe, compressors etc.]). Other avoided costs resulting from the reduction in use of other resources (electricity and water) are also included. The costs are the program equipment costs to purchase and install more efficient equipment, and are typically the costs paid by the customer and distributor. The costs are defined relative to a base case (i.e., they are the incremental cost associated with high-efficiency equipment relative to a base case less efficient piece of equipment that would be purchased absent a DSM program). They also include the distributors' program administrative costs to market, deliver and support the program. In the TRC, incentive costs (e.g., rebates or other payments made to a program participant) are not included in the costs. They are considered transfers of funds among members of society. The TRC is performed at a measure, program and portfolio of program level. The OEB generally looks at the level of the portfolio to ensure cost-effectiveness. The TRC results can be expressed as a net present value and as a ratio. Expressed as Net Present Value TRC, if the TRC is greater than zero (positive), the program is of net benefit from a societal perspective. Expressed as a ratio, if the TRC score is greater than 1, then the program is cost-effective.

In the OEB decision (EB-2008-0346), Board staff and consultants retained by Board staff suggested that the TRC test was no longer the best cost-effectiveness test because of its neglect of environmental externalities and recommended the Social Cost Test (SCT) be adopted. The *Green Energy Act, 2009* was cited as indicative of the government's intent to address carbon emissions. The SCT's advantage is that it incorporates the cost of carbon and other pollutants in the avoided supply costs.

81. Discount rate is an analytical tool that allows utilities to discount or adjust the costs and benefits of a DSM program, over its lifetime, to their present value since the value of the costs and benefits are worth less in the future than the present due to the erosion in value from inflation and other factors. The Net Present Value TRC metric sums the stream of future benefits and costs and uses a discount rate to express the benefits as a single current year value. The OEB directs utilities to use their after tax weighted average cost of capital (generally around 9-10%) as the discount rate. Cost-effectiveness is quite sensitive to the discount rate adopted, especially for benefits that will be realized far into the future. A lower discount rate would reduce the hurdle that programs must pass to be cost-effective and would allow more program activity to occur.
82. Highlights of the Enbridge plan are a total 2012 budget of \$30.9 million (\$7.0 million for low-income consumers, which is the maximum allowed by the OEB, focusing on free retrofits and providing incentives to social and assisted housing providers). Enbridge will offer new programs for a home labelling market transformation program to be launched in 2013, and a community energy retrofit program that will target one or more areas with a high proportion of poorly-built homes, and incent deep retrofits for these homes.
- Union's total budget is \$30.1 million (\$7.0 million for low-income conservation programs). Like Enbridge, Union's residential programs will decrease offerings of basic measures and emphasize deep measures for home efficiency (e.g., attic and basement wall insulation incentives for existing homes, assisting tract home builders to build homes at least 15% more efficient than minimum requirements of the Ontario Building Code).
- Union Gas will offer incentives for capital investments for industrial efficiency projects in 2012 only. This is a change from the company's original DSM plan proposal, but it will continue to provide other program elements like energy managers for later years. Union anticipates lifetime industrial savings of 1 billion cubic metres resulting from projects initiated in 2012, a significant increase from the target originally proposed. The budget for large industrial programs is about \$4.5 million.
83. Minister of Energy Brad Duguid, Directive to the Ontario Energy Board, March 31, 2010.
http://www.ontarioenergyboard.ca/OEB/ Documents/GEGEA%20Implementation%20and%20Readiness/minister_directive_20100423.pdf
84. Ontario Energy Board, *In the Matter of an Application by Hydro One Networks Inc. for an Order or Orders granting approval of initiatives and amounts related to the Conservation and Demand Management Code, EB-2010-0331/EB-2010-0332*, March 4, 2011.
- Ontario Energy Board, *In the Matter of an Application by Toronto Hydro-Electric System Limited Inc. for an Order or Orders granting approval of initiatives and amounts related to the Conservation and Demand Management Code, EB-2011-0011*, February 18, 2011
85. Electricity Distributors Association, *Re: Board file no. EB-2012-0003 Conservation and Demand Management (CDM) Guidelines for Electricity Distributors*, (2012), 3.
86. Environmental Commissioner of Ontario, *Annual Energy Conservation Progress Report – 2010 (Volume Two), Managing a Complex Energy System - Results* (Toronto, Ontario: 2011), 43.
87. Environmental Commissioner of Ontario, *Annual Energy Conservation Progress Report – 2010 (Volume Two), Managing a Complex Energy System - Results* (Toronto, Ontario: 2011), 32.
88. Ontario Ministry of Energy, information provided to the ECO in response to ECO inquiry, March 16, 2012.
89. Minister of Energy Brad Duguid, Directive to the Ontario Energy Board, November 23, 2010.
http://www.ontarioenergyboard.ca/OEB/ Documents/Documents/Minister_directive_smart_grid_20101123.pdf
90. Ontario Energy Board, *Staff Discussion Paper In Regard to the Establishment, Implementation and Promotion of a Smart Grid in Ontario, EB-2011-0004*, November 8, 2011.
91. Ontario Ministry of Energy, information provided to the ECO in response to ECO inquiry, March 16, 2012.
- The Ontario Energy Board held a Stakeholder Conference March 28 - 30, 2012. This Stakeholder Conference was related to the current work being done related to the "Renewed Regulatory Framework for Electricity" in Ontario, which includes Board work related to EB-2011-0004 (Developing Guidance for the Implementation of Smart Grid In Ontario). Other Board files that are included in this work are EB-2010-0377, EB-2010-0378, and EB-2011-0043.
92. Environmental Commissioner of Ontario, *Annual Energy Conservation Progress Report – 2010 (Volume One), Managing a Complex Energy System* (Toronto, Ontario: 2011), 51.

93. In addition to policy for the movement of people, although outside of our reporting year, MTO also posted a policy proposal notice on the Environmental Registry in early 2012 related to the efficient movement of goods. The proposed Freight-Supportive Guidelines will provide municipalities with tools and best practices to integrate and co-ordinate land use and freight mobility planning in Ontario's municipalities.
94. Ontario Ministry of Transportation, *Sustainability inSight: An innovative strategy for Ontario's Ministry of Transportation* (Toronto, Queen's Printer for Ontario: 2011).
95. Minister of Energy Brad Duguid, Directive to the Ontario Energy Board, February 17, 2011.
<http://www.ontarioenergyboard.ca/OEB/ Documents/Documents/Direction to the OEB 20110217 IPSP.pdf>
96. Environmental Commissioner of Ontario, *Annual Energy Conservation Progress Report – 2009 (Volume One), Rethinking Energy Conservation in Ontario* (Toronto, Ontario: 2010), 22-23.
97. Electricity Market Forum, "Reconnecting Supply and Demand: How Improving Electricity Pricing Can Help Integrate A Changing Supply Mix, Increase Efficiency and Empower Customers", Report of the Chair of the Electricity Market Forum, George Vegh, (December 2011).
98. Functions provided by generators, loads and transmitters that are required to support the reliable operation of the integrated transmission and generation system. These services are coordinated and controlled by the IESO as part of system operations. In Ontario, ancillary services include operating reserve, regulation, voltage control, reactive power, and black-start capability. The IESO uses ancillary services to meet several essential reliability objectives which it manages and integrates: continuous balancing of generation and demand; constant frequency and voltage control; transmission system security; response to unexpected outages and other contingencies, including emergency conditions.
99. Environmental Commissioner of Ontario, *Annual Energy Conservation Progress Report – 2010 (Volume One), Managing a Complex Energy System* (Toronto, Ontario: 2011), 26-27.

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