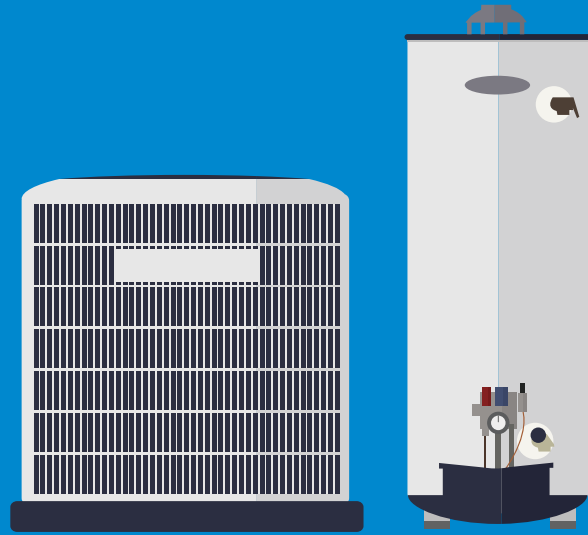


# 5

## Codes and Standards



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## 5.0 Codes and Standards

### 5.1 Introduction

Energy codes and standards are key tools for energy conservation in Ontario. They can be either voluntary or mandatory, and can apply to many types of energy use, including buildings, vehicles and appliances.

Some voluntary standards including, for example, LEED and ENERGY STAR®, play an important role in proving the technical and financial feasibility of innovations, and in developing market demand for more efficient buildings and products. But these voluntary standards are generally adopted by the best performers. Driving large-scale energy efficiency improvements down to weaker performers typically requires regulation.

Ontario's mandatory energy codes and standards are the Ontario Building Code (covering new buildings) and a regulation under the *Green Energy Act, 2009* (covering appliances and products); while vehicle standards are set by the federal government. The Building Code is discussed briefly in the text box below, and has been covered in previous ECO reports. See chapter 3 of this report for a text box about federal vehicle fuel efficiency standards.

**Driving large-scale energy efficiency improvements down to weaker performers typically requires regulation.**

#### **Continuous Improvement in Energy Performance of New Buildings Through the Ontario Building Code**

The energy efficiency requirements in the Ontario Building Code apply to new buildings and extensions of existing buildings.

Ontario has been a leader in energy efficiency provisions in its Building Code. The current levels of efficiency in the Ontario Code exceed most other jurisdictions for both homes (where Ontario requires Energuide 80 performance) and large buildings (where Ontario requirements are stricter than the commonly used ASHRAE 90.1-2010 standard, and roughly equivalent to Canada's National

Energy Code for Buildings (2011), which was recently adopted by several provinces).

The Code will soon require new buildings to be even more efficient, as higher efficiency levels already in law will come into effect on January 1, 2017 that will increase energy efficiency requirements by an additional 15 per cent for low-rise housing, and 13 per cent for large buildings. The Building Code Conservation Advisory Council has noted that each five-year Code update since 1997 has delivered approximately a 13 per cent improvement in predicted energy efficiency (this is for large buildings, although the trend for low-rise housing is similar) and has recommended that this 13 per cent rate of improvement over each Code cycle

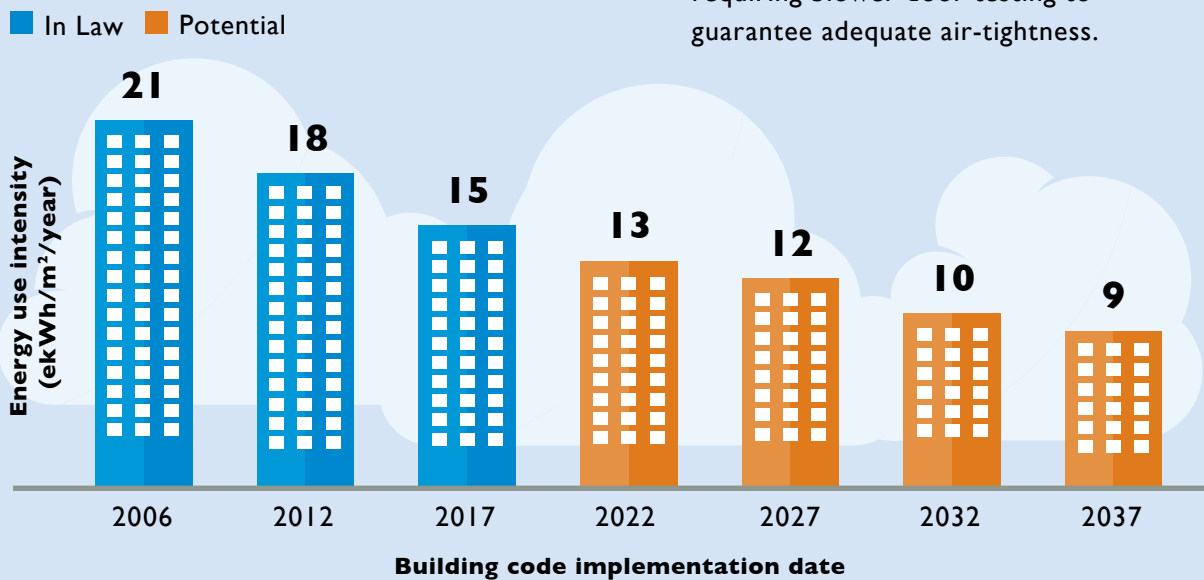
continue. The rate of improvement and impact on building energy use intensity (energy used per square foot of building space) is shown in Figure 5.1. A new building built to Code in 2017 is predicted to use approximately 35 per cent less energy than a building built to Code in 1997.

The Ministry of Municipal Affairs and Housing (MMAH) is expected to begin consultation in 2016 on the next edition of the Building Code, which will set the next round of energy efficiency levels (likely to come into effect in 2022).

In addition to the new overall building energy performance requirements, it will be interesting to see whether MMAH proposes additional changes to the Code, that could

improve building energy performance, which have been noted in previous ECO reports:

- Introducing energy efficiency requirements for renovations of existing buildings;
- Requiring buildings to be built “renewables-ready” for technologies such as electric vehicles and solar energy.
- Addressing the global warming impact of building material choices, such as insulation.
- Requiring building commissioning or other operational practices that could improve energy performance.
- Ensuring building construction practices and workmanship do not compromise energy performance, for example, requiring blower door testing to guarantee adequate air-tightness.



**Figure 5.1: Average predicted energy use intensity of new buildings built to Ontario Building Code requirements**

Note: Energy use intensities are sector-weighted averages for buildings built to the Ontario Building Code’s minimum energy efficiency requirements for part 3 (large) buildings. All fuels used in building energy use are converted into a common energy unit (ekWh: equivalent kilowatt-hours). “Potential” future energy use intensities assume that energy efficiency requirements will improve by 13 per cent in each five-year Code cycle, matching the rate of improvement in recent Code updates.

Source: Building Code Conservation Advisory Council

This chapter examines recent changes in minimum energy performance standards (MEPS) for appliances and products sold in Ontario. These standards do not apply retroactively to products already in use, but they do compel higher efficiency as old products wear out and are replaced. They allow Ontario to run leaner, achieving the same product services with less energy use.

The amount of energy (both from electricity and fossil fuels) this can save is significant, because of the broad scope of energy standards. Energy standards in the U.S. regulate products responsible for about 90 per cent of home energy use, about 60 per cent of commercial building use, and about 30 per cent of industrial energy use, percentages that are likely similar for Ontario.<sup>1</sup> The IESO estimates that product standards and changes to the Ontario Building Code will deliver 10.2 TWh of electricity savings by 2032 (85 per cent of which must come from new codes and standards that were not in effect as of 2012), approximately one third of the Long-Term

Energy Plan's target for all electricity savings by 2032.<sup>2</sup> The government does not have a target for the amount of natural gas savings that product standards can deliver.

## 5.2 Product Standards: Who Does What?

The Ontario *Green Energy Act, 2009*, prohibits the sale of products in Ontario that do not meet prescribed efficiency standards. The list of products covered and the efficiency requirements for each product are set in O. Reg. 404/12. The *Green Energy Act, 2009* and its regulations are administered by the Ontario Ministry of Energy.

Ontario rarely sets energy efficiency product standards by itself. The federal government regulates products moving across provincial borders within Canada and across national borders, while the Ontario government regulates products sold in Ontario. Where Canadian and Ontario standards both apply, the product must meet both standards.

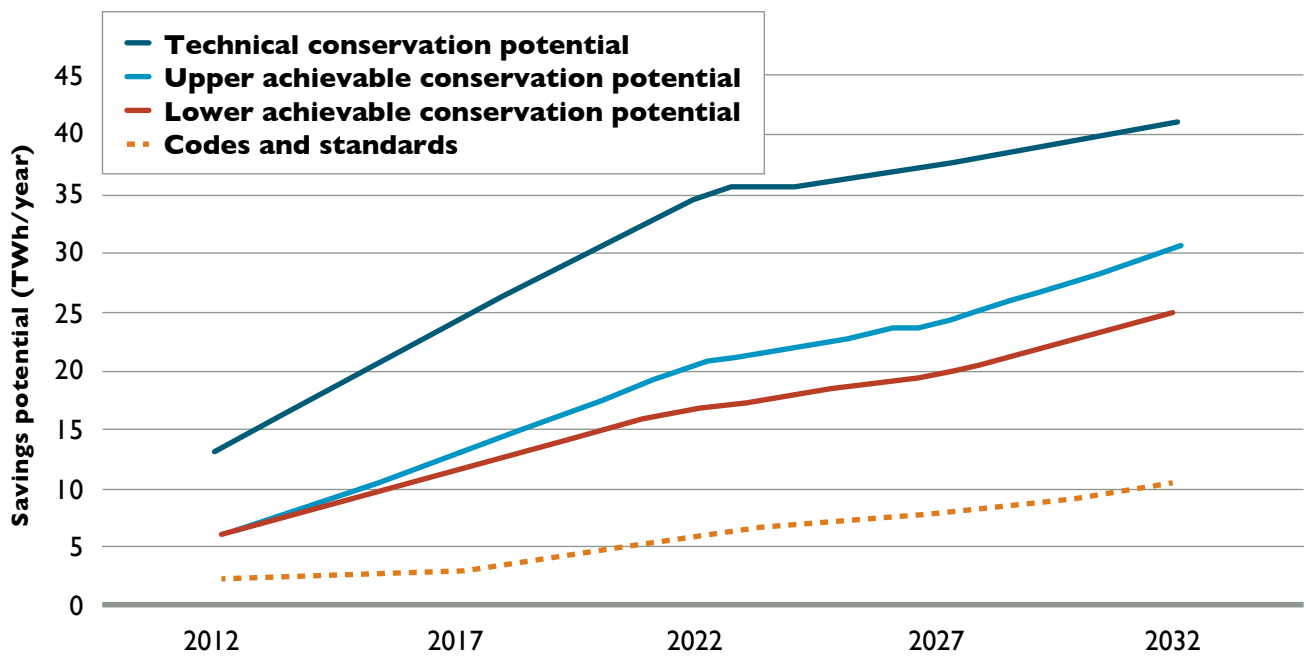


Figure 5.2: Potential electricity savings from codes and standards

Source: ICF Marbek

## Ontario rarely sets energy efficiency product standards by itself.

Both Canada and Ontario have the option to set their own independent standards, or to harmonize with efficiency standards set elsewhere. In the past, Canada has chosen to harmonize efficiency standards for certain products with standards set by the United States Department of Energy (DOE). DOE standards have no legal authority in Ontario, but, because of the size of the U.S. market, they influence manufacturer product lines, affecting what is offered for sale in Ontario.

Canadian and U.S. standards may be harmonized in one or many details, including the minimum energy performance level, which products are subject to a standard, and/or the test method used to measure compliance.

Historically, Ontario and other provinces have harmonized their efficiency standards for most products with the Canadian federal government. This extends the scope of the federal standard, so that it applies not only to products imported into the province, but also to products that are both manufactured and sold in Ontario. This type of harmonization was often helpful to Ontario manufacturers. If all provinces harmonize with federal standards, a single compliant product can be made in Ontario and sold across the country.

**Table 5.1: Who Does What?**

Organization	Role in Energy Efficiency Standards Development, and Impact on Ontario
Ontario provincial government (Ministry of Energy)	Sets minimum product efficiency standards through O. Reg. 404/12, under the <i>Green Energy Act, 2009</i> . Standards apply to any regulated products sold in Ontario.
Canadian federal government (Natural Resources Canada)	Sets minimum product efficiency standards through the <i>Energy Efficiency Regulations</i> under the <i>Energy Efficiency Act</i> . Standards apply to products imported into Canada or products manufactured in Canada and moved across provincial borders for sale, but not to products that are both manufactured and sold in Ontario. NRCan also requires dealers to submit product energy efficiency reports and to affix energy labels (EnerGuide) for certain products.
U.S. federal government (Department of Energy)	Sets minimum efficiency standards for products sold in the United States, indirectly impacting supply chain for products sold in Ontario.
Other sub-national jurisdictions	May set minimum efficiency standards that apply within the jurisdiction, and which Ontario may choose to adopt. In the United States, individual states can only set efficiency standards for products that are not regulated federally (with some exceptions). This restriction does not apply in Canada. Ontario, California and British Columbia have been quite active in standards development. California has long been a leader in standards development, and has continued to be very active in developing new standards in recent years. <sup>3</sup>

On occasion, prior to 2013, Ontario adopted standards set by the U.S. DOE (that were not matched by Canada), or by a sub-national jurisdiction, such as California.

### 5.3 What’s New Since 2013?

The Ministry of Energy has made four amendments to its energy efficiency standards regulation since 2013, when the ECO last reviewed Ontario’s actions on product standards.<sup>4</sup> The products

addressed through each of the four amendments are generally different (standards for any given product are typically reviewed on an approximate five-year cycle).

The four regulatory amendments are summarized briefly in Table 5.2. All four regulatory amendments were posted on the Environmental Registry for comment prior to being finalized. They received very few comments, mostly from manufacturers and other industry stakeholders.

**Table 5.2: Recent Amendments to O. Reg. 404/12 (Energy Efficiency – Appliances and Products)**

Regulatory Amendment	Date of Amendment	Environmental Registry #	Key Implications
O. Reg. 337/13	December 11, 2013	011-9337	<ul style="list-style-type: none"> <li>New or updated efficiency standards for 25 products (mostly harmonizing with U.S. standards), seven of which are newly regulated products for Ontario</li> <li>Introduced “rolling incorporation” (for one product test method only) to automatically update Ontario law to harmonize with standards updates in other jurisdiction (U.S. DOE)</li> </ul>
O. Reg. 93/14	March 26, 2014	012-0728	<ul style="list-style-type: none"> <li>Temporary harmonization (through December 31, 2014) with U.S./Canada standard for general service lighting (after 2014, Ontario-specific standard will apply)</li> </ul>
O. Reg. 298/14	December 10, 2014	012-2479	<ul style="list-style-type: none"> <li>New or updated efficiency standards for 21 products (mostly harmonizing with U.S. standards), three of which are newly regulated products for Ontario</li> <li>Expansion of “rolling incorporation” with U.S. standards for 10 additional products</li> </ul>

(continued)

**Table 5.2: Continued**

<b>Regulatory Amendment</b>	<b>Date of Amendment</b>	<b>Environmental Registry #</b>	<b>Key Implications</b>
O. Reg. 412/15	December 11, 2015	012-4146	<ul style="list-style-type: none"> <li>• New or updated efficiency standards for 18 products                             <ul style="list-style-type: none"> <li>• Harmonization and rolling incorporation with U.S. standards for 12 products</li> </ul> </li> <li>• Ontario-specific standards (higher than U.S./Canada levels) for five products, including commercial boilers and general service incandescent lighting                             <ul style="list-style-type: none"> <li>• Preceded by Ministry study to identify opportunities for Ontario-specific standards</li> </ul> </li> </ul>

## **5.4 Setting Standards: Harmonize or Set Our Own?**

### **5.4.1 Harmonization: Whom Should we Follow?**

As indicated above, Ontario historically harmonized its energy efficiency standards to Canadian federal standards, some of which in turn were harmonized to U.S. DOE standards. However, Canadian federal standards have been falling behind since 2010. With the exception of a regulation on general service lighting, Canada’s federal energy regulations were not updated since October 2011.

Meanwhile, the U.S. DOE has been very active, passing 40 new or updated standards since 2009, with many more standards under review. By U.S. law, the DOE is required to set standards that achieve the maximum improvement in energy

efficiency that is determined to be technologically feasible and economically justified. It follows a rigorous process that considers different potential efficiency levels, and assesses what impact these levels would have on product manufacturers and customers before setting a final standard. The standards adopted by DOE in recent years have been quite aggressive, setting high minimum levels of efficiency.

## **Canadian federal standards have been falling behind since 2010.**

In the four recent amendments, Ontario has mostly harmonized its standards directly to the newer DOE standards, instead of to the older,

lower Canadian federal standards. In addition, Ontario now has “rolling incorporation” with DOE standards, for certain products only. “Rolling incorporation” means that the Ontario regulation references the applicable U.S. standard “as it read on the date the particular appliance or product is manufactured.” As a result, updates to U.S. standards are automatically incorporated into Ontario law as soon as they happen, without waiting for an Ontario regulatory amendment. Prior to this change, it often took Ontario several years to update its regulation to harmonize with new U.S. (or Canadian) standards.

Some recent Ontario standards also harmonize to standards set by California or British Columbia. Adopting the standards of other leading jurisdictions has advantages, as the first adopter has already dealt with any implementation challenges associated with the new standard. Ontario adopted the efficiency level set by British Columbia for gas-fired residential water heaters, which is a slightly higher efficiency than the federal standard. O. Reg. 337/13 harmonized Ontario’s MEPS for televisions with a standard originally set by California (no MEPS for televisions exists at the federal level in the U.S. or Canada, with the exception of a maximum standby power limit).<sup>5</sup> More significantly, O. Reg. 412/15 harmonized its general service incandescent lamp requirements with a California requirement that, as of 2018, all general service lamps must meet a minimum efficiency level of 45 lumens per watt, which is roughly double the efficiency level of the current MEPS. The evolution of Ontario lighting standards is discussed in the textbox *Case Study 2: The Phase-Out of Inefficient Lighting – Round Two*.

Meanwhile, the Canadian government may be starting to catch up. In December 2015, Natural Resources Canada (NRCan) posted a new regulatory proposal which, if adopted, will increase minimum efficiency standards for many products to match U.S. DOE standards, with a plan to

introduce additional regulatory amendments in future years.<sup>6</sup> NRCan has announced its intention to work with the U.S. through the U.S. – Canada Regulatory Cooperation Council to align new and updated energy efficiency standards and test methods where possible.<sup>7</sup>

### 5.4.2 Challenges with Harmonization

Harmonization is not always the right choice for Ontario. If an existing standard is not suitable, Ontario can attempt to work with the Canadian government to develop a new, improved standard that can be applied provincially and federally, which is often a preferred approach. However, sometimes, the costs and benefits of a standard are different for Ontario than for the U.S. or Canada as a whole, because of factors like:

- Differences in energy prices (which affect the payback period for energy conservation);
- Differences in the importance of on-peak vs. off-peak electricity conservation (e.g., Ontario’s low carbon electricity system can provide low-cost, low-carbon power in off-peak hours when the supply mix is very clean);
- Differences in weather and climate (which can affect energy savings for heating/cooling equipment);
- Differences in climate change goals (and value of greenhouse gas emissions reductions); and
- Differences in product availability and cost.

## Harmonization is not always the right choice for Ontario.

Here are two case studies of the trade-offs involved.

## Case Study I: Residential Water Heaters

Ontario's zigzag struggle to set appropriate efficiency standards for residential storage tank water heaters illustrates some of the challenges Ontario faces in setting efficiency standards and assessing whether or not to harmonize with other jurisdictions.

Most Ontario homes have a traditional cylindrical hot water tank, often heated by natural gas. However, these water heaters only convert about 60 per cent of their energy into usable hot water, with the rest being lost, to the outside air in the heating process, or through the walls of the tank when hot water is not being used (standby losses). Water heating is the second largest energy use in Canadian homes (trailing only space heating), so higher-efficiency water heaters represent one of the largest potential energy savings opportunities in the residential sector.<sup>8</sup> Yet minimum efficiency standards in Ontario, particularly for gas-fired storage water heaters, remain low.

Much more efficient water heating technologies exist, including:

- tankless water heaters that avoid standby losses;
- condensing water heaters that capture and make use of the energy in the hot exhaust air (similar to the high-efficiency condensing furnaces that are now the minimum standard in Ontario); and
- electric heat pump water heaters that act like a refrigerator in reverse, moving heat from the surrounding air space to heat the water.

These technologies still have a small share of the marketplace, likely because they come with a higher initial cost. Some, but not all, consumers may recover this cost premium through operating energy savings, depending on how much hot water they use.

In the United States, new DOE standards that took effect in 2015 essentially eliminate large-volume low-efficiency water heaters.<sup>9</sup> Households requiring an abundant supply of hot water will be required to purchase one of the three higher-efficiency technologies described above. However, large-volume heaters have only a small share of the water heater market.<sup>10</sup> The DOE had considered mandating these higher efficiency technologies for smaller water heaters as well, but were dissuaded by concerns about the higher initial cost of high-efficiency products and about the ability of manufacturers to revamp their production lines. For larger-volume heaters, greater operating savings (due to higher volume of hot water use) make the initial cost premium less of a concern.

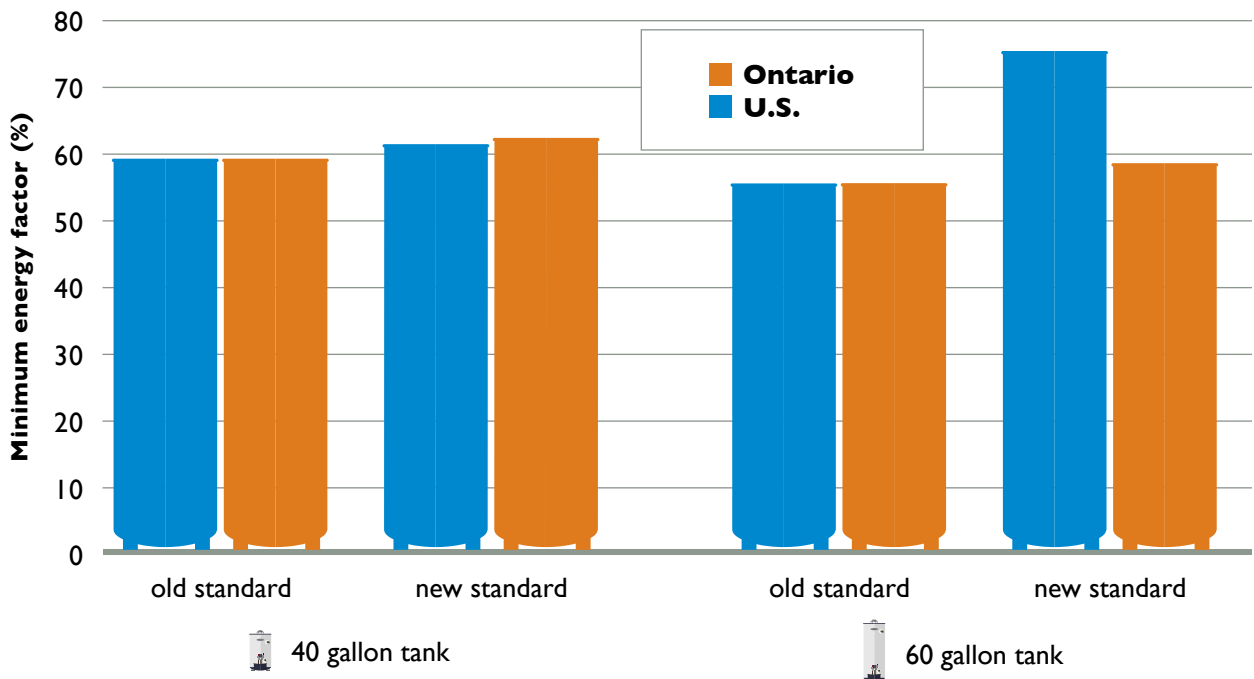
The DOE standards were passed in a 2010 rulemaking, giving manufacturers a five-year lead time to adapt to the new requirements. The new standards for large-volume tanks will help make high-efficiency technologies more common and perhaps drive down the price premium.

Ontario has struggled to decide whether to follow the DOE lead for large-volume water heaters. In June 2013, the Ministry of Energy proposed (Environmental Registry #011-9337) to match the DOE efficiency standard, for both gas and electric water heaters. However, the Ministry later abandoned this proposal (O. Reg. 337/13).

**Case Study I: Continued**

After several additional regulatory proposals and amendments,<sup>11</sup> the end result to date (shown below in Figure 5.3) is an Ontario efficiency standard for smaller gas-fired water heaters that is 1 per cent higher than the DOE (a 3 per cent increase in efficiency over Ontario’s old standard), and a standard for larger water heaters that lags far behind the DOE.

The story for electric water heaters is similar – the Ministry of Energy initially proposed to harmonize with the DOE standard that would require high-efficiency heat pump technology for larger water heaters, but did not follow through.<sup>12</sup>



**Figure 5.3: Gas water heater minimum efficiency levels**

Note: The “new” standard became effective in April 16, 2015 in the United States, and April 1, 2016 in Ontario.

Source: Ministry of Energy, U.S. Department of Energy

The reasons why the Ministry of Energy did not harmonize with the DOE requirements for large-volume water heaters illustrate some of its challenges in setting Ontario-specific standards, and in choosing whether and when to harmonize.

*(continued)*

## Case Study 1: Continued

For electric water heaters, the issue is that our climate is colder than most of the U.S.<sup>13</sup> Heat pump water heaters achieve their higher efficiency by moving heat from the surrounding room or the outside air to heat up the water in the tank. Depending on where the tank is located, the building heating system may need to work harder in the winter to compensate for this heat loss, although this could be partially offset by a reduction in air conditioning energy used in the summer. In most cases, a heat pump water heater will still save energy, but it may not be as much as predicted. Energy savings will be highest in warmer regions where heating energy use is not as important. In other words, what works for the U.S. (on average) may not work as well for Ontario. Hydro One has recently begun a pilot program (funded through the Independent Electricity System Operator's (IESO's) Conservation Fund), that will measure the savings from heat pump water heaters for Ontario customers.

For gas-fired water heaters, the concern was more about timing and impacts on manufacturers and distributors in the Canadian marketplace. In 2011, the Canadian federal government had proposed (but not adopted) a staged increase in water heater energy efficiency requirements that would require condensing technology by 2020.<sup>14</sup> Manufacturers designing products for the Canadian marketplace had assumed that Ontario would harmonize its efficiency requirements with this Canadian proposal, and had prepared accordingly. They argued that it was unfair and impractical for Ontario to propose higher efficiency requirements in 2013 that would come into force less than two years later, giving them little lead time to adjust product lines. Ontario accepted these arguments and did not follow through with its regulatory proposals. As of the current date, the original Canadian federal plan to move towards condensing water heaters by 2020 has still not been put into law. The path towards higher-efficiency water heaters north of the border is unclear.

## Case Study 2: The Phase-Out of Inefficient Lighting – Round Two

5

For most products, minimum energy performance standards (MEPS) are an obscure subject known only to industry insiders. This has not been the case for general service incandescent lighting (regular light bulbs), where the introduction of MEPS attracted extensive media coverage in recent years. These standards began to take effect in Ontario and Canada in 2014, two years later than originally planned.<sup>15</sup>

Ontario is currently in a leadership position on light bulb standards, one which it did not originally anticipate. Ontario and Canada originally passed into law identical MEPS that were slightly higher than the levels set in the United States. While the difference in efficiency levels was not great, a certain lighting technology (halogen incandescent light bulbs) could meet the U.S. standard, but not the Canadian and Ontario standards. Canada chose to lower its MEPS to match the United States.<sup>16</sup>

## Case Study 2: Continued

Ontario, however, granted only a temporary exemption (until the end of 2014, through O. Reg. 93/14) to products that met the lower U.S./Canada MEPS. The end result is that general service light bulbs sold in Ontario and manufactured in 2015 or later need to meet a slightly higher efficiency standard than light bulbs sold in the rest of Canada and the United States.

The higher standards can be met by using an infrared coating on halogen bulbs, or by using more energy-efficient alternatives such as light-emitting diodes (LEDs) or compact fluorescent light bulbs (CFLs). The Ministry of Energy believes that maintaining this higher standard is important to Ontario's conservation goals, and has estimated that approximately half of the energy savings expected from a light bulb MEPS would be lost if Ontario harmonized with the lower U.S./Canadian standard.<sup>17</sup>

Ontario's current efficiency standard is still far below the efficiency levels that CFLs and LEDs can deliver. However, a second phase of lighting efficiency standards is on the way. Ontario Regulation 412/15 has now harmonized its MEPS for general service incandescent lamps with a California requirement that, as of 2018, all general service lamps must meet a minimum efficiency level of 45 lumens per watt, which is roughly double the efficiency level of the current MEPS.<sup>18</sup> This is a level of performance that can easily be met by LEDs or CFLs, but cannot be met by any type of incandescent light bulbs. This change will likely keep Ontario ahead of Canadian and U.S. standards.<sup>19</sup>

### 5.4.3 When Should Ontario Lead?

When harmonizing with other jurisdictions is not the right answer. Ontario can develop its own original efficiency standards, or adopt voluntary leading-edge standards as mandatory Ontario standards. These options entail more work and carry a higher risk of non-compliance (or higher compliance costs). Ontario-specific standards also impose costs on industry, who must restrict their product offerings to products that comply with Ontario standards, and undertake third-party testing to demonstrate compliance.<sup>20</sup> However, unique standards can enable Ontario to capture cost-effective energy savings that would otherwise be lost.

The passage of the *Green Energy Act, 2009*, suggested that Ontario would make Ontario-specific MEPS a priority. However, as the ECO has previously reported, the Ontario government

did not follow through on its promise to make Ontario-specific MEPS higher than federal standards for appliances.<sup>21</sup> Since 2009, most of Ontario's energy efficiency performance standards have been harmonizations with standards developed elsewhere.

It was therefore a welcome surprise when, for the first time, the Ministry of Energy actively looked for opportunities where stricter Ontario-specific MEPS might be feasible and beneficial. In 2014, the Ministry commissioned two studies to assess the potential for Ontario-specific MEPS for gas- and oil-fired appliances (e.g., furnaces, boilers, water heaters) and air conditioners/heat pumps.<sup>22</sup> The studies estimated the costs and benefits associated with higher standards for 24 different products, using Ontario-specific information where possible. It recommended Ontario-specific MEPS where there was a significant net benefit without obvious technical or market supply issues.

The Ministry of Energy used these studies to propose Ontario-specific MEPS for eight products.<sup>23</sup> The proposed MEPS were generally modest increases in efficiency (5-10 per cent) over existing Canadian and U.S. MEPS, and would be cost-effective for customers. The total amount of energy saved would have been “approximately 500 GWh/year of electricity savings in 2032 (equivalent to the electricity consumed by more than 50,000 homes) and 30 PJ/year of gas savings in 2032 (equivalent to the energy consumed by more than 200,000 homes), resulting in consumers’ energy savings valued at \$300M/year by 2032.”<sup>24</sup> Unfortunately, this promising initiative mostly petered out.

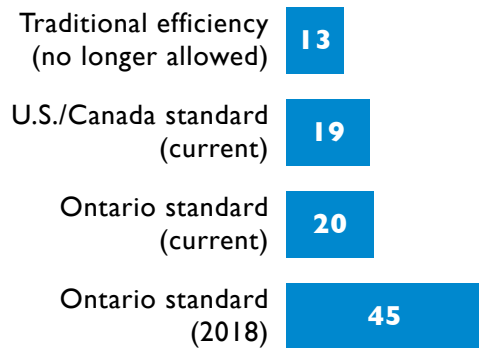
The Ministry consulted on these Ontario-specific MEPS proposals, first through a pre-Registry consultation with key stakeholders in February/ March 2015, and then in May 2015 through the Environmental Registry (#012-4146), prior to finalizing its standards updates

through O. Reg. 412/15. The proposed MEPS for many of the products were reduced between the pre-Registry consultation and the Registry posting, and again in the final regulation, in response to stakeholder feedback.<sup>25</sup>

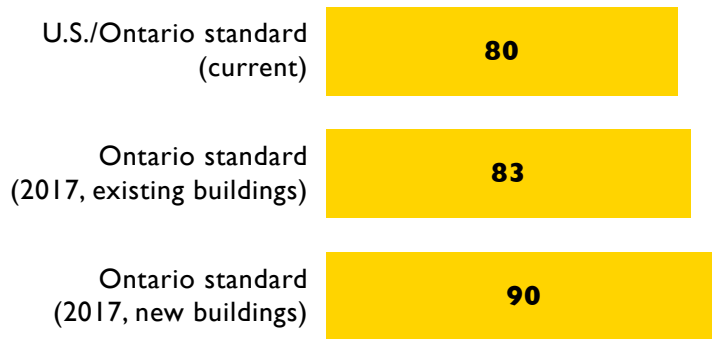
## Ontario has become a North American leader in efficiency standards for general service lighting (common light bulbs), and commercial boilers, which account for most natural gas use in large buildings.



### Lighting efficiency (lumens per watt)



### Boiler efficiency (%)



**Figure 5.4: Ontario’s leading efficiency standards for general service lighting and commercial boilers**

Notes: Lighting standards assume a “60 watt” equivalent bulb that delivers 800 lumens of light output. Boiler standards shown are for commercial hot water boilers with a heat output between 88 kilowatts and 732 kilowatts.

Sources: Ministry of Energy, Natural Resources Canada, U.S. Environmental Protection Agency

Predictably, some industry stakeholders expressed concerns that some of the proposed Ontario-specific MEPS could reduce consumer selection and increase costs. For some products (small central air conditioning/heat pump, geothermal heat pump, commercial boiler), stakeholders indicated that the proposed MEPS could result in an increase in product size and/or installation cost, which could be of particular concern for retrofit applications.<sup>26</sup> The initial proposal to raise MEPS for hot water boilers to 90 per cent efficiency, which would require condensing technology, attracted the most comments. While several boiler manufacturers expressed support for the higher proposed MEPS, others expressed concern that condensing boilers were not always appropriate in retrofit applications, and that the expected energy savings may not occur due to high water supply temperatures in the building.

In the end, the Ministry implemented Ontario-specific MEPS for four of the original eight products, although these Ontario-specific MEPS were not as stringent as the Ministry's original proposals. Standards for the other four products were aligned with Canadian or U.S. standards, or abandoned altogether. Most significantly, Ontario passed into law new Ontario-specific MEPS for both small and large commercial boilers, which provide heating for many larger buildings. For "new building applications" only, hot water boilers will be required to achieve 90 per cent efficiency (the highest mandatory MEPS in North America). Replacement hot water boilers in existing buildings and steam boilers need not achieve this level of efficiency, but are still required to meet Ontario-specific MEPS that are higher than U.S. or Canadian levels. The other two Ontario-specific MEPS implemented were for water chillers and geothermal heat pumps, and were aligned with the voluntary ASHRAE 90.1-2013 standard.

## These standards do not regulate the total energy or environmental impact of an appliance.

### 5.5 How Good are our Standards?

#### 5.5.1 What Environmental Impacts do Efficiency Standards Cover?

The *Green Energy Act, 2009*, prohibits the sale of products in Ontario that do not meet prescribed efficiency standards. The list of covered products and the specific MEPS are set in regulation (O. Reg. 404/12). These standards do not regulate the total energy or environmental impact of an appliance or other products. They only regulate the product's operating energy efficiency, and do not cover, for example:

1. Its energy use on a life-cycle basis (including production and end-of-life processing);<sup>27</sup>
2. Its durability (how long it will last before it must be replaced);
3. Greenhouse gas emissions are not directly referenced in the MEPS – however, the benefit from avoided emissions can be one of the factors taken into account when the government decides what minimum efficiency level is appropriate<sup>28</sup>;
4. Water efficiency (discussed further in section 5.6); and
5. Toxics or other environmentally harmful impacts such as ozone-depleting substances.

### 5.5.2 How Much Energy do our Standards Save?

The overall amount of energy and carbon savings from product standards is large, but quantifying the impact of Ontario's own regulations is difficult. The Ministry of Energy and the IESO have recently funded a study which will more accurately assess the contribution of product standards to Ontario's electricity conservation targets.<sup>29</sup>

The Ministry of Energy claims that all of its recent standards updates (made over the past four years) will result in 16.5 TWh of electricity savings and 27.0 PJ of oil and natural gas savings (primarily natural gas) per year.<sup>30</sup> This is likely an overestimate. The Ministry's methodology is consistent with that used by Natural Resources Canada and the U.S. Department of Energy.<sup>31</sup> However, this methodology does not account for natural market transformation and efficiency improvements brought on by technological advances and consumer preference, which may or may not be significant. Instead, the methodology assumes that all changes in product market share (more efficient products gaining a larger share of the market) are caused by efficiency standards.

In addition, in cases where Ontario is harmonizing with a Canadian or U.S. standard, the methodology attributes some savings to Ontario's action that would more accurately be attributed to the impact of the national standard, because the national standard would remove many less-efficient products from the Ontario market, even in the absence of Ontario regulation.<sup>32</sup>

While the Ministry's estimate of energy savings is of limited value when assessing the impact of harmonization with Canada/U.S. standards, it is relevant in assessing proposals for Ontario-specific MEPS. In such cases, the energy savings can more accurately be credited to the Ministry of Energy's actions.

As shown in Table 5.3, most of the potential savings from the Ontario-specific MEPS for gas- and oil-fired appliances and air conditioners/heat pumps that were proposed during pre-Registry consultation were lost when the Ministry retreated from its original proposals. Some savings will remain, particularly from the Ontario-specific boiler standards.

## 5.6 Recommendations

The ECO is generally supportive of Ontario's recent actions on product standards. It makes sense for Ontario to automatically harmonize with most U.S. DOE standards, without waiting several years for Canadian and Ontario regulations to be amended.

On the other hand, in the ECO's opinion, Ontario has enough unique circumstances that the Ministry of Energy should continue to research opportunities for Ontario-specific MEPS. This can include adopting standards from other states and provinces, or leading voluntary standards, that are higher than federal standards. The Ministry of Energy's study of gas- and oil-fired appliances and air conditioning was an honest attempt to assess the potential for Ontario-specific standards, but the final results in terms of new legal standards were limited. The study failed to give adequate weight to Ontario's aggressive greenhouse gas emissions reductions targets, and our electricity supply mix with low-cost (and low-carbon) baseload generation in off-peak hours.<sup>33</sup> Future attempts might be also more successful with longer lead times and better early industry consultation.

Aggressive Ontario-specific product efficiency standards may be more feasible if the Ministry works with the IESO, local distribution companies, and gas utilities to tighten the links between voluntary conservation programs and aggressive mandatory standards. For example, the Ministry

**Table 5.3: Energy Savings from Ontario-Specific Energy Performance Standards for Fuel-Burning Appliances and Air Conditioning Equipment**

<b>Product</b>	<b>Expected Energy Savings (Preliminary Estimates Based on Original Pre-Registry Proposals)</b>	<b>Expected Energy Savings (Final Regulation)</b>
Liquid-air geothermal heat pump	~30 GWh electricity	30.5 GWh
Water chiller	~140 GWh electricity	32.4 GWh
Small ducted AC/heat pump	~200 GWh electricity	0 GWh
Room air conditioner	~40 GWh electricity	0 GWh
Portable air conditioner	~10 GWh electricity	0 GWh (product not regulated)
Computer room air conditioner	~70 GWh electricity	0.9 GWh
Commercial gas-fired boiler, small	~20 PJ natural gas	7.1 PJ
Commercial gas-fired boiler, large	~10 PJ natural gas	2.6 PJ
<b>Totals</b>	<b>~500 GWh electricity and ~30 PJ natural gas</b>	<b>63.8 GWh electricity and 9.7 PJ natural gas</b>

Source: Ministry of Energy

could set an aggressive product standard with a long lead time (e.g., five years or even longer). In the period before the standard is to take effect, customized utility programs could help to transform the market, increasing the volume of products sold and driving down costs for the higher-efficiency option that would become the new standard. This approach is used for the Ontario Building Code, and could potentially be pursued with specific products such as condensing gas-fired water heaters, where a voluntary program could help address concerns around cost, performance, and manufacturer impact. Another option is for utility programs to help address some of the operational concerns that may arise when new standards require installing higher-efficiency equipment in retrofit situations. The Toronto Atmospheric Fund suggested taking this approach for boiler

efficiency standards – requiring condensing levels of efficiency, but rewarding the gas utilities if they delivered programs to ensure that high-efficiency boilers were sized, installed, and set up appropriately. Both British Columbia and California credit utilities for the role that their conservation programs play in leading towards mandatory standards.<sup>34</sup>

No product efficiency standards currently limit water use. Higher water consumption can also increase energy use, both in the home (if more water needs to be heated) and upstream/downstream, as municipalities use more energy to treat and pump water to consumers, and then to treat the resulting wastewater. Water and wastewater are many municipalities' largest energy use.

## Water fixtures with excessively high flow rates waste both energy and water.

However, legal authority for water efficiency and energy efficiency standards has been splintered in Ontario, and the result has been a lack of action. The *Water Opportunities and Water Conservation Act, 2010* moved the legal authority for setting water efficiency standards from the Ministry of Energy to the Ministry of the Environment and Climate Change (MOECC). Five years later, MOECC has not regulated a single product under this authority.<sup>35</sup> The Ministry of Energy has proposed an amendment to the *Green Energy Act, 2009* that, if passed, would restore its authority to regulate water efficiency for products such as dishwashers that use both energy and water.<sup>36</sup> However, this is not a comprehensive solution. One product category that needs attention and is not addressed by this amendment is water fixtures (e.g. showerheads, faucets). Water fixtures with excessively high flow rates waste both energy and water. As a recent example of what could be accomplished, California recently passed state-specific standards for water fixtures (faucets, toilets, and urinals). The state expects that these standards will reduce water consumption by these products by about one-quarter, and save consumers money on both their energy and water bills.<sup>37</sup> The ECO encourages the Ministry of Energy and the Ministry of the Environment and Climate Change to take an integrated approach to assess opportunities for Ontario-specific standards for water fixtures and other water-using products, considering the impacts of both water and energy use.

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**The Minister of Environment and Climate Change and the Minister of Energy should establish product standards for the efficient use of water in fixtures.**

Finally, standards are only effective when they are complied with. High levels of compliance generally require a realistic risk that noncompliance will be both detected and punished. Ontario is ineffective in both areas.

## Standards are only effective when they are complied with.

Unlike at the federal level, distributors do not need to submit information to the Ontario government to demonstrate a product's compliance with Ontario laws.<sup>38</sup> Rather, the law requires them to mark products that meet Ontario efficiency requirements with the label of the certification body that conducted the energy performance testing. In practice, this generic certification mark cannot be used to effectively check for compliance with Ontario law, as the certification body may have only tested the product and verified that it met a (lower) U.S. or Canadian performance level. The existing Ontario law allows for customized labeling requirements, and Ontario may wish to use this approach for products with an Ontario-specific performance standard, to make it easier to identify non-compliant products.<sup>39</sup> Non-compliant products could also be detected by Ontario staff by making use of the product energy efficiency information collected by the federal government, and there may be additional opportunities to collaborate with the federal government.<sup>40</sup>



Unfortunately, even if Ontario detects non-compliance, its ability to act is limited, because the *Green Energy Act, 2009*, removed the Ministry's authority to inspect businesses for violation of Ontario product efficiency standards and assess penalties. California has gone the opposite direction in recent years, placing a greater emphasis on compliance and adding the legal authority to impose penalties for non-compliance with its state-specific standards.<sup>41</sup> The Legislature should restore such powers in Ontario. Even without the power to impose fines, the Ministry could devote more effort to: ensuring that product manufacturers, distributors, and resellers are fully aware of Ontario-specific standards, monitoring for non-compliance, and publishing information on businesses that do not comply with the law.

In the ECO's view, a stronger approach to compliance and enforcement is needed if Ontario is serious about setting its own standards that are higher than U.S. or Canadian standards. For such products, Ontario cannot free-ride on compliance activities undertaken by these jurisdictions. Ontario's efficiency standards for light bulbs may be a particular compliance concern. This is a ubiquitous product sold through many channels where Ontario currently has higher standards than anywhere else in North America, and where additional lighting technologies will become non-compliant with Ontario law in 2018. The Ministry of Energy has indicated that it will monitor the phase out of non-compliant lighting products.<sup>42</sup>

Compliance is another area where collaboration between the Ministry of Energy and the Ministry of the Environment and Climate Change may be beneficial. MOECC may be better positioned than the Ministry of Energy to handle this responsibility, as it has built up substantial compliance and enforcement capacity due to its responsibility for enforcing other Ontario environmental laws.

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**The Ministry of the Environment and Climate Change should obtain authority to inspect and enforce compliance with product efficiency standards.**

## Endnotes

1. U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, website, *Appliance and Equipment Standards Program*, accessed April 2016. [energy.gov/eere/buildings/appliance-and-equipment-standards-program](http://energy.gov/eere/buildings/appliance-and-equipment-standards-program). However, there are some differences in the scope of products regulated by Ontario standards and U.S. federal standards.
2. 10.2 TWh out of a total 30.2 TWh. Ontario Power Authority, presentation, *Conservation Targets and How They Reduce the Demand Forecast, 2013 LTEP: Module 2*, p. 10, January 2014.
3. California commenced a multi-year process in 2012 to establish energy efficiency standards for a wide range of products not covered at the federal level, including computers and other consumer electronics, lighting products, and water-using products.
4. Environmental Commissioner of Ontario, report, *Annual Energy Conservation Progress Report - 2012 (Volume Two)*, section 4.1, 2013.
5. Ontario also proposed (Environmental Registry proposal # 011-9337) to harmonize with California's MEPS for battery chargers, another product that is not federally regulated. However, Ontario eventually decided not to adopt the California standard, and to wait until the U.S. finalized a federal standard, which has not yet occurred.
6. Natural Resources Canada, website, *Regulatory Update*, December 2015. [www.nrcan.gc.ca/energy/regulations-codes-standards/17959](http://www.nrcan.gc.ca/energy/regulations-codes-standards/17959)  
Natural Resources Canada, website, *Forward Regulatory Plan 2016-2018*, accessed April 2016. [www.nrcan.gc.ca/energy/regulations-codes-standards/18318](http://www.nrcan.gc.ca/energy/regulations-codes-standards/18318)
7. Natural Resources Canada/U.S. Department of Energy, presentation, *Canada-United States Regulatory Cooperation Council Webinar: Proposed Approach for Energy Efficiency Standards*, January 12, 2015. [energy.gov/sites/prod/files/2015/02/f20/RCC\\_Webinar\\_Presentation.pdf](http://energy.gov/sites/prod/files/2015/02/f20/RCC_Webinar_Presentation.pdf)
8. Natural Resources Canada, report, *Energy Efficiency Trends in Canada 1990-2009*, p.12, 2013.
9. U.S. Department of Energy, Final Rulemaking, *Energy Conservation Program: Energy Conservation Standards for Residential Water Heaters, Direct Heating Equipment, and Pool Heaters; Final Rule*, April 16, 2010.
10. The shipments market shares for large volume products were 4 percent for gas fired storage water heaters and 9 percent for electric storage water heaters in 2010 (*ibid*).
11. For gas-fired water heaters, O. Reg. 337/13 introduced Ontario efficiency levels that were independent of water heater size. The efficiency levels were lower than DOE for large water heaters, but higher than DOE for smaller water heaters. These requirements would have come into force on April 1, 2016, and were aligned with a standard NRCan had proposed in November 2011, but did not implement. In 2014, the Ministry proposed (Environmental Registry # 012-2479) for a second time to comply with the DOE efficiency requirements for gas-fired water heaters, but with a two year delay (compliance date of September 1, 2017). This proposal was not implemented. Finally, in 2015, the Ministry (through O. Reg. 412/15) reduced the Ontario-specific efficiency requirements that it had brought in through O. Reg. 337/13. This final efficiency level was at a MEPS that British Columbia had already made effective as far back as 2010.
12. After not acting on the proposal to match DOE levels, the Ministry of Energy first introduced new (lower than DOE) efficiency levels and maximum standby losses (in O. Reg. 337/13), then removed the minimum efficiency levels (in O. Reg. 298/14). This last change likely had little practical impact on energy use, as essentially all lost energy in electric resistance heating is due to standby losses.
13. Several comments in response to Environmental Registry posting 011-9337 questioned the use of heat pump water heaters in Canadian climates. However, research by the Pacific Northwest National Laboratory concludes that "the experimental data indicate that the penalty of installing a HPWH {heat pump water heater} in conditioned space may not be as large as modeling studies suggest, due to the buffering of interior walls resulting in localized cooling in the water heater closet, with very little

- impact on surrounding interior temperatures. Only approximately  $43.4 \pm 12.2\%$  of the theoretical space conditioning load was made up by the HVAC system in the heating season, and  $37.2 \pm 4.7\%$  cooling season.”
- Pacific Northwest National Laboratory, report, *Impact of Ducting on Heat Pump Water Heater Space Conditioning Energy Use and Comfort*, p.iv, July 2014.
- 14.** Natural Resources Canada, website, *Regulatory Update - November 2011*, accessed April 2016. [www.nrcan.gc.ca/energy/regulations-codes-standards/bulletins/7145#Water\\_Heaters](http://www.nrcan.gc.ca/energy/regulations-codes-standards/bulletins/7145#Water_Heaters). This was an amendment to an earlier June 2010 NRCan bulletin which had proposed a more aggressive timeline for higher-efficiency water heaters (condensing levels by 2016).
- 15.** The standards took effect on January 1, 2014 for 100W and 75 W equivalents, and December 31, 2014 for 60W and 40W equivalents.
- 16.** Natural Resources Canada’s Regulatory Impact Analysis Statement discusses how harmonization with the U.S. will reduce the expected energy savings from the lighting standard. British Columbia also chose to lower its lighting standard to harmonize with the U.S.
- Government of Canada, periodical (Canada Gazette 148:2), *Regulations Amending the Energy Efficiency Regulations*, January 2014.
- 17.** Ministry of Energy, information provided to the ECO in response to ECO inquiry, September 2015; April 2016. The Ministry notes that the current Ontario standard has led most consumers to choose higher-efficiency LED or CFL lighting, instead of the lowest-efficiency technology (infrared halogen lamps) that complies with the current Ontario standard.
- 18.** California Energy Commission, report, *2015 Appliance Efficiency Regulations*, p.192, July 2015.
- 19.** The United States has a provision in its law that requires a 45 lumens/watt MEPS for general service lighting (or a new lighting standard delivering equivalent energy savings) by 2020.
- 20.** Ontario does not currently require manufacturers or distributors to file product energy efficiency reports that demonstrate compliance with Ontario standards. However, the law as written still requires third-party testing to prove compliance. The administrative burden of this step can be reduced if the Ontario standard specifies the same test method as a Canadian or U.S. standard. This can allow a product to only require one round of third-party testing, even if the Ontario minimum energy performance standard is different. Ontario Regulation 404/12 (s 2.3) allows for some flexibility in product testing to avoid the need for multiple tests to comply with different jurisdictional standards.
- 21.** Environmental Commissioner of Ontario, report, *Annual Energy Conservation Progress Report - 2011 (Volume One)*, section 2, 2012.
- The government’s promise was to set “North American leading energy efficiency standards (Energy Star) for household appliances, including efficient use of water”.
- 22.** Caneta Research, report (unpublished), *Fuel Burning Equipment Study*, July 2014;
- Caneta Research, report (unpublished), *Air Conditioner and Heat Pump Study*, July 2014.
- 23.** Liquid-air geothermal heat pumps, water chillers, small ducted air conditioners/heat pumps, room air conditioners, portable air conditioners, computer room air conditioners, large commercial gas-fired boilers, and small commercial gas-fired boilers.
- 24.** Ministry of Energy, presentation, *Product Efficiency Standards: Pre-Environmental Registry Stakeholder Consultation*, p. 10, February 2015. The proposed standards were expected to deliver at least a 7% internal rate of return to customers, when accounting for both the increase in initial capital cost and the reduction in operating energy cost that would come from the higher efficiency levels.

25.

**Table: Proposals for Ontario-Specific Energy Performance Standards for Fuel-Burning Appliances and Air Conditioning Equipment**

Product	Original Proposal (Pre-Registry)	Registry Proposal	Final Regulation
Liquid-air geothermal heat pump	New Ontario-specific MEPS in all 4 categories	MEPS lower than in pre-Registry proposal, but still Ontario-specific in all 4 categories (higher than Canadian MEPS, and aligned with ASHRAE 90.1-2013 in 3 of 4 categories).	<b>Ontario-specific MEPS</b> in 3 of 4 categories, aligned with ASHRAE 90.1-2013 levels (higher than Canadian MEPS). New MEPS in 4 <sup>th</sup> category (open-loop cooling) not implemented.
Water chiller	New Ontario-specific MEPS (vapour compression chillers only)	MEPS lower than in pre-Registry proposal, but still Ontario-specific.	<b>Ontario-specific MEPS</b> – full alignment with ASHRAE 90.1-2013
Small ducted AC/ heat pump	Mix of Ontario-specific MEPS and alignment with DOE MEPS	Full alignment with DOE MEPS (Ontario-specific MEPS removed), with the exception that Ontario-specific climate zone (V) is used to test heating season performance for heat pumps	Same as Registry proposal – full alignment with DOE MEPS, with the exception that Ontario-specific climate zone (V) is used to test heating season performance for heat pumps
Room air conditioner	Mix of Ontario-specific MEPS and alignment with DOE MEPS	Same as pre-Registry proposal	Full alignment with DOE MEPS (Ontario-specific MEPS removed)
Portable air conditioner	Regulate product for the first time, with Ontario-specific MEPS (product is not regulated by U.S. or Canada)	Product removed from proposal – will not be regulated at this time	Not Applicable
Computer room air conditioner	Mix of Ontario-specific MEPS and alignment with DOE MEPS	Ontario –specific MEPS removed, full alignment with DOE	Same as Registry proposal - Ontario – specific MEPS removed, full alignment with DOE
Commercial gas-fired boiler, small	Ontario-specific MEPS for hot water and steam boilers, requiring condensing technology (90% efficiency) for hot water boilers	MEPS for hot water boilers lowered to 85% (non-condensing), but MEPS for both hot water and steam boilers still higher than Canadian/U.S. MEPS	<b>Ontario-specific MEPS</b> in all 4 categories: <ul style="list-style-type: none"> <li>Hot water boilers in existing construction: 83%;</li> <li>Hot water boilers in new construction: 90%;</li> <li>Steam boilers (natural draft): 78%;</li> <li>Steam boilers (not natural draft): 80%</li> </ul>
Commercial gas-fired boiler, large	Ontario-specific MEPS for hot water and steam boilers, requiring condensing technology (90% efficiency) for hot water boilers	MEPS for hot water boilers lowered to 85% (non-condensing), but MEPS for both hot water and steam boilers still higher than Canadian/U.S. MEPS	<b>Ontario-specific MEPS</b> in all 4 categories: <ul style="list-style-type: none"> <li>Hot water boilers in existing construction: 83%;</li> <li>Hot water boilers in new construction: 90%;</li> <li>Steam boilers (natural draft): 80%;</li> <li>Steam boilers (not natural draft) 81%</li> </ul>

Note: The Registry proposal also contained an additional Ontario-specific MEPS for a new product that arose from the initial consultant research – MEPS for fryers used in commercial kitchens (a product that was not previously regulated) would be set at ENERGY STAR® levels. This proposal was not implemented in the final regulation.

Source: Ministry of Energy

26. Ministry of Energy, information provided to the ECO in response to ECO inquiry, June 2015.
27. The relative importance of energy use and greenhouse gas emissions at different stages of a product's life cycle differs substantially between product categories. For major appliances, energy use during the production phase is usually 10 per cent or less of the total energy use over the product's life cycle, while for consumer electronics, this figure can be 50 per cent or higher. Unfortunately, at this stage, "accurate product-model level LCA {life cycle analysis} comparison is near impossible", making it difficult to incorporate into product efficiency standards. Amanda Gonzalez, Alex Chase, Noah Horowitz, report, *What We Know and Don't Know about Embodied Energy and Greenhouse Gases for Electronics, Appliances, and Light Bulbs*, pp.9-148, 2012.
28. Avoided greenhouse gas emissions are especially tricky to calculate for electricity consumption, since it depends on the emissions profile of the electricity used.
29. It is encouraging to see this work being undertaken, as the ECO has previously recommended that the IESO devote expanded effort to measuring and reporting the energy savings from codes and standards. Environmental Commissioner of Ontario, report, *Annual Energy Conservation Progress Report - 2014*, section 2.3, 2015.
- 30.

**Table: Estimated Energy Savings in 2032 from Recent Product Standards Updates**

Source Regulation	Date	Electricity Savings (TWh)	Oil and Natural Gas Savings (PJ)
13/12	February 2012	5.9	0
404/12	December 2012	2.4	16.6
337/13	December 2013	4.9	0.2
93/14	March 2014	0 <sup>30</sup>	0
298/14	December 2014	1.1	0.5
412/15	December 2015	2.2	9.7
<b>Totals</b>		<b>16.5</b>	<b>27.0</b>

Note: The greenhouse gas emissions reductions from the oil and natural gas savings alone are about 1.4 megatonnes CO<sub>2</sub>e, which is about 2.5% of the emissions gap between Ontario's current emissions and its 2030 greenhouse gas emissions reduction target.

While the reported electricity savings equate to roughly 55% of Ontario's 2032 electricity conservation target (30 TWh), these two numbers should not be directly compared, due to methodological differences.

Source: Ministry of Energy

- 31.** Briefly, the Ministry's methodology applies the following steps to estimate the annual energy savings that can be expected from a new standard (MENG response to ECO information request, September 9, 2015, q11 and attachment 5.):
- 1.** Create a "baseline case", which forecasts the number of new products that would be purchased each year, and assumes the market share of products at each efficiency level remains constant.
  - 2.** Create a "standards case" where the number of new products sold remains the same as the baseline case, but the distribution of products sold at each efficiency level is altered, such that products with an efficiency level below the new standard are raised to the new MEPS (existing stock remains at its existing efficiency level until end-of-life).
  - 3.** Calculate the difference between the "standards case" stock and the "baseline case" stock for each year.
  - 4.** Considering stock lifetime and the unit energy consumption for each efficiency level, calculate the associated energy savings in each year.

Ministry of Energy, information provided to the ECO in response to ECO inquiry, September 2015.

- 32.** For example, in a case where Ontario is harmonizing with a U.S./Canadian standard, only the portion of products produced by Ontario manufacturers would truly be impacted by Ontario's action, and only if they are producing a separate line of products for the Ontario market. Suppliers from outside the province would already be forced to move to the higher efficiency levels imposed by the U.S./Canadian standard, regardless of whether or not Ontario harmonized with this standard.
- 33.** No avoided cost of carbon was included in the analysis. The avoided cost of electricity was modeled as an average energy unit cost (residential products) or an average energy cost plus a demand cost (commercial products).
- 34.** B.C. Reg. 326/2008 – Demand-Side Measures, section 4(1.4), under the *Utilities Commission Act* allows part of the energy savings from a regulatory standard to be credited to utilities, depending on their actions. Institute for Electric Efficiency, report, *Integrating Codes and Standards into Electric Utility Energy Efficiency Portfolios*, (2011), contains more

information on how California and several other U.S. utilities integrate codes & standards with utility programs.

- 35.** The Ontario Building Code does set minimum water efficiency standards for fixtures (section 7.6.4), but these apply only to new buildings. *Ontario Water Resources Act*, section 34.12, provides MOECC's authority for water efficiency standards.
- 36.** Bill 135, *Energy Statute Law Amendment Act, 2015*. Because the Ministry of Energy does not yet have the authority to regulate water efficiency, Ontario efficiency standards for residential clotheswashers and dishwashers are harmonized with the energy efficiency requirements of the U.S. DOE standards, but not with the water efficiency requirements of these standards.
- 37.** California Energy Commission, factsheet, *Frequently Asked Questions: Energy Efficiency Standards for Water Appliances*, undated. [www.energy.ca.gov/appliances/2015-AAER-1/rulemaking/Water\\_Appliance\\_Fact\\_Sheet.pdf](http://www.energy.ca.gov/appliances/2015-AAER-1/rulemaking/Water_Appliance_Fact_Sheet.pdf)
- Savings from the California standards update are estimated at \$1.6 billion in water bill savings and \$2.1 billion in energy bill savings, over a ten year period, although this includes some savings from products other than water fixtures.
- California Energy Commission, report, *Staff Report: Revised Standardized Regulatory Impact Assessment of 2014 Proposed Appliance Efficiency Regulations : Regulations for Regulations for Toilets, Urinals, Faucets, Dimming Ballasts, Air Filters, and Heat-Pump Water-Chilling Packages*, p.4, February 2015.
- 38.** At the federal level, dealers are required to file an energy efficiency report describing the energy efficiency of the product, and the name of the certification authority that conducted the product energy performance verification testing. Natural Resources Canada also conducts occasional post-market compliance testing where products are re-tested to confirm that they meet reported efficiency levels. A recent European report has identified that product energy efficiency claims submitted by manufacturers may be inaccurate, and understate actual energy use. MarketWatch, report, *Report on Laboratory Testing Activities*, March 2016.
- 39.** Ontario Regulation 404/12 – Energy Efficiency – Appliances and Products, section 4.1.



- 40.** Ontario may wish to investigate whether it could piggyback on the federal government's compliance actions (perhaps through a cost-sharing arrangement) to identify non-compliance with Ontario law, as the federal government already conducts marketplace audits and post-market compliance testing to ensure compliance with federal standards. Natural Resources Canada, information provided to the ECO in response to ECO inquiry, April 2016.
- 41.** California Energy Commission/California Public Utilities Commission, report, *Codes and Standards Action Plan 2012-2015*, undated. [www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=5308](http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=5308)
- 42.** Ministry of Energy, information provided to the ECO in response to ECO inquiry, September 2015.