

Developing the 2017 Long-Term Energy Plan:

A special report of the
Environmental Commissioner of Ontario

December 2016



Environmental
Commissioner
of Ontario



December 2016

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(4) of the *Environmental Bill of Rights, 1993* (EBR), I present the attached Special Report of the Environmental Commissioner of Ontario on development of the 2017 Long-Term Energy Plan, for your submission to the Legislative Assembly of Ontario.

This Special Report summarizes key recommendations made by my office over the years regarding energy planning, and updates these recommendations to work within the specific context of the Ministry of Energy's 2017 Long-Term Energy Planning process.

Yours truly,

Dianne Saxe

Environmental Commissioner of Ontario



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Summary of Recommendations

The Long-Term Energy Plan Should...

Enable Ontario to meet its climate change targets.

1. Plan for an energy supply mix that enables Ontario to achieve its greenhouse gas targets.
2. Address the risk of increased greenhouse gas emissions from customers choosing natural gas over electricity for cost reasons.

Consider the environmental impacts of energy resources on our air, water and land.

3. Minimize the environmental impacts of Ontario's energy system.
4. Commit the government of Ontario to meaningfully participate in the federal approvals process for energy projects with a significant impact on Ontario's environment.

Put conservation first.

5. Demonstrate to the public that all feasible conservation opportunities are exhausted before building new energy infrastructure.
6. Improve the methodology for comparing energy conservation with energy supply.
7. Set conservation targets for all energy sources.
8. Ensure that regional electricity planning puts conservation first and is effectively integrated with other levels of energy planning.

Apply evidence-based decision making.

9. Provide detailed plans to hedge against energy supply risks associated with nuclear refurbishment and license extension.
10. Compare all options to balance supply and demand in the electricity system, not just natural gas.
11. Before subsidizing expansion of the natural gas distribution system, publicly compare the costs and benefits of alternatives such as conservation and clean energy technologies.

Provide opportunities for meaningful public participation.

12. Consult the public on a detailed draft Long-Term Energy Plan.
13. Consult the public on implementation directives/plans.
14. Do not override the Long-Term Energy Plan and its approved implementation plans, in between the three-year review cycle.

Introduction

The Ministry of Energy is currently consulting to develop an updated version of the province's Long-Term Energy Plan, which will set out a vision for Ontario's energy system for the next 20 years, and guide Ontario's near-term implementation actions. The Environmental Commissioner of Ontario (ECO) is uniquely placed to provide input into this process.

The ECO's responsibilities include reporting annually to the Ontario legislature on energy conservation and greenhouse gas emissions reductions in Ontario, and government compliance with the *Environmental Bill of Rights, 1993*. In previous reports, the ECO has reviewed government decisions on energy planning, and made recommendations for improvement. This Special Report summarizes key recommendations made by the ECO over the years regarding energy planning, and updates these recommendations to work within the specific context of the Ministry of Energy's 2017 Long-Term Energy Planning process.

Overall, it is encouraging to see that the government is developing a Long-Term Energy Plan that covers all energy sources used in Ontario, not just electricity. This is necessary in order to align the Long-Term Energy Plan with Ontario's climate change policies, an overarching goal that has been stressed in the [Premier's Mandate Letter](#) to the Minister of Energy.¹

Our recommendations focus on the need for the Long-Term Energy Plan to:

- 1) Enable Ontario to meet its climate change targets;
- 2) Consider the environmental impacts of energy resources on our air, water and land;
- 3) Put conservation first;
- 4) Apply evidence-based decision-making; and,
- 5) Provide opportunities for meaningful public participation.

PART I: BACKGROUND

This section provides a brief history of recent energy planning in Ontario. This background provides a necessary context for the specific recommendations the ECO makes in sections 2 to 6.

1.1 *The Electricity Restructuring Act, 2004 and the Integrated Power System Plan*

The recent history of energy system planning in Ontario begins with the *Electricity Restructuring Act, 2004*. The planning process established by this legislation was succinctly described by then-Minister of Energy Dwight Duncan:

Under our proposed legislation, the Ontario government would continue to set targets for conservation and electricity from renewable sources and set guidelines for diversity of supply. However, responsibility for ensuring long-term supply adequacy, a mandate that no existing institution in Ontario's electricity sector now carries, would belong to a new institution, the Ontario Power Authority. It will ensure that never again will we find ourselves in the predicament we're in today.² The power authority would assess adequacy and reliability of electricity resources and forecast future demand. It would also prepare an integrated system plan for generation, transmission and conservation, to be reviewed by the Ontario Energy Board. In addition to its planning functions, the power authority would have the power to procure new supply and demand management initiatives, either by competition or by contract.³

Under this system,⁴ energy planning was focused exclusively on electricity with the primary goal of ensuring reliability and adequacy of supply. The Ontario Power Authority (OPA) was required by law to develop a 20 year energy plan, known as an Integrated Power System Plan (IPSP), to be updated every three years. The government's role was to set high-level goals that the OPA must follow (e.g., goals regarding the use of renewable electricity or conservation) through a Supply Mix Directive, but the OPA was given responsibility for developing the detailed IPSP.

1.2 *Regulatory Oversight*

The *Electricity Act, 1998* (as amended by the *Electricity Restructuring Act, 2004*) and accompanying regulations laid out a process for review and approval of the IPSP. The Plan (and supporting evidence) was to be filed by the OPA for review by the Ontario Energy Board (OEB). The OEB's quasi-judicial hearing process allowed for intervenors to actively participate in the hearing, submit evidence or arguments, and question the evidence submitted by the OPA and other parties.

The OPA was also required to "ensure that safety, environmental protection and environmental sustainability are considered in developing the plan",⁵ and this aspect of the Plan was also to be reviewed by the OEB. As a corollary, the Plan was specifically exempted by regulation⁶ from the requirement for an Environmental Assessment through the *Environmental Assessment Act*, meaning

that the OEB, and not the former Ministry of the Environment, would have the final say as to whether the Plan was satisfactory from an environmental perspective.

Once the Plan, and supporting procurement processes, were approved by the OEB, the OPA would then have the authority to act on its own initiative to procure energy supply or conservation projects compatible with the approved Plan.

1.3 The IPSP Process in Practice

The first IPSP process started as intended, with a Supply Mix Directive in June 2006 from the Ministry of Energy to the OPA.⁷ The OPA then submitted an IPSP to the OEB for review in August 2007. The IPSP hearing attracted a great deal of participation from interested stakeholders. However, following the appointment of a new energy minister who wished to change some of the goals of the Supply Mix Directive, the process (expected to take about 18 months) was not allowed to reach a decision. Mid-hearing in September 2008, a new directive from the Minister of Energy amended the Supply Mix Directive and ordered the OPA to substantially revise the IPSP; the OPA never submitted a revised IPSP to the Board for review.⁸

Rule by Directives

In the absence of an approved IPSP, the OPA lacked authority to procure electricity conservation or supply resources. Instead, the Ministry of Energy made extensive use of one-off directives to the OPA, directing it to undertake procurements for specific electricity resources.⁹ While each of these directives was in essence a major policy decision, the directives were not subject to public consultation or justification via supporting evidence.

The IPSP Morphs into the LTEP

In November 2010, following public consultation, the Ministry of Energy released a new product, a Long-Term Energy Plan (LTEP), which was not a component of the energy system planning process set out in the *Electricity Act, 1998*. This Plan was accompanied by a new draft Supply Mix Directive to the OPA. The Plan was essentially a plain-language version of the government goals outlined in the draft directive, although it also included a few additional commitments that did not involve the OPA, such as the introduction of the Ontario Clean Energy Benefit and an intent to direct the OEB on the smart grid. The Plan was focused exclusively on electricity.

After the draft Supply Mix Directive was finalized, the OPA was directed to prepare a new IPSP in response, as it was in 2006. However, this did not occur. The OPA (presumably under instruction from the Ministry) never filed a revised IPSP with the Board, and the Ministry continued issuing directives to the OPA. It gradually became apparent that the government had abandoned the IPSP process set out in the *Electricity Act, 1998*.

This continued until the 2010 LTEP was updated in 2013. The 2013 LTEP no longer made any reference to the IPSP process. Without any statutory authority, the LTEP stood alone as the guidance document for energy system planning in Ontario. The scope of the 2013 LTEP expanded greatly from the previous plan, including new government energy-related commitments that were not strictly related to

electricity system planning and resource procurement. For the first time, the Plan also touched on other energy sources (oil and natural gas), although in a perfunctory fashion.

1.4 The Current Energy Planning Framework

In 2016, the Ontario legislature passed the *Energy Statute Law Amendment Act, 2016* (which amends the *Electricity Act, 1998* again). This Act essentially legalized the energy planning framework that the government had been using since 2010, with a few new wrinkles.

The Ministry of Energy is now legally charged with developing a Long-Term Energy Plan, on a regular basis to be prescribed in regulation (likely triennially, although the period has not yet been defined), that balances the government's goals and objectives for the energy sector, including:

- cost-effectiveness,
- reliability and resiliency,
- conservation,
- cleaner energy sources and emerging technologies,
- air emissions, and
- Aboriginal and stakeholder consultation.

The Ministry's planning responsibilities apply to *energy*, implying a responsibility to consider all major energy sources (not just electricity), even though these legal requirements are housed in the *Electricity Act, 1998*. Prior to finalizing the LTEP, the Ministry is required to consider a technical report on the electricity system prepared by the Independent Electricity System Operator (IESO), and conduct public consultation, including the use of the Environmental Registry.

For the first LTEP conducted under the new Act, the Ministry commissioned two background reports – an IESO-produced report on Ontario's electricity system called the [Ontario Planning Outlook](#), and a [Fuels Technical Report](#) covering other energy sources that was prepared by Navigant Consulting.

The two reports look forward over a twenty-year period, develop multiple demand outlooks for the use of key energy sources, and assess options for meeting the level of demand. The demand outlooks consider alternative futures for Ontario electricity and fuels demand. In particular, the outlooks make differing assumptions as to the degree of electrification, alternative fuel use and natural gas conservation, which impacts forecasts of energy use and greenhouse gas (GHG) emissions. However, none of the six outlooks assume that the energy sector will achieve its proportional share of Ontario's 2020 and 2030 GHG emissions reduction targets (see section 2.1).

Table 1: Key Assumptions in the 2017 Long-Term Energy Plan Demand Outlooks

Outlook	Assumptions
A	Low-demand scenario where electricity demand declines, and little fuel switching from fossil fuels to electricity occurs. Scenario A is only modeled for the electricity sector.
B	Electricity and fuels demand remain relatively flat. Assumes achievement of existing energy conservation targets and implementation of planned energy efficiency standards.
C	Outlook B + greater electrification of space heating, personal vehicles, industrial energy use and transit.
D	Outlook C + additional electrification of energy use.
E	Outlook C + additional natural gas conservation + fuel switching from natural gas and transportation fuels to alternative fuels .
F	Outlook D + additional natural gas conservation + fuel switching from natural gas and transportation fuels to alternative fuels (more natural gas conservation and fuel switching than in Outlook E).

Source: Navigant, *Fuels Technical Report*, September 2016; IESO, *Ontario Planning Outlook*, September 2016

Following the publication of these reports, the Ministry launched a public consultation process with a discussion guide, [Planning Ontario's Energy Future](#), which summarizes the findings in the background reports and poses a series of questions for consideration. The *Fuels Technical Report* and many of the questions posed in the discussion guide suggest that the government is considering an LTEP that covers all energy sources used in Ontario, not just electricity. This is a welcome change and one that the ECO has long recommended.¹⁰

1.5 2017 LTEP Implementation

The *Energy Statute Law Amendment Act, 2016*, sets out a new process for what will happen after the Ministry finalizes the LTEP. The Minister of Energy will likely issue implementation directives to the OEB and IESO. These agencies are then required to submit implementation plans back to the Ministry of Energy for review and approval, prior to taking action.

The Minister of Energy has the authority to subsequently amend his implementation directives. The Minister can also issue additional directives to the IESO at any time that have primacy over the LTEP implementation directive.¹¹ As with the old IPSP process, the LTEP (and supporting implementation directives) are exempt from the requirements of the *Environmental Assessment Act*.¹²

The Ministry of Energy will presumably need additional tools (not specified in the *Energy Statute Law Amendment Act, 2016*) to implement the LTEP, particularly for fuels other than electricity and natural gas.

1.6 Working Within the Framework of the New Act

From a legal perspective, the *Energy Statute Law Amendment Act, 2016* was an improvement. No longer is the government ignoring a valid statute and conducting power system planning under an extra-legal approach.¹³

The Act, however, was rushed through the legislative process. No opportunity was granted to the public to review and comment on the draft legislation through the Environmental Registry, in violation of the *Environmental Bill of Rights*.¹⁴

The Ministry of Energy claimed that the new energy planning model was necessary due to the inefficiency of the IPSP model.¹⁵ However, when the proposed legislation was reviewed by the Standing Committee on General Government, most delegates to the Committee argued against its proposed amendments. In particular, delegates expressed concern with the lesser role and degree of autonomy given to the IESO and the OEB, and the correspondingly greater centralization of power and responsibility given to the Ministry of Energy. A related concern was the lack of transparency as to how the final plan would be developed.¹⁶ Despite these concerns, the legislation was passed without a single substantive amendment.

The ECO shares some of the concerns raised at the Standing Committee hearings. The Ontario model of a centralized plan developed entirely by the Ministry of Energy without oversight is unusual in North America, with most other jurisdictions requiring a system plan that is developed by the energy utility and reviewed by the appropriate energy regulatory body. The 2014 review of Manitoba Hydro's Preferred Development Plan by Manitoba's Public Utilities Board is a recent example of the virtues of a sober second look by a regulatory body, and led to the cancellation of a \$10 billion hydroelectric project, which the Board concluded was not needed.¹⁷

The Ministry should strive to preserve a key virtue of the IPSP process – transparent, evidence-based decision making informed by public and stakeholder input – as much as possible as the LTEP is finalized and implemented. Meaningful stakeholder engagement is critical to crafting an LTEP and associated policies that respond to the specific needs, challenges, and opportunities present in today's energy market, and reflect the priorities of the community as a whole.

The ECO's recommendations in sections 2 to 6 do not attempt to rewrite the legislation. We take the current legal framework as it exists, and make recommendations designed to produce the best energy planning process and outcomes available within this legal framework.

The Ministry should strive to preserve a key virtue of the IPSP process – transparent, evidence-based decision making informed by public and stakeholder input.

PART II: RECOMMENDATIONS

2. Alignment with Climate Targets

2.1 Ensuring Energy Mix Is Compatible With Ontario's Greenhouse Gas Emissions Reduction Targets

Despite Ontario's low-carbon electricity supply, Ontario's energy sources as a whole are over 80% fossil fuel based (see Figure 1), and account for more than 70% of Ontario's GHG emissions (see Figure 2). In order for Ontario's LTEP to not conflict with the government's ambitious GHG emissions reduction targets, it will need to provide for proportional GHG reductions within the energy sector.

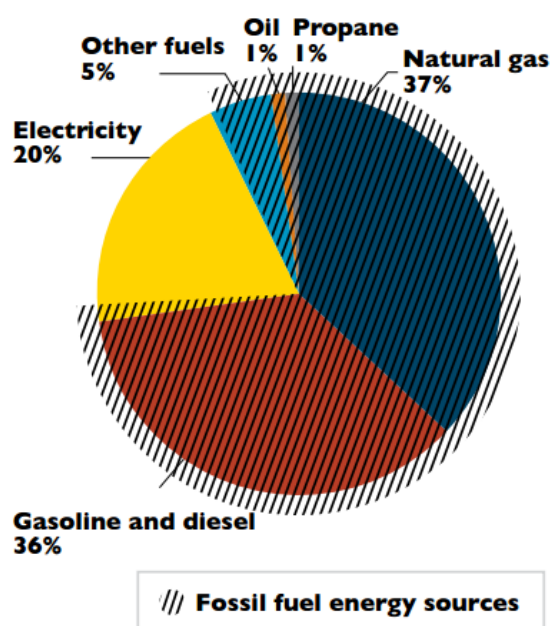


Figure 1: Ontario's Energy Use by Fuel Type in 2014

Note: 2014 values are preliminary data. Other Fuels refers to coke oven gas, petroleum coke, steam etc. Other Fuels also captures any statistical difference between the total energy use data reported by Statistics Canada and the individual fuel use it reports. This figure does not fully capture the use of biomass for energy.

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

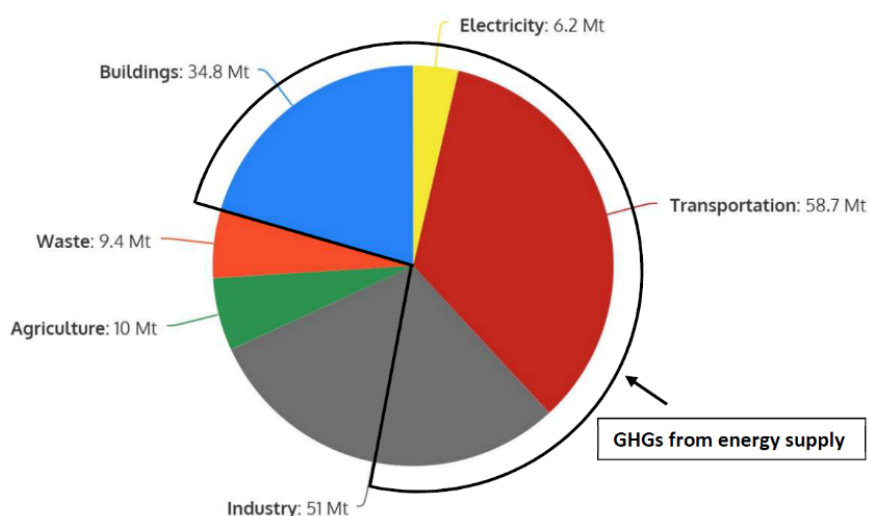


Figure 2: Ontario's 2014 Greenhouse Gas Emissions by Sector

Note: Industry GHG emissions are approximately 50% due to combustion, and counted here as emissions from energy supply. The remainder result from process emissions, fugitive sources, and pipelines. Transportation does not include Ontario's share of international marine navigation or aviation emissions.

Source: Environment and Climate Change Canada, *National Inventory Report 1990-2014: Greenhouse Gas Sources and Sinks in Canada*, Part 3, Table A11-12, p.55, 2016; Navigant, *Fuels Technical Report*, Module 6, Data table for Figure 26, 2016.

The government of Ontario has committed to achieve significant GHG reductions by 2020 and 2030 compared to 1990 levels. Given progress to date, this means that emissions must decrease from 170 Mt in 2014 to 155 Mt, or about 9% below current levels. More significant reductions will be required to meet the 2030 target (a decrease to 115 Mt or about 32% below 2014 levels). For the energy system to

be consistent with the provincial GHG targets it should provide proportional emissions reductions, meaning a decrease from 2014 levels of 127.1 Mt of emissions to about 116 Mt in 2020, and to about 86 Mt in 2030.¹⁸

As described above, the technical reports consider several different demand and supply scenarios for Ontario energy use; below is an illustration of the forecasted GHG emissions of all of those scenarios (other than Outlook A, which was only modeled for the electricity sector, not the fuels sector) throughout the term of the LTEP.¹⁹

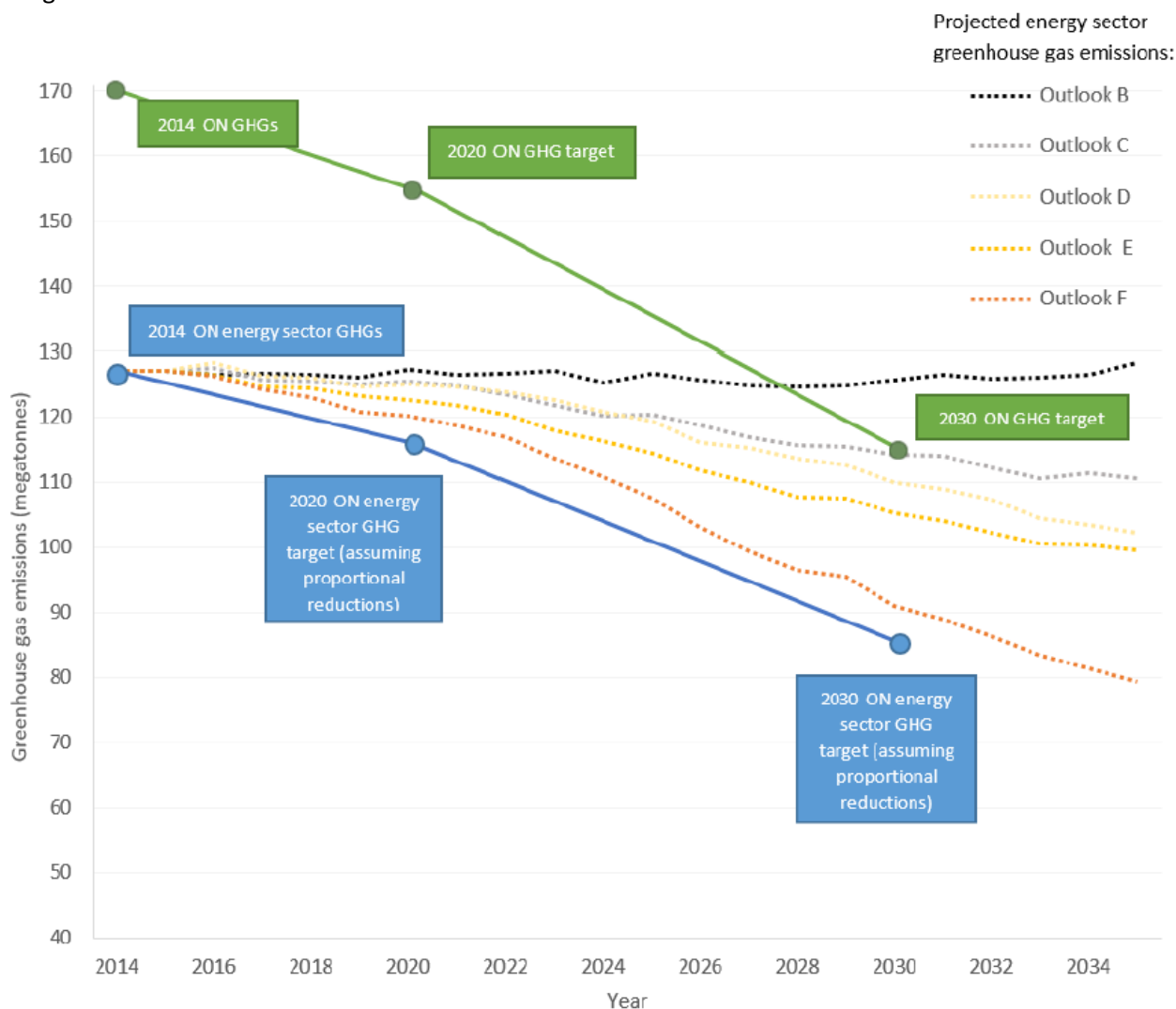


Figure 3: Comparison of LTEP Energy Sector Greenhouse Gas Emissions Projections with Ontario Climate Targets

Note: Where an outlook provides for different supply options (i.e., electricity Outlooks C and D) an average of potential GHG emissions was used. There is some minor inconsistency between the emissions numbers for electricity used in the *Fuels Technical Report* and the *Ontario Planning Outlook* for 2014 and 2015. For clarity, the above graph uses the IESO emissions data for electricity.

Source: Navigant, *Fuels Technical Report*, Module 3: Emissions Outlook, September 2016; IESO, *Ontario Planning Outlook*, Data Table for Figure 26 & Module 6: Emissions Outlook, September 2016; Environment and Climate Change Canada, *National Inventory Report 1990-2014: Greenhouse Gas Sources and Sinks in Canada*, Part 3, Table A11-12, p.55, 2016.

The scenarios presented in the technical reports are not all of equal value in contributing to Ontario's climate targets. Under Outlook B, emissions from the energy sector alone would be higher than Ontario's overall target in 2030!²⁰ Only Outlook F comes close to providing the energy sector's proportional share of GHG reductions needed from all sectors if Ontario is to meet the target.

For the energy system to be consistent with the province's GHG targets it should provide proportional emissions reductions

The final LTEP cannot afford to be indifferent about which energy supply mix is appropriate for Ontario. The LTEP should explicitly acknowledge how its selected energy supply mix will either help meet the energy sector's share of needed province-wide GHG reductions or hinder the province in meeting its targets. In the case of hindrance, the LTEP should explain how emissions reductions outside of the energy sector (for example, in waste or agriculture), would bridge the gap.

Recommendation 1: Plan for an energy supply mix that enables Ontario to achieve its greenhouse gas targets.

2.2 Fuel Switching Due to Differences in Energy Prices

Neither of the technical reports addresses how customer choice (driven by price) may affect the demand for energy sources. This issue is most apparent in relation to home heating.

The IESO *Ontario Planning Outlook* highlights the need for Ontario's energy supply to be increasingly electrified if it is to be consistent with the province's climate policies, due to Ontario's low-carbon electricity supply.²¹ The majority of this electrification is forecast to occur in the residential, commercial and industrial sectors.²² Most significantly, the technical reports consider two scenarios of increased electrification of new equipment for home and building heating (Outlook C calls for 25%, and D, 50%). If the LTEP is to adopt either of these scenarios (which will likely be necessary if it is to support the province's GHG reduction targets), it will have to address a major obstacle to achieving them: the significant differential between the cost of natural gas versus electricity, per unit of energy.²³

The LTEP will need to address the significant differential between the cost of natural gas versus electricity

Looking at heating in the residential sector specifically, the likely low-carbon alternative to natural gas is electric heat pumps (ground source or air source).²⁴ However, even though they can replace natural gas furnaces *and* central air conditioning, heat pumps still cost significantly more to install and operate, despite their extremely high efficiency. This is primarily due to the current price difference between electricity and natural gas.

Not only does the current price differential mean that increased electrification of home heating is unlikely, it also means that the opposite is true: increased gasification is likely. The energy cost premium is much greater for customers with electric furnaces or baseboard heating (because these forms of electric heating are much less efficient than heat pumps), making these customers most likely to switch to natural gas. According to Union Gas's most recent annual report, it expects the trend of residential conversions to natural gas to continue into 2016, driven in part by electricity prices.²⁵

The Climate Change Action Plan discusses the government's intention to use GHG auction proceeds to subsidize the cost of electricity, claiming that this will reduce greenhouse gas emissions by 3 MT. As shown in *Facing Climate Change*, the ECO found no evidence to support this claim.²⁶ Targeted incentives for capital equipment (such as heat pumps for home heating) could be more effective in encouraging fuel switching and thus reducing greenhouse gas emissions, at least until a more accurate carbon price is internalized in the cost of natural gas.

A similar risk of fuel switching away from low-carbon electricity to fossil fuels may exist in other sectors (e.g., industries generating electricity themselves from natural gas instead of drawing power from the grid). If the LTEP does not account for and address these trends, the energy future that it projects will not be realized.

Recommendation 2: Address the risk of increased greenhouse gas emissions from customers choosing natural gas over electricity for cost reasons.

3. Protecting the Environment

Both the *Ontario Planning Outlook* and the *Fuels Technical Report* provide information on how our future energy choices will affect Ontario's greenhouse gas emissions. However, energy projects have environmental consequences other than greenhouse gas emissions, and these also need to be addressed.

For example, the *Ontario Planning Outlook* describes several options to meet Ontario's electricity needs in the two scenarios where significant electrification occurs (Outlooks C and D).²⁷ These options are portfolios of new electricity resources that include varying amounts of waterpower, wind, solar, natural gas, nuclear, demand response²⁸, or imports (see Figure 4). Each of these technologies (plus the new transmission infrastructure that would be needed for some resources) has its own environmental impact, be it land-use footprint, impact on species of risk and their habitats, or the threat of exposure to radioactive materials. Although the *Ontario Planning Outlook* discusses the economic costs and GHG emissions associated with the different resource mixes, it contains not a word on these other environmental impacts. Neither does the *Fuels Technical Report* discuss the potential negative environmental impacts associated with fossil fuels and alternative fuels, or how these impacts could be mitigated.

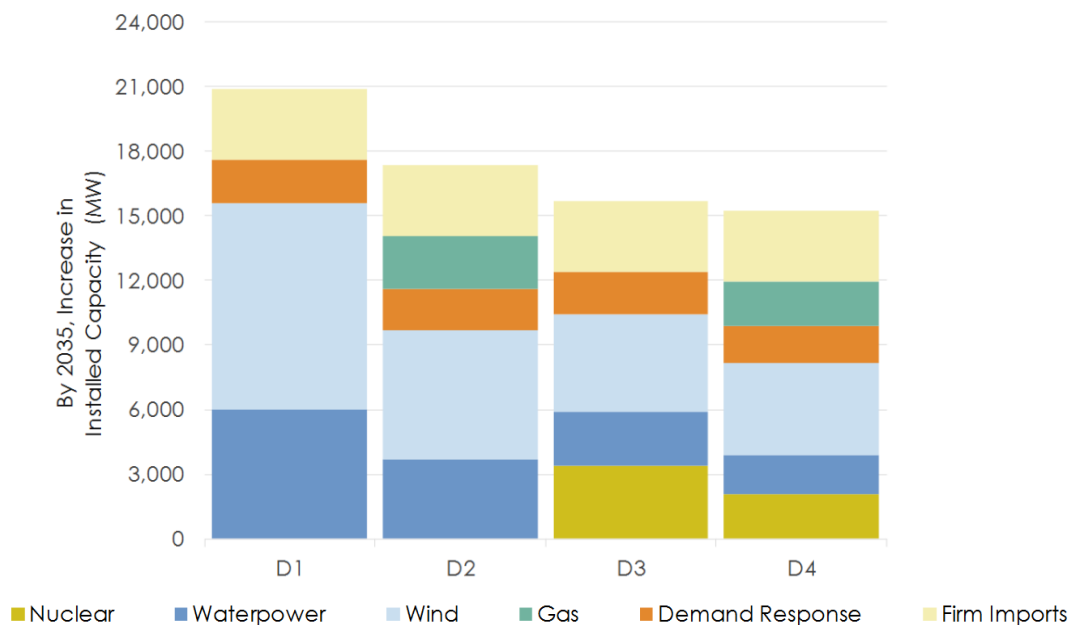


Figure 4: Potential mixes of new energy resources to meet increased electricity demand (Outlook D)

Source: IESO, *Ontario Planning Outlook*, Module 7, slide 47, September 2016.

The final LTEP cannot make the same omission. As discussed in section 1.2, the new energy planning framework has explicitly removed the ability of the Ministry of the Environment and Climate Change or the Ontario Energy Board to oversee and regulate

The new energy planning framework has explicitly removed the ability to oversee and regulate the cumulative environmental impacts of the decisions made in the LTEP.

the cumulative environmental impacts of the decisions made in the LTEP. In this respect, the legal framework is clearly insufficient. As a second-best solution, the Ministry of Energy should work closely with the Ministry of the Environment and Climate Change and other ministries and agencies as appropriate, to assess the environmental impacts associated with different mixes of energy resources, and to consult the public about those impacts.

Recommendation 3: Minimize the environmental impacts of Ontario's energy system.

For some major categories of energy projects with environmental impacts – in particular, electricity transmission lines or natural gas and oil pipelines that cross provincial or national borders, and nuclear energy projects – the final approval authority is the federal government, not the government of Ontario.

For gas and oil pipeline projects, Ontario established a set of principles in the 2013 LTEP to guide its intervention in federal reviews of these projects. For the proposed TransCanada Energy East project, the Ontario Minister of Energy also requested the OEB to examine and report on the implications of the project for Ontario, including the impact on the natural environment.²⁹ The OEB commissioned expert advice and conducted public consultations, and then reported back to the Ministry in August 2015. The OEB's report offered advice in several areas, including a recommendation that TransCanada should consider alternative pipeline routing that would avoid environmentally sensitive areas.³⁰

The ECO believes that this approach has put the Ministry in a strong position to advocate for Ontario's interests (including protection of Ontario's environment) at the National Energy Board hearing on Energy East. Ontario should take similar steps for other major energy projects regulated federally, including nuclear projects, that could significantly impact Ontario.

Recommendation 4: Commit the government of Ontario to meaningfully participate in the federal approvals process for energy projects with a significant impact on Ontario's environment.

4. Putting Conservation First

The International Energy Agency reported that conservation may be able to achieve about 40% of needed global GHG reductions.³¹ What's more, according to the IEA, "energy efficiency measures are among the most cost-effective actions that can be deployed to reduce emissions in the short, medium and long term."³² These findings suggest that Ontario can and should set more ambitious and comprehensive conservation targets.

The province has made some progress in its commitment to conservation. The 2013 LTEP adopted the policy of putting conservation first in energy system planning, committing that "conservation will be considered before building new generation and transmission facilities, and will be the preferred choice wherever cost-effective."³³ The ECO supports continuing the Conservation First approach in the new LTEP and makes several proposals to help the Ministry put this policy into practice. These proposals respond to questions posed in the LTEP discussion guide regarding how to enhance conservation programs and whether to set conservation targets for other fuels.

4.1 Loading Order

The ECO has previously recommended that energy system planning should include a loading order that puts conservation first where feasible, ahead of generation and wires solutions, as was proposed for the first Ontario IPSP³⁴ and is used in California.³⁵ This could be operationalized in the Long-Term Energy Plan by placing an onus on the Ministry of Energy to justify government decisions arising from the LTEP that call for taxpayer or ratepayer spending on new energy supply or energy delivery infrastructure (e.g., procurement directives to the IESO, or direct government spending on energy infrastructure). In all such cases, the Ministry should be required to provide evidence of how conservation was considered, and why (e.g., for reasons of cost, reliability, technological feasibility) it was not a suitable alternative. Under the Ministry's direction, a similar principle has already been adopted into the infrastructure planning activities of electricity and gas distributors.³⁶

Recommendation 5: Demonstrate to the public that all feasible conservation opportunities are exhausted before building new energy infrastructure.

4.2 Accurate Valuation of Conservation Cost-Effectiveness, Including Valuing Avoided Greenhouse Gas Emissions

Putting conservation first where cost-effective requires an accurate accounting of the costs and benefits of energy conservation in comparison to energy supply. The assumptions relating to electricity conservation in the *Ontario Planning Outlook* are deficient in two respects. They are outdated with respect to the cost of energy supply (and thus the value of conservation in avoiding energy supply investments), and are inadequate in pricing the benefit of carbon emissions reductions.

The IESO values conservation by calculating the avoided costs that would otherwise be incurred if conservation were not pursued.³⁷ However, the *Ontario Planning Outlook* appears to use the values of

avoided costs from the 2013 LTEP. This value tells us how much conservation was worth then, not now. The IESO needs to provide a more recent calculation of avoided costs, under each of the proposed energy demand outlooks. Apart from the questionable accuracy of outdated values, this is also important since the value of conservation varies depending on which demand outlook ultimately comes to pass. If electricity demand is flat or falling (Outlooks A and B), then additional electricity conservation will have less economic value. If, on the other hand, significant electrification takes place (Outlooks C or D), then the value of electricity conservation is higher, as it can eliminate the need for new electricity supply investments that would otherwise be needed to meet the higher demand. Logic suggests that conservation would play a larger role in Ontario's energy mix in this scenario.

An accurate cost comparison between energy conservation and new energy supply also requires a reasonable value for the environmental benefit of avoided greenhouse gas emissions from conservation programs. The value currently used to represent *all* environmental and non-energy benefits (e.g., air quality, biodiversity, improved comfort) in cost-benefit analysis for natural gas and electricity conservation programs is 15% of the energy cost savings. This is almost certainly too low just for the benefit of avoided greenhouse gas emissions, particularly for natural gas conservation programs, and for electricity programs that target periods of peak demand (when gas-fired generation is operating). The 15% adder does not have any logical connection to the carbon price that will emerge through Ontario's cap and trade program, nor to international best practice on internal carbon shadow pricing. Many conservation measures will be in place for several decades, so cost-benefit analysis should be based on an expectation of how the carbon price will change over that time horizon. It is uncertain where carbon prices will end up, but the trend is forecasted to be upwards, moderate estimates are in the \$90/tonne range by 2030.³⁸

Accurately pricing the emissions reductions benefits of conservation would also increase opportunities for conservation programs targeted around hours of peak demand, helping to address another outstanding ECO recommendation – to focus electricity conservation programs on times when conservation displaces natural gas-fired generation, when it has the most environmental and economic value.³⁹

Recommendation 6: Improve the methodology for comparing energy conservation with energy supply.

4.3 Conservation Targets for Other Fuels

The ECO criticized previous LTEPs for being energy plans in name only, focused almost exclusively on electricity. Based on the *Fuels Technical Report* and the questions posed in the LTEP discussion guide, the next LTEP holds the promise of being a true energy plan addressing multiple fuels, which is commendable, and addresses a long-standing ECO recommendation.⁴⁰

One specific question posed in the discussion guide is whether Ontario should set provincial conservation targets for other fuel types such as natural gas, oil and propane.⁴¹ Previous LTEPs have only included conservation targets for electricity.

To date, Ontario has placed too much emphasis on the conservation of electricity, and not enough emphasis on the conservation of fossil fuels, given the dominance of fossil fuels in terms of overall energy use and greenhouse gas emissions (see Figures 1 and 2).⁴²

Thus, the ECO supports, and indeed has previously recommended, establishing conservation targets for other fuels.⁴³

For natural gas distributors, conservation targets already exist, but are set through OEB review, not by the Ministry as part of the LTEP. The government would need to assess whether LTEP conservation targets for natural gas would complement, modify, or duplicate the OEB process and take appropriate action. One concern is that the low price of natural gas has made natural gas conservation a poor cousin to electricity conservation from a customer perspective. As discussed in section 4.2, proper accounting of the value of avoided greenhouse gas emissions is a necessary first step to increasing the amount of natural gas conservation.

For other fuels, such as gasoline and diesel, more work is needed to set targets. Ontario does not yet have an adequate understanding of the conservation potential, or appropriate mechanisms (e.g., legal tools, program delivery agents) for delivering conservation measures and achieving conservation targets. The impact of fuel switching between energy sources, and how fuel switching would affect conservation targets, would also need to be carefully considered. These issues are best examined as part of an energy conservation strategy covering all major energy sources, as the ECO has previously recommended.⁴⁴

The current program delivery system does a poor job providing households and businesses with a one-stop resource for conservation of different energy sources.

A closely related issue is how to integrate conservation programs for different energy sources. On multiple occasions⁴⁵, the government has given direction that it wants to see improved integration of electricity and natural gas conservation program design and delivery. In the ECO's view, progress in this area has been inadequate, and the current program delivery system does a poor job providing households and businesses with a one-stop resource for conservation of different energy sources.

The ECO has also recommended using benchmarking analysis to help assess conservation potential and set energy conservation targets.⁴⁶ Benchmarking determines the amount of energy savings potential in a sector by comparing the energy use of each building or facility in a sector to comparable best-in-class performers.⁴⁷ Benchmarking can complement the technical potential studies that have recently been used to assess the conservation potential in the electricity and gas sectors, and can account for conservation opportunities (e.g., from changes to operational behaviour) that are missed in technical

potential studies.⁴⁸ Related ECO recommendations (to set energy use intensity targets for public buildings; mandate home energy use disclosure prior to sale; and require large private buildings to disclose their energy intensity) could all help make use of benchmarking to set appropriate conservation targets.⁴⁹

Recommendation 7: Set conservation targets for all energy sources.

4.4 Conservation in Regional Planning: Going Beyond the Long-Term Energy Plan Targets

The regional electricity planning process is disconnected from the LTEP. It is a potentially advantageous initiative but its conservation benefits are far from being fully realized.

In the 2013 LTEP, Ontario committed to promoting the policy of *Conservation First* in regional electricity planning [...]. The Ministry continues to monitor the IESO's and OEB's progress in this area.

-Ministry of Energy, *Planning Ontario's Energy Future: A Discussion Guide to Start the Conversation*, p.42.

In contrast to the Long-Term Energy Plan's province-wide focus, the regional planning process is concerned with the issue of different needs in different regions, and balancing electricity supply and demand at the regional level. If there is an imbalance, the options are to reduce regional electricity use through conservation, increase electricity supply within the region through local generation, or develop wires solutions to improve the ability to move electricity to the region from the rest of the province. In theory, enhanced conservation programs (beyond the provincial conservation targets set through the LTEP) may make sense on a region-specific basis if they can be used to defer or eliminate regional infrastructure investments. However, the success of regional planning in promoting conservation is hampered by several features of the inaugural regional planning cycle just completed in 2016.

Several Integrated Regional Resource Plans (IRRPs) are transitional plans that began under the previous process of transmission planning on an as-needed basis, and did not meaningfully address the broader set of solutions, including conservation, to meet resource needs. Given their transitional character, they seem weakly linked to the Long-Term Energy Plan's long-term conservation targets.

This first generation of regional plans suffered under this disconnected process.⁵⁰ None identified any specific long-term needs and basically put the task off until the next planning cycle. Plans that did try to address long-term needs framed them at a highly conceptual level, as a paradigm termed *community*

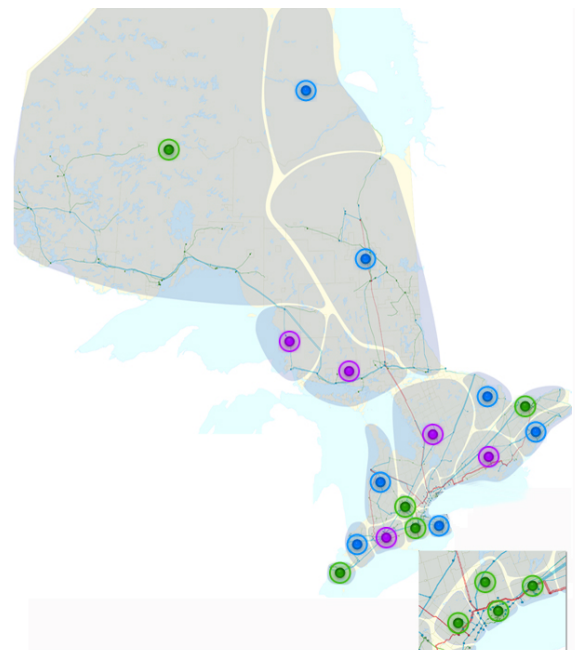


Figure 5: Ontario's 21 electricity regions

Source: Ministry of Energy, infosheet, *Planning for Electricity Infrastructure*, Spring 2015.

self-sufficiency, with no detailed proposals for aggressive conservation to achieve this goal.⁵¹ Several plans state that due to forecast uncertainty, it is not prudent to plan for the long-term (i.e., 2025-2035).

The short-term emphasis did not allow for serious consideration of conservation in this planning cycle

The plans devote much more attention to the near- (2015-2020) and medium-term (2015-2024) timeframes and proffer solutions that fit these horizons, like wires and transformers. As a consequence, the treatment of conservation in the near-term horizon seems perfunctory. IRRPs assumed only a minimum amount of conservation, adopting the LTEP's conservation targets as the default with no assessment of incremental conservation opportunities above this level.⁵² IRRPs then

incorporate any distributed generation contracted in the region through IESO procurement processes, and essentially in most plans, any near-term residual needs are met through transmission lines and transformer stations.⁵³ Though the short-term emphasis did not allow for serious consideration of conservation in this planning cycle, it may be better integrated in the next cycle of regional planning in 2020.⁵⁴ If so, the contribution of local initiatives (conservation or distributed generation) can be aggregated to produce a more accurate forecast of the provincial demand for electricity from the central (IESO-operated) grid.

And further, several existing gaps in Ontario's energy planning processes will need to be addressed. The 2017 mid-term review of the province's electricity conservation policy (the Conservation First Framework) should assess how adequately local electricity distribution company conservation plans capitalize on information provided in regional electricity planning and in community energy plans (a bottom-up approach to energy planning usually led by municipalities) by targeting and minimizing all new electricity demand needs identified.⁵⁵

How will local energy plans integrate with broader planning? And how do we ensure that we better integrate fuels and electricity planning with broader community planning?

Planning Ontario's Energy Future: A Discussion Guide to Start the Conversation, p. 4.

Regional planning conducted to date has followed a disappointing strategy: minimal action on conservation. Repeating this in future planning cycles will mean continued lost opportunities, and does not address the questions posed above by the Ministry of Energy. Recently completed IRRPs that did refer to a goal of self-sufficiency (which would imply significant conservation and local generation) passed the buck to the community energy planning process, to take any action towards this goal. Will the next round of IRRPs released in 2020 then be informed by community energy plans? Will the 2020 LTEP be informed by community energy plans? Will the next provincial electricity conservation framework (to replace the current framework which expires in 2020) be informed by IRRPs and community energy plans? And as past ECO reports have asked, how will the Ministry and electricity agencies respond if the community plan differs dramatically from the regional plan or the LTEP?⁵⁶

Recommendation 8: Ensure that regional electricity planning puts conservation first and is effectively integrated with other levels of energy planning.

5. Evidence-Based Decision Making

Evidence-based decision making (informed by public and stakeholder input) should inform all aspects of the Long-Term Energy Plan, as it is likely to reduce costs, improve effectiveness, and increase public acceptance of the final Plan. In addition to the recommendation made above that conservation should always be reviewed as a possible alternative to proposed infrastructure investments, the ECO offers the following suggestions, related to nuclear refurbishment and natural gas infrastructure.

5.1 Addressing Nuclear-Related Risks to Reliability, Emissions, and Cost of Electricity Supply

The IESO's *Ontario Planning Outlook* notes that availability of the nuclear fleet is the largest risk to Ontario's expected mix of electricity resources over the LTEP planning horizon. It highlights two major risks associated with nuclear power supply in the province: the regulatory risk associated with the license extension application for the Pickering nuclear station, and the potential for delays and cost overruns (possibly triggering cancellation of subsequent reactor refurbishments) in the Bruce and Darlington nuclear refurbishments.⁵⁷ Approximately 10 gigawatts of electricity capacity, currently supplying roughly half of Ontario's electricity production, is potentially subject to one of these two risks (see Figure 6).

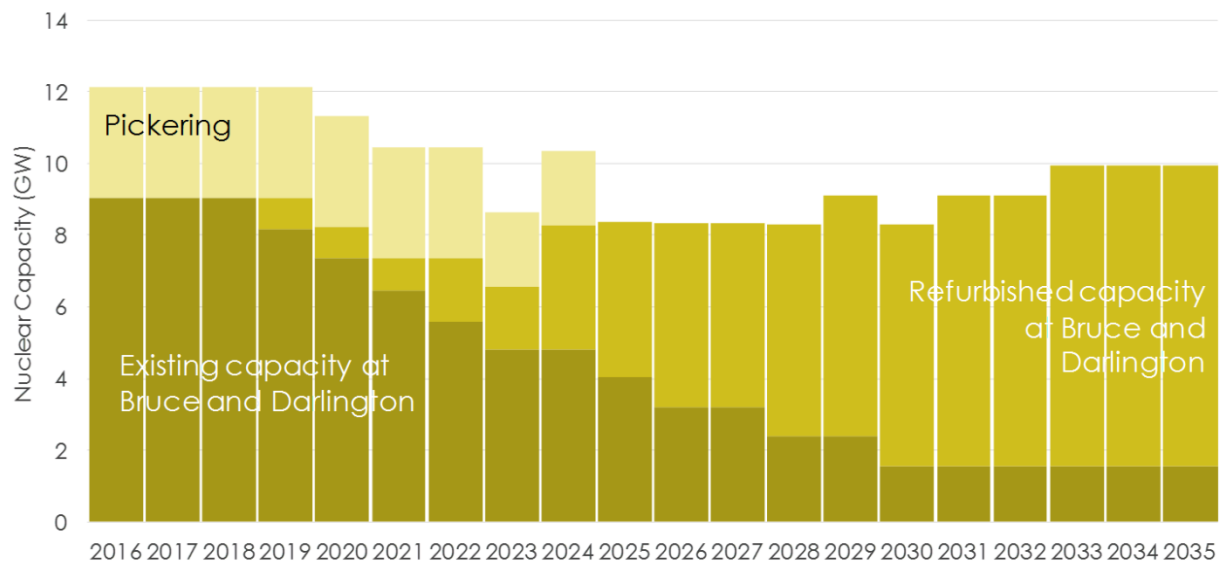


Figure 6: Nuclear fleet installed capacity (2016-2035)

Source: IESO, *Ontario Planning Outlook*, Module 4, slide 9, September 2016.

The *Ontario Planning Outlook* indicates that it has provided for an increased reserve margin of electricity supply as a contingency plan for potential delays in the refurbishments, though it does *not* indicate any further details, such as how much of a reserve is provided, what length of delay would trigger the IESO to contract for this reserve, and what costs this would add to the price of electricity.⁵⁸ The *Ontario Planning Outlook* does not indicate at all how it would address cost overruns or a licence extension application denial, but simply suggests that there would be time to develop alternatives should one of these situations occur.⁵⁹

Some protection is built into the refurbishment contracts, which provide the province with opportunities to cancel a contract should there be delays or cost overruns, or if alternative energy supply options become more affordable. However, it is unclear how these off-ramps would function in practice. In the case of the recently started Darlington refurbishment there are no documents that detail how the off-ramp mechanism will work. In the case of the Bruce Power refurbishment, though more details are provided, it is still unclear what level of cost escalation would stop the project.⁶⁰

Given the dominant role of nuclear energy in Ontario's electricity mix, the level of consideration given to these risks in the LTEP needs to be higher. There is a risk to meeting Ontario's greenhouse gas emissions targets, as a reduction in nuclear energy production would likely be filled in part by increased production from Ontario's gas-fired generators. If Ontario's contingency plan is to develop a lower-emissions alternative to gas-fired generation, there are risks as to whether alternative solutions to ensure system reliability can be provided in reasonable time and at a reasonable cost.

Recommendation 9: Provide detailed plans to hedge against energy supply risks associated with nuclear refurbishment and license extension.

5.2 The Role of Natural Gas in Complementing Electricity Infrastructure

Three questions in the Long-Term Energy Plan discussion guide touch on the linkages between Ontario's electricity and natural gas networks:

1. **What role do you foresee for natural gas to supplement and complement the province's existing electricity storage options?**
2. **How can Ontario further support innovative energy storage technologies that leverage our existing natural gas infrastructure assets and take advantage of our clean electricity system?**
3. **What additional policies should the government consider to expand access to natural gas?**

The first two questions are similar and raise a valid point that natural gas may have a role to play in balancing Ontario's electricity supply and demand. Electricity must be produced, delivered, and consumed nearly instantaneously for the grid to maintain balance. This requires grid infrastructure -- including generation, transmission and distribution systems -- to be sized to manage the highest peak usage of the year, despite consumer electricity demand varying significantly both throughout the day and year. The need to size the grid to the highest peak demand results in system inefficiencies, such as: underutilization of assets, high cost to ratepayers, and the likelihood of excess electricity production at times of low demand.

As Ontario has moved to a lower-emission electricity supply mix with a higher proportion of inflexible nuclear and intermittent renewables (wind and solar), the ability to match supply with demand has become more difficult, and is driving the need for storage. Although prices are dropping, electricity storage remains relatively expensive to acquire and limited in its capacity. In contrast to electricity, natural gas can be stored at rather low cost, and Ontario has significant gas storage facilities, including the Dawn hub near Sarnia.

Although combustion of natural gas produces GHG emissions, existing natural gas infrastructure can potentially play a role in the transition to a low-carbon energy system. Certain technologies could reduce (or at least not increase) Ontario's overall greenhouse gas emissions.

Natural gas can help balance electricity supply and demand in at least three ways:

1. Using natural gas-fired electricity generation to help meet peak electrical demand.
2. Powering end uses with natural gas instead of electricity at times of peak electrical demand.
 - One example is dual-fuel technologies that can switch between using electricity and natural gas (e.g., electric heat pumps combined with small furnaces to provide space heating to buildings). The flexibility to meet critical energy uses from gas or electricity also provides a degree of resiliency against outages.
3. Using excess electricity that would otherwise go to waste to produce hydrogen or methane, fuels that can then be injected into the gas grid (power-to-gas).

Electricity supply and demand can also be balanced with many other tools, for example:

- A well-designed electricity resource mix of baseload, variable, and peaking generation and conservation that better matches Ontario's demand curve;
- Electricity storage;
- Variable electricity price signals and demand response programs to increase or decrease certain electrical loads at specific times (e.g. electric vehicle charging, thermal storage of hot or chilled water); and,
- Imports/exports and curtailment.

The ECO has long argued that proper electricity pricing signals have an important role to play in balancing supply and demand and may minimize the need for technology procurements.⁶¹ It is encouraging to see the Ontario Energy Board examining alternative pricing pilots for the Regulated Price Plan.

Should resource procurement be necessary, the IESO is in the best position to compare the economic value of different approaches and technologies. Solutions involving natural gas should not be ruled out, but nor should it be assumed that they are desirable. There is simply not enough information in the LTEP background materials to determine the role that gas infrastructure should play in helping to balance Ontario's electricity system.

Recommendation 10: Compare all options to balance supply and demand in the electricity system, not just natural gas.

The third question posed by the Ministry (“What additional policies should the government consider to expand access to natural gas?”) is similar to the first two in that assumes natural gas is the best solution to a problem. In this case, the problem being addressed is presumably the higher heating bills faced by residents and businesses that do not have access to natural gas. Several alternative low-carbon solutions exist, such as:

- energy retrofits and conservation programs to reduce energy use and energy costs; and,
- financial assistance to convert to other energy supply technologies that would lower fuel costs (e.g., high-efficiency electric heat pumps, solar thermal, biomass).

The government has committed to developing grant and loan programs for natural gas access, and encouraged the OEB to examine opportunities to facilitate access to natural gas expansion for more communities.⁶²

However, the OEB has recently ruled out cross-subsidizing expansion of gas service to new communities by increasing rates for existing gas customers.⁶³

This may change the cost-effectiveness of natural gas expansion, both to the gas companies and to potential customers, especially since new natural gas infrastructure might have to be fully paid for over a relatively short operating life in light of Ontario’s GHG targets. It would therefore be appropriate for the Ministry of Energy to fully and publicly evaluate the costs and benefits of alternatives prior to subsidizing gas infrastructure expansion.⁶⁴ Furthermore, it is imperative that any decision to expand natural gas infrastructure be based on an economic analysis that incorporates a reasonable price on carbon (as mentioned in section 4.2) and enables the energy plan to play its fair role in achieving the province’s GHG reduction targets.

It would be appropriate for the Ministry of Energy to fully and publicly evaluate the costs and benefits of alternatives prior to subsidizing gas infrastructure expansion.

Recommendation 11: Before subsidizing expansion of the natural gas distribution system, publicly compare the costs and benefits of alternatives such as conservation and clean energy technologies.

6. Public and Stakeholder Participation

6.1 Developing the LTEP

It is admirable that the Ministry has published the *Ontario Planning Outlook* and *Fuels Technical Report* as information resources to guide the development of the LTEP, and has followed these with public consultation, as required by the *Electricity Act, 1998*. However, the LTEP discussion guide that builds on the technical reports and is intended to guide consultation is vague and open-ended. It asks general questions about many aspects of energy policy, but does not table specific policy proposals that the Ministry is considering for inclusion in the LTEP. The exact scope of consultation is hazy, given the extremely broad purpose of the LTEP – “setting out and balancing the Government of Ontario’s goals and objectives respecting energy for the period specified by the plan”. If the government moves directly from this to the final LTEP, it will have given the appearance, but not the reality, of substantive public consultation on what are enormous environmental and economic decisions.

In contrast, the 2010 LTEP consultation was built on a clear and specific policy proposal – the draft Supply Mix Directive to the OPA.⁶⁵ This laid out the government’s proposed goals and actions for the electricity system, providing stakeholders and the public an opportunity to comment on the specific proposals, before the LTEP was finalized.⁶⁶

While the Supply Mix Directive is no longer the appropriate mechanism in the new planning framework, a similar document (a draft LTEP, for lack of a better term) that clearly describes what actions the Ministry of Energy is proposing to implement through the LTEP should be tabled for public consultation, before the LTEP is finalized.

To enable meaningful public consultation, the draft LTEP should describe key policies the Ministry is proposing (e.g., changes to any of the energy resource targets in the 2013 LTEP,⁶⁷ or new government programs, grants, and legislative or regulatory actions).

The *Electricity Act, 1998* (section 25.29 (2)) requires the Long-Term Energy Plan to set out and balance the government’s goals and objectives for the energy sector, which can include cost-effectiveness, reliability, use of cleaner energy sources, and other matters. As part of the consultation process, the Ministry of Energy should explain how the proposals in the draft LTEP meet and balance these objectives and provide supporting evidence that it used to arrive at the proposals.

Recommendation 12: Consult the public on a detailed draft Long-Term Energy Plan.

To ensure transparent decision-making, when the final LTEP is released, the Ministry of Energy should explain any changes between the draft and final LTEP, and the rationale for the changes.

6.2 Implementing the LTEP

The legal framework for the LTEP is hierarchical, with the LTEP at the top setting high-level direction, and implementation directives (and plans) to (and from) the OEB and IESO to fill in the details. In some

ways, this is similar to the two-level structure of legislation and regulations. The government usually provides an opportunity for public consultation on regulations (through the Regulatory Registry and Environmental Registry) because this is where many key policy decisions are made and it is important to get the details right.⁶⁸ Similarly, it is important for the Ministry of Energy to provide an opportunity for public consultation (including the use of the Environmental Registry) on the LTEP at the implementation stage.

It is unclear whether it is more appropriate for the Ministry to consult the public prior to issuing the implementation directives, to consult after the IESO and OEB have submitted implementation plans to the Minister for review, or both. This probably depends on how detailed the implementation directives are, and whether they make new policy. In any event, consultation can be tightly scoped. The intent is not to review the destination set in the LTEP, but to determine whether the proposed implementation approach is the best way to get there.

Recommendation 13: Consult the public on implementation directives/plans.

A successful LTEP requires a balancing act. On the one hand, the LTEP must present a long-term vision for Ontario's energy sector, including achieving Ontario's climate targets, and work towards the dramatic transformation of the energy sector that this entails. On the other hand, it must also be adaptable to changing circumstances and avoid making significant financial commitments for resources that turn out to be unneeded. Many key technologies for our energy future, such as energy storage, distributed generation, the smart grid, and electric vehicles, are rapidly evolving. It is a time of significant uncertainty, and no one can predict exactly what the next twenty years will bring.

The Minister of Energy has legal authority to issue new directives to the IESO at any time, which take precedence over the approved LTEP implementation plans. However, this power should be used very sparingly, if at all. Ontario was not well served by the system of *ad hoc* rule by directive, with the attendant lack of public consultation and rushed decision-making based on imperfect evidence, that we experienced in the past few years. Instead, each three-year review of the LTEP provides a more appropriate opportunity to reassess Ontario's situation and make necessary course corrections. To navigate uncertainty and avoid the need to override the LTEP between the three-year updates, implementation plans need to carefully assess what investment decisions need to be made within the three-year period, and what decisions can be deferred to a later date.

Ontario was not well served by the system of *ad hoc* rule by directive.

Recommendation 14: Do not override the Long-Term Energy Plan and its approved implementation plans, in between the three-year review cycle.

Appendix: Previous Relevant ECO Commentary/Recommendations

The table below lists commentary and recommendations made by the ECO in previous reports (available at www.eco.on.ca/our-reports/) that have relevance to the current LTEP consultation and are referenced in this report.

Previous ECO Commentary/Recommendation	ECO Report
<i>The LTEP should enable Ontario to meet its climate change targets</i>	
“The ECO is concerned about the apparent lack of alignment between the Climate Change Action Plan targets and the LTEP.”	→ 2012 Climate Change Report , p.24 (See also 2013- 2015 Climate Change Reports)
“Ontario has committed to make major reductions in our greenhouse gas emissions. This necessarily requires steep decreases in fossil fuel consumption. [...] Ontario’s 2015 Climate Change Strategy pledges to “review and make recommendations regarding existing policies and programs that support fossil fuel use” and to “look at removing existing initiatives that support fossil fuel use...”. The ECO agrees that this review is overdue[.]”	→ 2015/2016 Energy Report , 143
“The ECO recommends that the Ministry of Energy build upon the work completed in the [2013] Long-Term Energy Plan and produce a comprehensive multi-fuel energy plan.”	→ 2015/2016 Energy Report , p. 151 (See also, 2010 Energy Report Vol. 1 , p.19)
“[C]ogent evidence would be needed to show that the proposed subsidy to all midsize industrial and commercial customers will produce any additional emission reductions below the current baseline, much less 3 Mt in 2020.”	→ 2016 Climate Change Report , p.120
<i>The LTEP should consider the environmental impacts of energy resources on our air, water and land.</i>	
“The ECO believes that such a major, capital-intensive electricity plan also deserves thorough scrutiny by environmental experts.”	→ 2006/07 Annual (Environmental Protection) Report , p. 86

“The ECO recommends that the Ministry of Energy amend the <i>Ontario Energy Board Act, 1998</i> so that the Ontario Energy Board’s objectives include having regard to the environmental costs associated with energy consumption.”	→ 2010 Energy Report Vol.2 , p.43
<i>The LTEP should put conservation first.</i>	
“The ECO suggests the government take the following steps to operationalize Conservation First: [...] Issue a supply Mix Directive or legislative amendment to create a legally binding “loading order” for the sequence of planning options in which electricity demand is met (e.g., energy efficiency as the first preferred option, followed by renewable generation, clean distributed generation, etc.).”	→ 2014 Energy Report , p.56
“It is expected that avoided costs will be updated again as part of the next LTEP, in 2016 or 2017. The ECO suggests that this updated version of avoided costs should be used going forward in conservation program cost-effectiveness testing.”	→ 2015/2016 Energy Report , p.131
“[U]ntil very recently, the tests used in Ontario to compare the cost of conservation relative to new energy supply placed no value on the environmental benefits that conservation offers, such as avoided greenhouse gas emissions. This is a systemic concern which undervalues energy conservation and limits Ontario’s ability to tap its full potential.”	→ 2014 Energy Report , p.21
“The ECO recommends that the Secretary of Cabinet direct the development of a comprehensive energy conservation strategy encompassing all major energy sources used in Ontario.”	→ 2015/2016 Energy Report , p.151 (See also 2009 Energy Report Vol.1 , p.43)
“The ECO recommends that the Ontario Energy Board require natural gas utilities to file advance notice of any identified distribution system need that could have significant cost impact, and ensure conservation is considered as the first resource to meet some or all of this need.”	→ 2014 Energy Report , p.67
“Ontario should focus electricity conservation programs on times of higher demand, when conservation displaces natural gas-fired generation.”	→ 2015/2016 Energy Report , p.133
“Ontario should adopt formal targets for reducing fossil fuel consumption.”	→ 2015/2016 Energy Report , p. viii

“The ECO recommends that the Ministry of Energy and Infrastructure establish reportable benchmarking by sector. This would assist the government in deciding whether to establish targets to conserve natural gas, oil, propane and transportation fuels, and would make the targets meaningful.”	→ 2015/2016 Energy Report , p.151 (See also 2009 Energy Report Vol. 1 , p.42)
“The Minister of Energy should: ...set energy use intensity targets for all public buildings; implement Green Energy Act, 2009 provisions that protect consumers by mandating home energy use disclosure prior to sale; and require large private sector buildings to disclose their energy intensity.”	→ 2015/2016 Energy Report , p. 80 (See also 2011 Energy Report Vol.1 , p.3)
“The ECO suggests the government [...] [i]ssue direction to the OPA on how to implement Conservation First in the IRRP’s Scoping Assessment Outcome Report.”	→ 2014 Energy Report , p.56
“How successfully regional electricity planning can be integrated with other local plans (e.g., municipal plans and community energy plans) depends on whether the government implements the OPA-IESO report’s recommendations. These include recommendations designed to: incorporate energy decisions into municipal Official Plans; and strengthen the Provincial Policy Statement, provincial plans and legislation.”	→ 2014 Energy Report , p.57
<i>The LTEP should apply evidence-based decision making.</i>	
“[T]he ECO generally found the Ministry of Energy unwilling or unable to provide detailed explanations of elements of the Plan, particularly information underlying or supporting data presented in the LTEP...The IPSP-2011 must present these data so the assumptions can be scrutinized.”	→ 2010 Energy Report Vol. 1 , p. 16
“[T]he LTEP could have been improved by directly explaining the trade-offs that result from choosing between generation and conservation options and the trade-offs among generation options.”	→ 2010 Energy Report Vol. 1 , p. 18
“The ECO recommends that the Ministry of Energy lead an integrated review of the electricity pricing structure for fairness and conservation.” ²	→ 2014 Energy Report , p. 83
<i>The LTEP should provide opportunities for meaningful public participation.</i>	
“[T]he ECO has emphasized the importance of ministries carrying out effective public consultation on energy-related targets and initiatives.”	→ 2006/07 Annual (Environmental Protection) Report , p. 86

“The ECO recommends that the Ministry of Energy [...] provide an opportunity for public input in the development of policy directives [...], as required by the <i>Environmental Bill of Rights, 1993</i>.”	→ 2009 Energy Report Vol.1, p.22-23, 44 (See also, 2014 Energy Report, p.21)
“The ECO recommends that each update of the Long-Term Energy Plan explain the rationale for all target changes, including the consequences of altering, missing, exceeding or abandoning targets.”	→ 2014 Energy Report, p.36

Endnotes

¹ Premier Kathleen Wynne, letter, [September 2016 Mandate letter: Energy](#), September 23, 2016.

² The Minister was referring to a situation of potential “brown outs” due to a shortage of electricity.

³ Hon. Dwight Duncan (Minister of Energy), transcript, Legislative Assembly of Ontario, June 15, 2004. ([Opening statement](#) when Bill 100 was introduced into the Legislature.)

⁴ See revoked ss.25.30-25.32 of the *Electricity Act, 1998*, as well as revoked O. Reg. 424/04 (Integrated Power System Plan); See also the original ECO decision review, Environmental Commissioner of Ontario, report, [Reconciling our Priorities, Annual Report 2006-2007](#), “Ontario’s Electricity System: The Ministry of Energy Proposes a Massive Overhaul”, p.81, 2007.

⁵ O. Reg. 424/04 (Integrated Power System Plan), s.2.(1)7.

⁶ O. Reg. 276/06 (Designation and Exemption of Integrated Power System Plan).

⁷ Minister of Energy, directive to Ontario Power Authority, [Re: Integrated Power System Plan](#), June 13, 2006. The Supply Mix Directive was preceded by a Supply Mix Advice report from the OPA, that was subject to public comment.

⁸ Minister of Energy, directive to Ontario Power Authority, [Re: Amendments to Supply Mix Directive Issued June 13, 2006](#), September 17, 2008.

⁹ The list of directives from the Minister of Energy to the Ontario Power Authority can be found [here](#).

¹⁰ Environmental Commissioner of Ontario, report, [Managing a Complex Energy System, 2010 Energy Report Vol.1](#), p.19, 2011; Environmental Commissioner of Ontario, report, [Let’s Get Serious, 2015/2016 Energy Conservation Report, chapter 8](#), p.151, 2016.

¹¹ *Electricity Act, 1998*, s.25.32(5), (6).

¹² *Ibid*, s.25.32.1.

¹³ Environmental Commissioner of Ontario, report, [Planning to Conserve, 2014 Energy Conservation Report](#), p.38, s.2.3.9, 2015.

¹⁴ Environmental Commissioner of Ontario, report, [Small Steps Forward, Environmental Protection Report Vol.1](#), p.30-31, 2016.

¹⁵ Hon. Bob Chiarelli (Minister of Energy), transcript, Legislative Assembly of Ontario, November 3, 2015. ([Second reading debate](#) in the Legislature.)

¹⁶ Legislative Assembly of Ontario, debates and proceedings, [Bill 135, Energy Statute Law Amendment Act, 2016](#), submissions presented to the Standing Committee on General Government, February 22 and 24, 2016. (Presentations by the Ontario Society of Professional Engineers, the Society of Energy Professionals, and the Green Energy Coalition note many of these concerns.)

¹⁷ Public Utilities Board, report, [Needs For And Alternatives To \(NFAT\) Review of Manitoba Hydro’s Preferred Development Plan – Final Report](#), June 20, 2014.

¹⁸ 127.1 Mt comes from a combination of the IESO, [Ontario Planning Outlook, Module 6: Emissions Outlook](#), slide 6, September 2016, and Navigant Consulting, [Fuels Technical Report, Data Table for Figure 26: Historical Ontario GHG Emissions \(incl. fugitive emissions\)](#), September 2016.

¹⁹ Policy developments have occurred since the *Ontario Planning Outlook* was published that could affect its projections of emissions for the electricity sector. On September 27, 2016, the Minister of Energy directed the IESO to suspend the Large Renewables Procurement II, which would likely increase GHG emissions, at least in Outlook B. The October 21, 2016 announcement of an Ontario-Quebec Electricity Trade Agreement is supposed to reduce GHG emissions by about 1 Mt a year starting in 2017. (Minister of Energy, directive to the Independent Electricity System Operator, [Re: Large Renewable Procurement \(LRP\) II and Energy from Waste Standard Offer Program \(EFWSOP\)](#), September 27, 2016; Government of Ontario, news release, [Ontario and Québec Working Together to Drive Economic Growth](#), October 21, 2016.)

²⁰ Unless emissions trading with other jurisdictions is assumed.

²¹ Independent Electricity System Operator, report, [Ontario Planning Outlook](#), p.1, September 2016.

²² *Ibid*, Table 1, p.7, see also p.8.

²³ At current prices, the commodity cost of natural gas (excluding delivery to the customer) is roughly 1/10 the cost of electricity, per unit of energy content (\$0.01 per equivalent kilowatt-hour for natural gas, versus \$0.11 per equivalent kilowatt-hour for electricity). Differences in the delivery cost and the higher end use efficiencies possible with electrical equipment reduce, but do not eliminate, this price differential.

²⁴ For larger buildings, low-carbon district energy systems will likely also have an important role to play.

²⁵ Union Gas Limited, report, *Annual Report 2015*, p.13, March 2016. (Available via www.SEDAR.com)

²⁶ Environmental Commissioner of Ontario, report, [Facing Climate Change, 2016 Annual GHG Progress Report](#), p.120, 2016.

²⁷ See in particular, Independent Electricity System Operator, report, [Ontario Planning Outlook, Module 7](#), September 2016.

²⁸ Demand response is a reduction in electricity demand by participating end users, in response to operator control or price signals.

²⁹ Minister of Energy, letter to the Ontario Energy Board, [Re: Ontario Energy Board Report on Implications for Ontario of TransCanada PipeLines Limited Energy East Project](#), November 12, 2013.

³⁰ Ontario Energy Board, report to the Minister of Energy, [Giving a Voice to Ontarians on Energy East](#), s.4.1.4, August 13, 2015.

³¹ International Energy Agency, report, *World Energy Outlook Special Report: Redrawing the Energy-Climate Map*, p.9-10 and p.54, June 10, 2013.

³² International Energy Agency, report, *Energy, Climate Change and Environment*, s.5.4.1, 2016.

³³ Government of Ontario, report, [Achieving Balance, Ontario's Long-Term Energy Plan](#), p.20, 2013.

³⁴ For example, Ontario Power Authority, EB-2007-0707 Application and Evidence, *The Integrated Power System Plan for the Period 2008-2027*, Exhibit B, Tab 1, pp.29-34, 2008. (The term used is a "priority order" which is the same as a loading order.)

³⁵ Environmental Commissioner of Ontario, report, [Managing a Complex Energy System, 2010 Energy Report Vol.1](#), s.3, 2011; A [2012 California Public Utilities Commission decision](#) provides guidance as to how California utilities should interpret the loading order requirement in their demand-supply planning.

³⁶ Minister of Energy, Order in Council, [Directive to the Ontario Energy Board](#), s.5, March 26, 2014; OEB subsequently updated [CDM code](#) (section 4.1) and [DSM Framework](#) (section 13) in response to the Minister's direction.

³⁷ Environmental Commissioner of Ontario, report, [Planning to Conserve, 2014 Energy Report](#), chapter 6, 2015.

³⁸ According to an ICF analysis, referenced in: Adrian Morrow, news article, The Globe and Mail, [Ontario likely to miss 2030 emissions target by half, report says](#), April 20, 2016; For several years major North American oil and gas companies (including Enbridge) have adopted a robust internal price on carbon in their long-term strategic plans, ranging from \$48 to \$68 per tonne. (Sustainable Prosperity, policy brief, *Shadow Carbon Pricing in the Canadian Energy Sector*, p.7, March 2013.); The United Kingdom applies a shadow price on carbon to its policy appraisal process that assumes a comprehensive global carbon market in 2030. By 2030 the UK's low-cost carbon forecast is 38.23 £/tCO₂e (\$61.99 CAD) and high forecast is 117.68 £/tCO₂e (\$190.83 CAD). (United Kingdom Department of Energy and Climate Change, *Updated short-term traded carbon values used for UK public policy appraisal*, p.6, November 2015.)

³⁹ Environmental Commissioner of Ontario, report, [Let's Get Serious, 2015/2016 Energy Conservation Report, chapter 6](#), p.133, 2016.

⁴⁰ Environmental Commissioner of Ontario, report, [Managing a Complex Energy System, 2010 Energy Report Vol. 1](#), 2011; Environmental Commissioner of Ontario, report, [Let's Get Serious, 2015/2016 Energy Conservation Report, chapter 8](#), p.151, 2016.

⁴¹ Ministry of Energy, discussion guide, [Planning Ontario's Energy Future: A Discussion Guide to Start the Conversation](#), p.37, October 2016.

⁴² Environmental Commissioner of Ontario, report, [Let's Get Serious, 2015/2016 Energy Conservation Report](#), particularly chapters 2 and 6, 2016.

⁴³ Environmental Commissioner of Ontario, report, [Let's Get Serious, 2015/2016 Energy Conservation Report, chapter 8](#), p.151, 2016.

⁴⁴ Environmental Commissioner of Ontario, report, [Rethinking Energy Conservation in Ontario, 2009 Energy Report, Vol. 1](#), 2010; Environmental Commissioner of Ontario, report, [Let's Get Serious, 2015/2016 Energy Conservation Report, chapter 8](#), p.151, 2016.

⁴⁵ Minister of Energy, directive to the Ontario Power Authority, [Re: Conservation and Demand Management Initiatives Under the GEA Conservation Framework](#), April 23, 2010; Minister of Energy, Order in Council, [Directive to the Ontario Energy Board](#), s.4, March 26, 2014;

⁴⁶ Environmental Commissioner of Ontario, report, [Rethinking Energy Conservation in Ontario, 2009 Energy Report, Vol. 1](#), 2010; Environmental Commissioner of Ontario, report, [Let's Get Serious, 2015/2016 Energy Conservation Report, chapter 8](#), p.151, 2016.

⁴⁷ The [Mayor's Megawatt Challenge](#) is a good example of the approach of using benchmarking to set targets and identify conservation potential. This approach was also used by the ECO to identify the conservation potential of buildings in the Broader Public Sector. (Environmental Commissioner of Ontario, report, [Let's Get Serious, 2015/2016 Energy Conservation Report, chapter 4](#), 2016.)

⁴⁸ Nexant, report, [Achievable Potential Study: Short Term Analysis](#), June 30, 2016; ICF International, report, [Natural Gas Conservation Potential Study](#), June 30, 2016.

⁴⁹ Environmental Commissioner of Ontario, report, [Let's Get Serious, 2015/2016 Energy Conservation Report, chapter 4](#), 2016.

⁵⁰ Independent Electricity System Operator, [Windsor-Essex Region, Integrated Regional Resource Plan](#), ss.3.2 and 7, and p.39, April 28, 2015.

⁵¹ *Ibid*, p.40, April 28, 2015.

⁵² *Ibid*.

⁵³ A key decision point is the application of IESO's ORTAC (Ontario Resource and Transmission Assessment Criteria). ORTAC provides technical criteria used to determine adequacy and reliability of IESO-controlled grid. The criteria are used to evaluate planned generation and transmission; the only mention of conservation is dispatchable load, particularly when to trip dispatchable load, and even then only as a stop gap measure. ORTAC standards are applied to identify areas with needs to address the impacts of potential major supply interruptions.

⁵⁴ Independent Electricity System Operator, [Bronte Sub-Region \(Part of the Burlington-Nanticoke Planning Region\), Integrated Regional Resource Plan](#), p.2 and 9, June 30, 2016.

⁵⁵ There is some indication that the next regional electricity plans for Toronto, Barrie-Innisfil, and Parry Sound-Muskoka will undertake such an initiative with the help of the IESO. (see IESO, presentation, [Toronto Local Advisory Committee Meeting #3](#), slide 31, November 23, 2016.)

⁵⁶ Environmental Commissioner of Ontario, report, [Planning to Conserve, 2014 Energy Conservation Report](#), pp.46-59, 2015.

⁵⁷ Independent Electricity System Operator, report, [Ontario Planning Outlook, Module 4](#), slide 22, September 2016.

⁵⁸ *Ibid*, slide 32.

⁵⁹ *Ibid*, slide 22.

⁶⁰ Geoff Zochodne, news article, QP Briefing, 'No documents' from government on how \$12.8N nuke plant rebuild could be stopped, OPG says, October 27, 2016.

⁶¹ Environmental Commissioner of Ontario, report, [Planning to Conserve, 2014 Energy Conservation Report](#), pp.70-83, 2015.

⁶² Minister of Energy, [letter to the Ontario Energy Board](#), February 17, 2015.

⁶³ Ontario Energy Board, EB-2016-0004 Decision With Reasons, [Ontario Energy Board Generic Proceeding on Community Expansion](#), November 17, 2016.

⁶⁴ Mowat Centre, report #131, [Brave New World at the OEB, Policy Development and the Natural Gas Expansion Case](#), November 2016.

⁶⁵ Ministry of Energy, Environmental Registry posting #011-1701, [Draft Supply Mix Directive](#), November 23, 2010; Ministry of Energy, [directive to the Ontario Power Authority](#), February 17, 2011. (The previous (2006/2007) IPSP process also included a Supply Mix Advice report from the OPA that was posted for public comment, prior to the Ministry finalizing its Supply Mix Directive.)

⁶⁶ Including posting on the Environmental Registry (Ministry of Energy, Environmental Registry posting #011-1701, [Draft Supply Mix Directive](#), November 23, 2010). However, the Ministry of Energy did not make any substantive changes to the draft directive based on consultation.

⁶⁷ In 2014 the ECO recommended that each LTEP update should explain the rationale and consequences for any target changes. (Environmental Commissioner of Ontario, report, [Planning to Conserve, 2014 Energy Report](#), p.36, 2015.)

⁶⁸ For example, O. Reg. 332/12 (Building Code) is a regulation containing the key energy efficiency requirements for new buildings, whereas its parent legislation (*Building Code Act, 1992*) is enabling only.