Market Achievable Potential: Foreword to Addendum #1

March 2018

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1. Background

The IESO published an Achievable Potential Study (APS) in June 2016. The study assessed the potential for cost-effective energy savings by 2020 and by 2035 from energy-efficiency measures, including behind-the-meter generation from combined heat and power and waste energy recovery. The study identified that 7.3 terawatt-hours (TWh) of savings by 2020 were achievable within the existing budget of $1.8 billion for the Conservation First Framework (CFF) compared to the program target of 7 TWh. The study also showed that 17.8 TWh of savings are achievable by 2035 at a cost of approximately $5.5 billion, projecting forward current spending levels and customer incentives (Budget-Constrained Achievable Potential).[1]

In response to advice provided by the independent expert panel established to guide the APS, the IESO developed an additional scenario that assessed the potential for achieving additional conservation savings – the Market Achievable Potential (MAP). The MAP identifies the total cost-effective energy-efficiency potential resulting from adjusted market adoption rates, assuming customer incentives cover 100 percent of the incremental costs between the efficient measure and the standard measure. The MAP identified that 29 TWh of cost-effective achievable conservation potential are available by 2035 at a cost of approximately $15 billion. This represents an incremental potential of 11.2 TWh and an incremental budget of $9.5 billion relative to the Budget-Constrained Achievable Potential.

2. Assessment of the Implications of Committing to the Market Achievable Potential Today

The IESO assessed the implications of pursuing higher levels of long-term conservation savings identified in the MAP, focusing on electricity demand and supply balances, greenhouse gas (GHG) emissions and costs.

The electricity demand and supply outlook, consistent with the 2017 Long-Term Energy Plan, was the starting point for the IESO's assessment.[2] Two demand outlooks were assessed: one that achieves the current conservation target (Status Quo Outlook, 31 TWh conservation savings by 2035), and another that achieves the MAP (MAP Outlook, 46 TWh conservation savings by 2035). The conservation savings assumed in each outlook are illustrated in Figure 1. There is a range of other possible levels of conservation achievable between the current conservation target and the MAP; however, this analysis only contemplates the impact of committing to the full MAP, the highest level of cost-effective conservation achievable over the study period.

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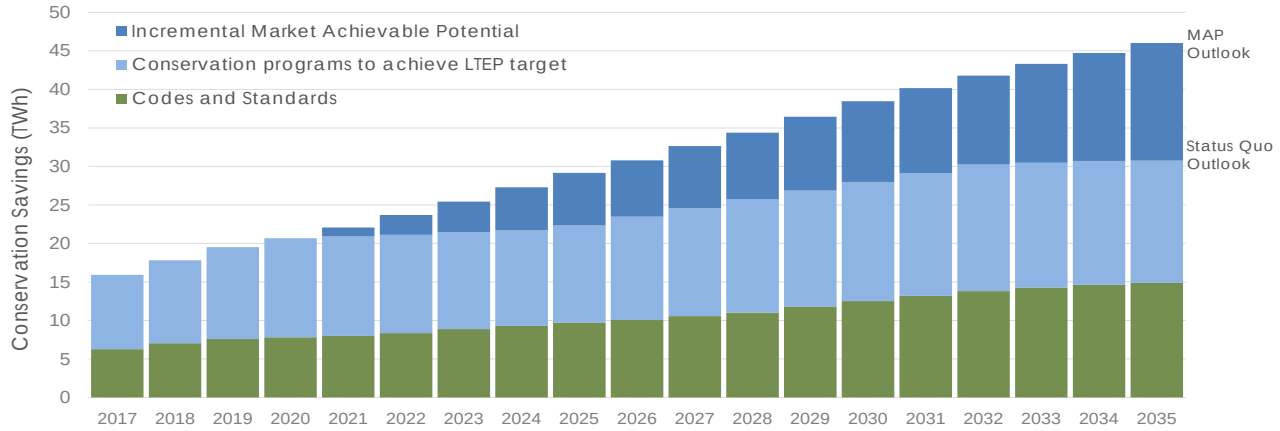
[1] Budget-Constrained Achievable Potential considers that customer incentives cover on average about 25 percent of the incremental costs between the efficient measure and the standard measure.

[2] 2017 Long-Term Energy Plan. http://www.ieso.ca/sector-participants/planning-and-forecasting/long-term-energy-plan

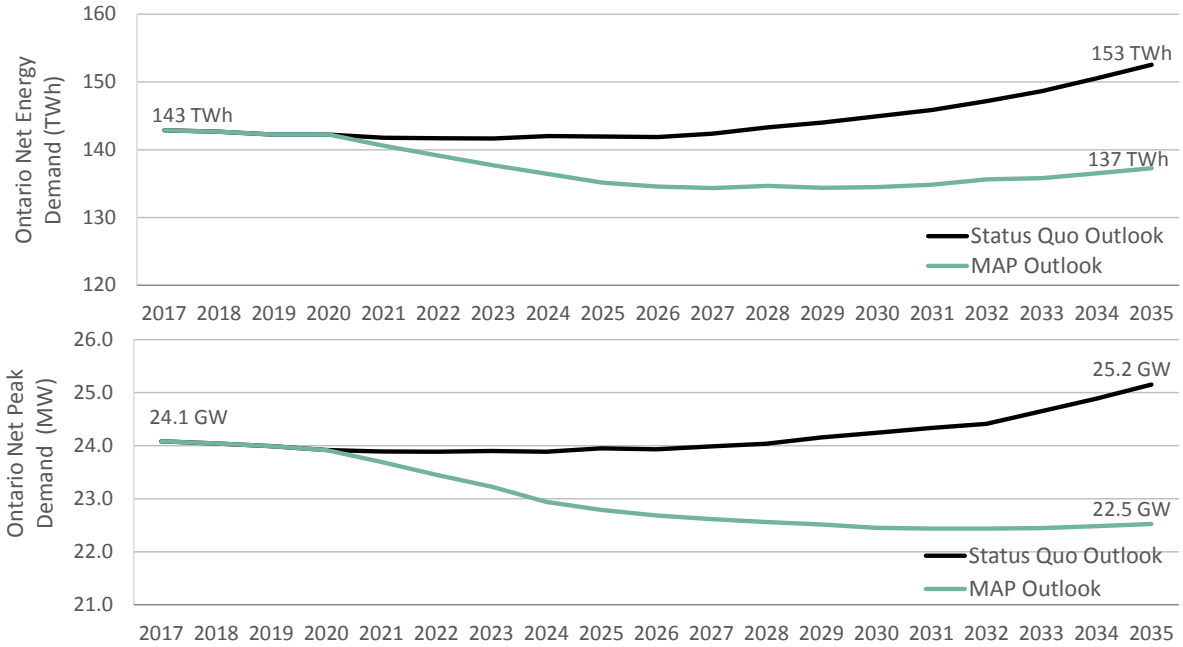
While the current conservation target could be achieved through a combination of conservation programs and building codes and equipment standards, the MAP study contemplated that incremental savings would be achieved through programs only. For purposes of analysis, incremental MAP savings were assumed to begin in 2021, following the end of the current CFF.

Figure 1: Conservation Savings[3]



The higher level of conservation savings in the MAP Outlook reduces electricity consumption and peak demand by about 10 percent compared to the Status Quo Outlook (Figure 2).

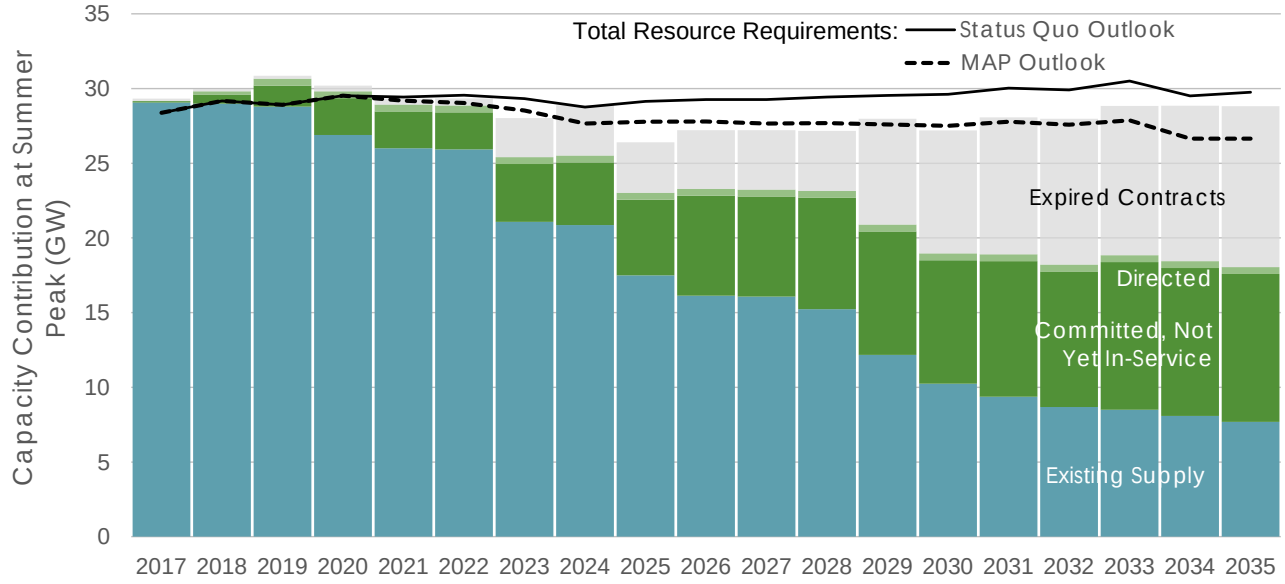
Figure 2: Electricity Demand Outlooks



[3] The 2013 LTEP established an energy-savings target of 30 TWh by 2032 (31 TWh by 2035). The 2016 Market Achievable Potential identified a total of 46 TWh cost-effective energy-savings potential by 2035.

Comparing the demand outlooks to the supply outlook, provided that existing and planned supply resources continue to operate or be otherwise replaced, Ontario would face capacity surpluses in the near term before transitioning into supply deficits. While the timing of capacity needs would be generally similar across both outlooks, with needs emerging in the early 2020s, the magnitude and duration of capacity needs would differ across the two outlooks: in the MAP Outlook, capacity needs would be between 1 GW to 1.5 GW lower and persist throughout the 2023-2028 period. Beyond 2031, the MAP Outlook would see capacity surpluses of up to 2 GW (Figure 3).

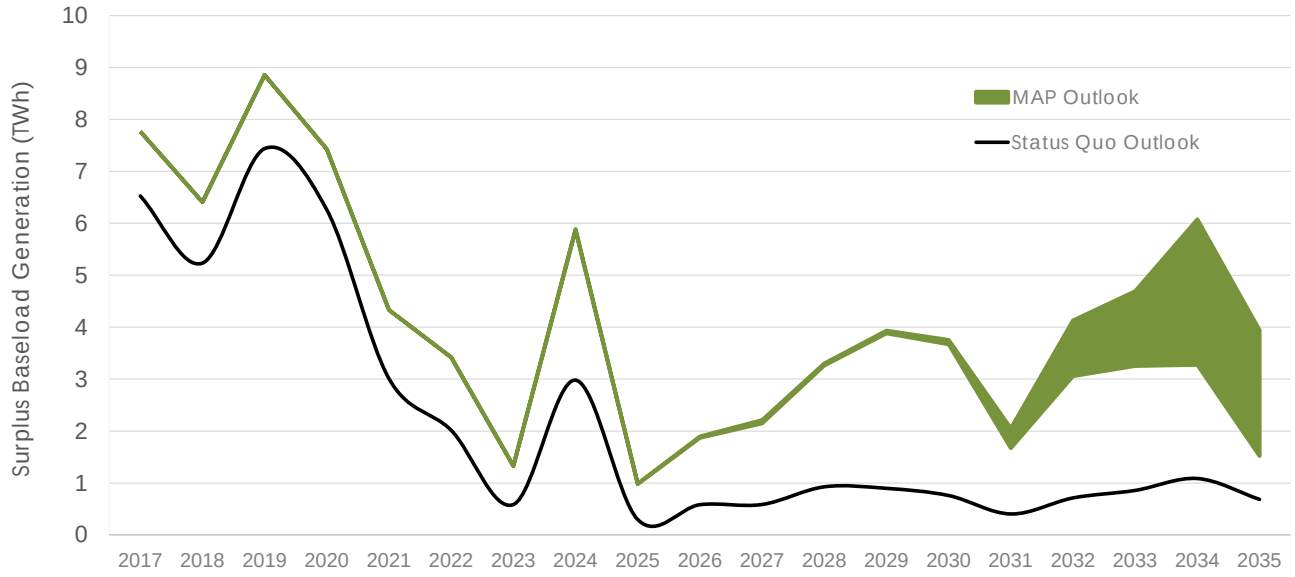
Figure 3: Resource Adequacy Outlook



A variety of electricity resources could help meet identified needs. Where resource shortfalls were identified, it was assumed that needs could be addressed by gas-fired generation (or resources with similar characteristics). In instances of surplus, the need to invest in new resources or reacquire existing resources (such as gas-fired generation or renewable resources) at the end of their contract terms would be reduced. Higher levels of conservation savings would tend to reduce the need for such resources. A number of indicative supply mix adaptations were considered to meet identified needs under each Outlook to assess implications for surplus baseload generation, electricity sector emissions and electricity costs.

Across the various indicative supply mix adaptations, it was estimated that surplus baseload generation would increase by between 22 and 30 TWh cumulatively between 2021 and 2035 in the MAP Outlook (Figure 4).

Figure 4: Surplus Baseload Generation Outlook



The MAP Outlook would result in lower levels of GHG emissions from electricity generation, by an average of about 0.7 megatonnes per year: this is premised on the assumption that incremental conservation is achieved through measures that do not have net GHG emissions. The average cost of this incremental GHG reduction ranges from $100 to $200/tonne, compared to the economic value of cap and trade, which averages $30/tonne throughout the planning period.[4]

The total cost of electricity service would increase by an annual average of about $100 million to $200 million per year between 2021 and 2035 in the MAP Outlook. As the incremental conservation in the MAP Outlook begins to ramp up in 2021 after the current CFF ends, the incremental cost of the MAP would exceed the avoided cost of supply resources between 2021 and 2030, leading to a maximum $600-million per-year increase in the total cost of electricity service during this period. In the later years, as the incremental conservation cost is lower than the avoided cost of supply resources, the total cost of electricity service would decrease by a maximum of $300 million per year by 2035. This would translate to an average increase in residential bills of $11/month and in industrial rates of $1/MWh to $3/MWh relative to the Status Quo Outlook.[5]

3. Opportunities for Increasing Conservation Targets

[4]The planning outlook assumes under the cap-and-trade program, the carbon price ranges from $18/tonne in 2017 to $40/tonne by 2035, averaging $30/tonne throughout the planning period.

[5]The residential bill impact described here does not reflect the Ontario Fair Hydro Plan. The analysis reflects changes to residential electricity bills associated with changes to the total cost of electricity service under the MAP Outlook.

While additional conservation savings potential exists, in light of the current demand and supply outlook and the implications of pursuing the full MAP (as described above), a need does not exist at this time to increase conservation above the current 2013 LTEP established energy-savings target of 30 TWh by 2032 (31 TWh by 2035). As the outlook for the electricity system evolves, however, the IESO will continue to assess what opportunities exist for additional conservation to meet future electricity system needs and to reduce emissions and costs for electricity consumers.

In the meantime, opportunities exist to better understand conservation savings and to identify how best to capture their value for the electricity system and its customers:

- As additional conservation is pursued, costs to achieve savings as well as channels through which they are achieved will likely evolve. Understanding conservation cost curves can help to identify what cost-effective achievable potential exists across the full spectrum of available measures. These cost curves will demonstrate the range of cost-effective conservation achievable levels and their associated costs between the current conservation target and the MAP. They will also provide the ability to better align the timing of conservation to reflect system needs to reduce the total cost of electricity service.
- While the MAP study assumes additional savings are achieved through conservation programs, opportunities may exist to pursue these additional savings through a combination of improved codes and standards, electricity conservation programs and non-electricity sector targeted programs.
- Opportunities may exist to improve how program budgets/expenditures are allocated and funded over time to improve program cost-effectiveness.
- Opportunities exist to "right size" and better target local conservation savings to maximize the value of conservation.

Opportunities also exist to further identify and understand supply responses that would provide the most value in conjunction with higher levels of conservation. The impact of these supply mix adaptations on system operability will also need to be considered, particularly where reduced reliance on gas-fired generation is contemplated. As the electricity system outlook evolves, the value of additional conservation will change. An integrated approach – one that looks at conservation in tandem with the rest of the supply mix – can help Ontario consumers maximize the value of conservation resources and can help identify when to commit to higher levels. The MAP assessment provides valuable context for further work in this regard, including as planning conditions and options evolve.

The IESO is currently conducting a mid-term review of the 2015-2020 CFF. The Ontario Energy Board is conducting a similar review of the Demand Side Management Framework for natural gas programs. These mid-point check-ins examine how current programs are meeting customer needs, distributor budgets and targets for conservation programs, as well as their co-ordination with the province's climate change objectives, including Green Ontario Fund programs. The IESO is using the

mid-term review as an opportunity to examine how conservation programs can better meet electricity needs, such as those identified through regional electricity planning.

The IESO will continue to work with the government, local distribution companies, gas companies and other agencies to regularly assess the achievable potential for electricity conservation, considering initiatives under Ontario's Climate Change Action Plan. This will help to inform future conservation targets while the IESO continues to explore opportunities to enhance the value that conservation programs provide to electricity consumers. The next achievable potential study is currently under development and is expected to be completed in 2019.