
The Future of Electricity in Ontario

Ontario Ministry of Energy

January 30th, 2017

Rural Ontario Municipalities Association (ROMA) Conference

Presentation Outline

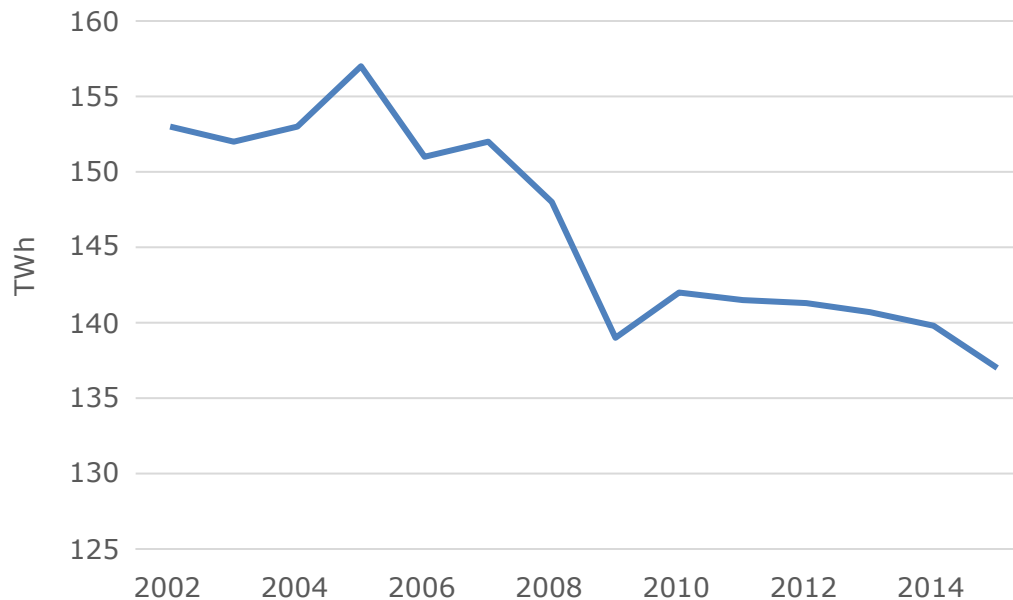
1. Today's electricity system
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3. What we heard and what we're doing (or something like that)

1. Today's electricity system

Annual demand

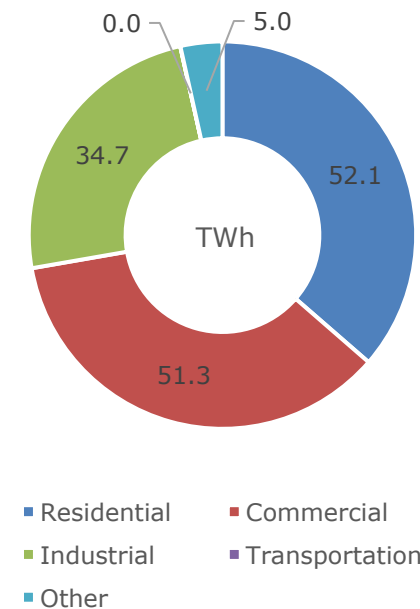
- Since 2005, annual grid demand has declined 13% to 137 TWh due to four factors:
 1. Changes in the economy
 2. Energy efficiency programs and improvements in building codes and equipment standards
 3. Changes in consumer behaviour
 4. Growing presence of embedded generation

Grid Demand 2002-2015



Source: IESO

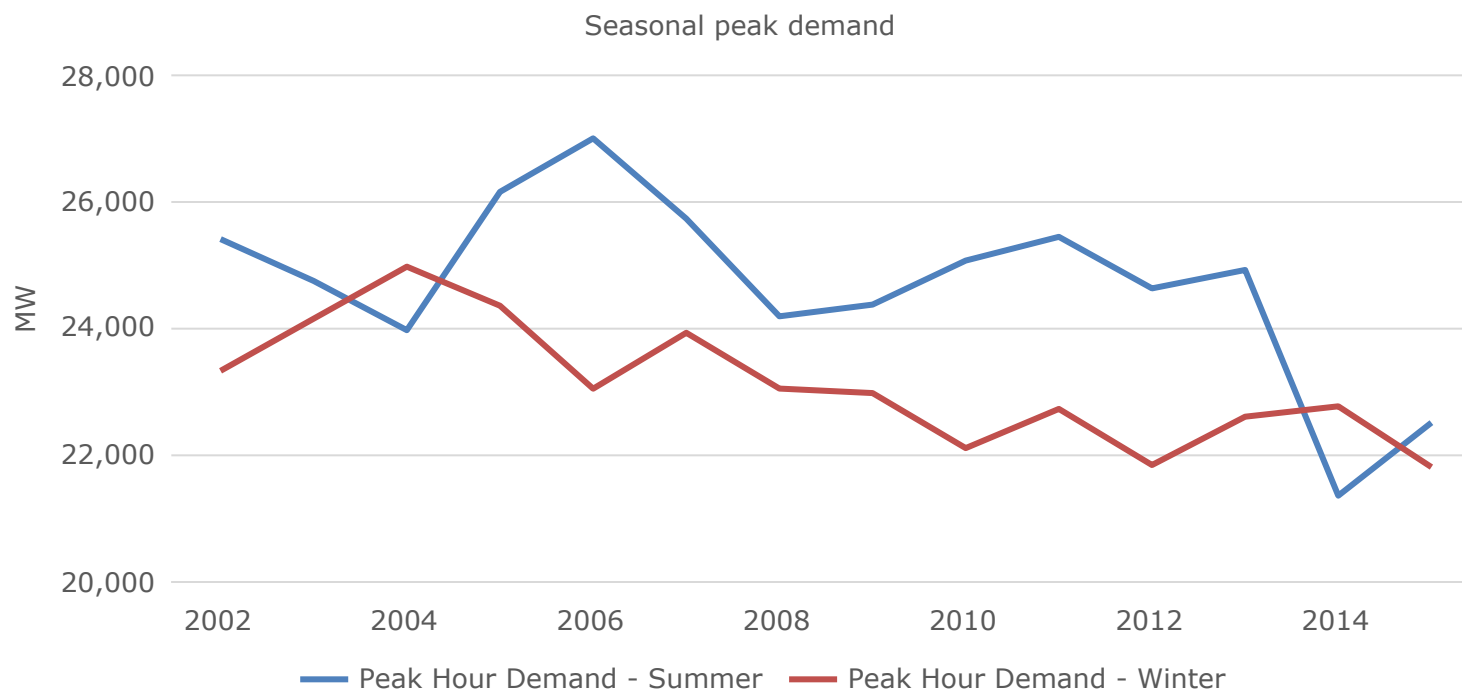
Electricity demand by sector 2015



Source: IESO

Peak demand

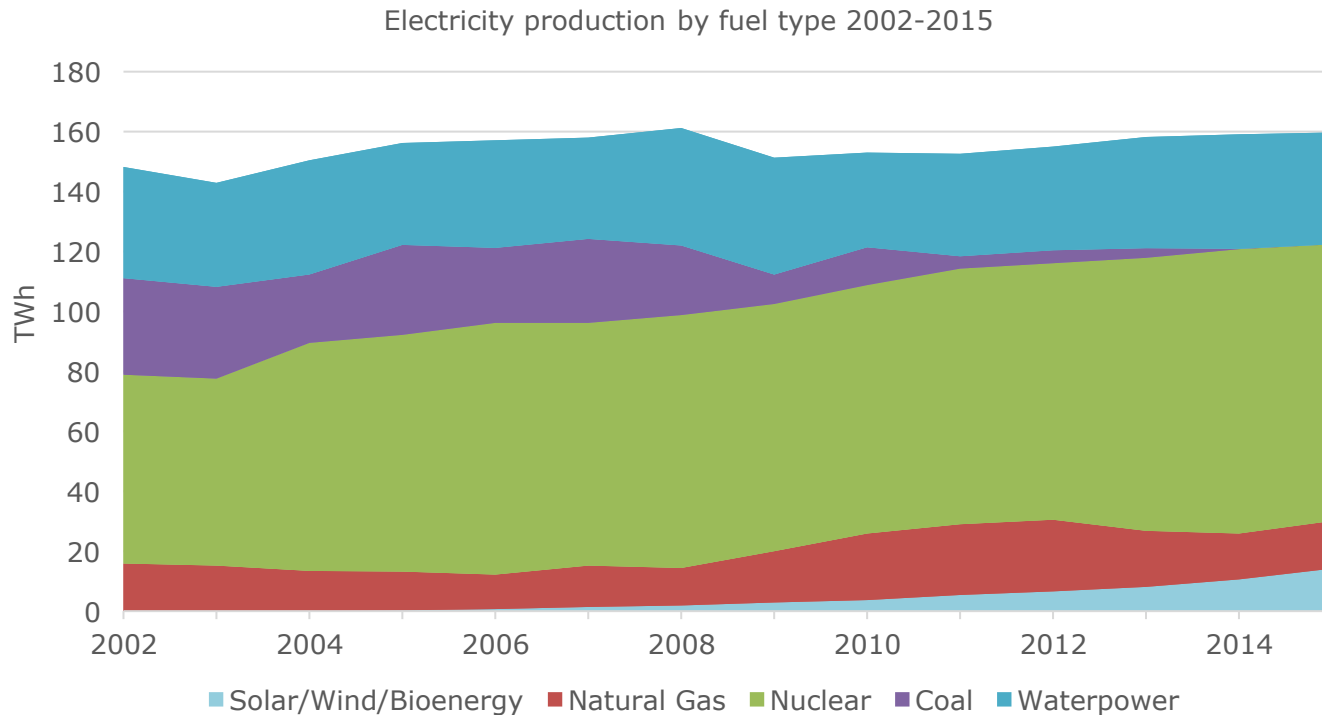
- Ontario is now a summer peaking jurisdiction as a result of demand from air conditioning units.
- Compared to 2002, peak annual grid demand during both summer and winter has declined due to conservation, energy efficiency programs and changes in consumer behaviour.



Source: NERC

Supply

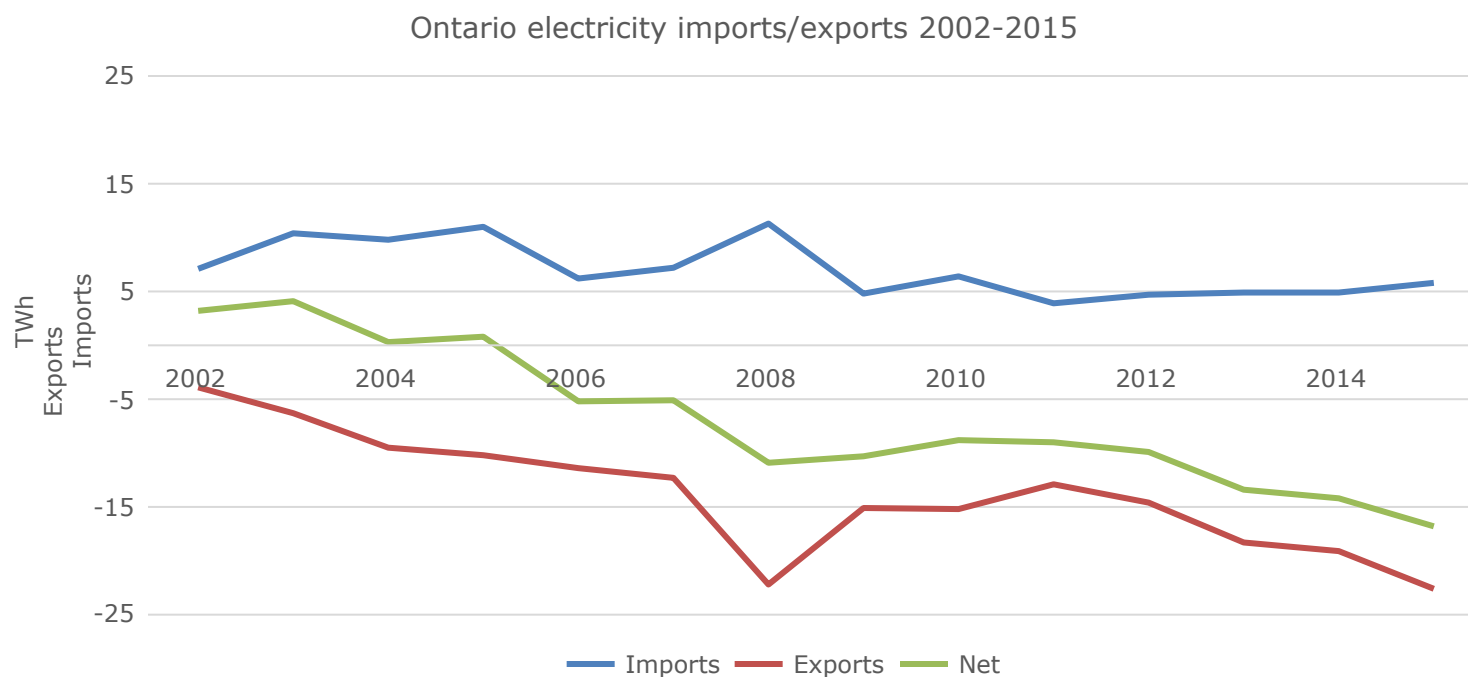
- The supply and generation mix has changed fundamentally since 2002:
 - Decline of coal in the generation mix from 22% share in 2002 to complete closure by 2014
 - Emergence of solar, wind and bioenergy to represent a 9% share of generation mix by 2015
 - Nuclear generation increasing share with natural gas and waterpower maintaining shares of ~10% and ~23% respectively



Source: NIR and IESO

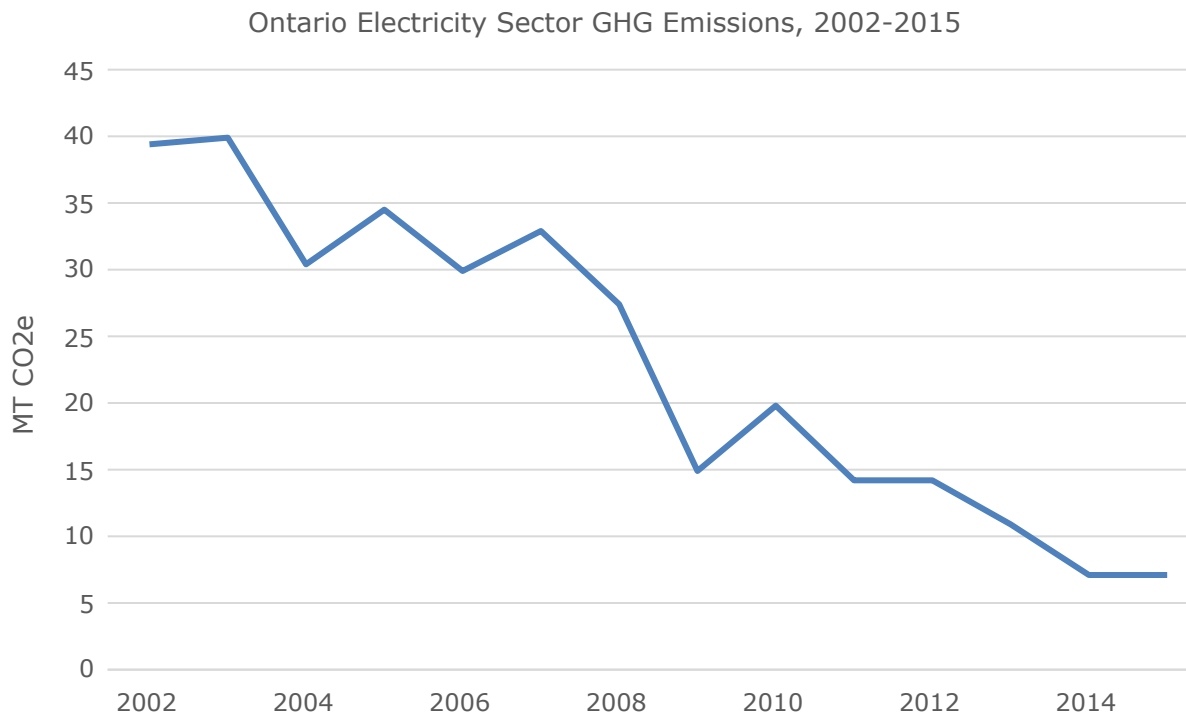
Electricity trade

- Interties enable Ontario to trade electricity with neighboring jurisdictions to efficiently manage surplus generation and demand peaks.
- Ontario's electricity system has 26 interties with five neighboring jurisdictions.
- Since 2006, Ontario has been a net exporter with 16.8 TWh traded in 2015.
- Historically, Quebec is Ontario's primary source for imports while exports from Ontario typically go to Michigan and New York.



Emissions

- GHG emissions from Ontario's electricity sector declined 82% between 2002 and 2015, primarily as a result of the closure of coal-fired generation and declining electricity demand.
- Approximately 90% of electricity generation in Ontario now comes from non-fossil fuelled generation.

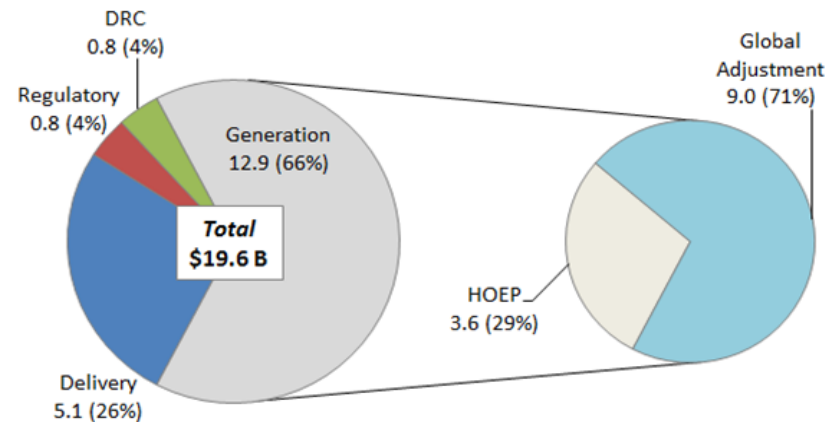


Source: NIR and IESO

System costs

- In Ontario, the costs associated with providing electricity service to consumers are recovered through the commodity, delivery, regulatory and tax components on the customer bill.
- For residential consumers, prices to recover the electricity cost are set through the Regulated Price Plan (RPP).
- In the commercial and industrial sector, electricity costs are split out by wholesale market prices (HOEP) and Global Adjustment (GA) costs.
- The GA charge ensures recovery of long-term generation, conservation and demand management costs, and is applied to all consumer groups.
- Total system costs in 2016, excluding HST, are projected to be approximately \$21 billion (2016\$). These costs are recovered from about 5 million consumers.
- Generation costs (i.e., commodity cost of electricity) represent roughly two-thirds of the total cost of electricity service in Ontario.

Electricity System Costs (2012\$B)
2016 (Projected)



Source: 2013 LTEP

Rate Mitigation Initiatives – Overview

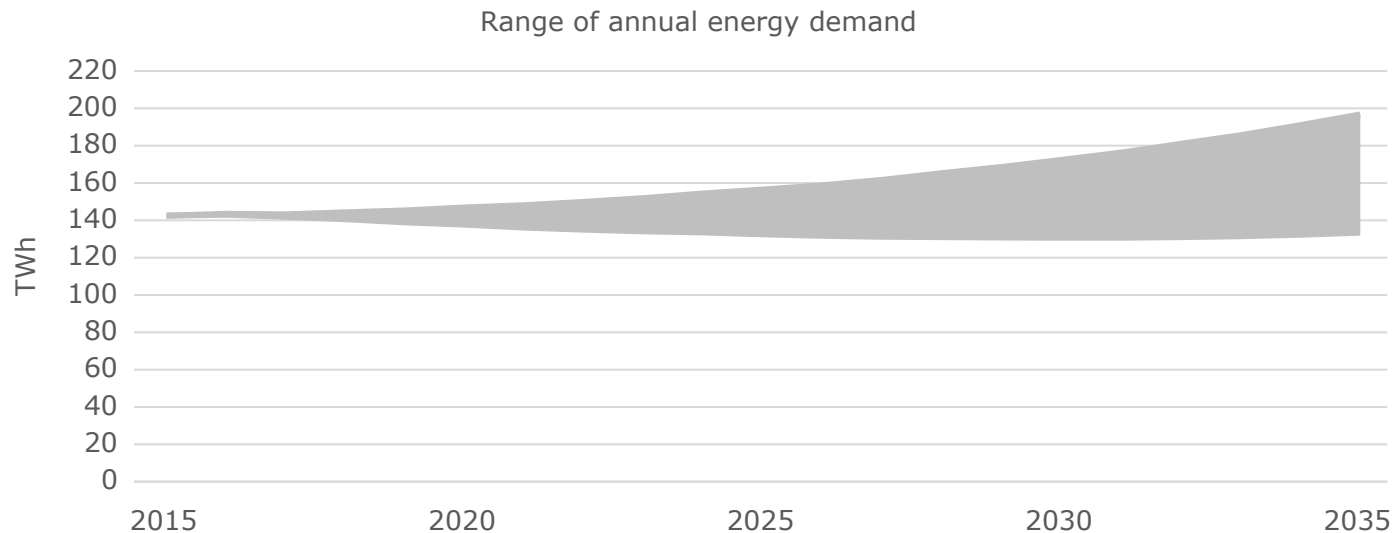
- Electricity costs are increasing as the necessary investments are made to decarbonize and modernize the province's electricity infrastructure (i.e., \$35 billion+ investment in cleaner generation and \$15.5 billion investment in Hydro One transmission and distribution systems).
- Since 2013, a number of actions have been taken to reduce overall electricity system costs:

<i>System wide initiatives</i>	<i>Residential</i>	<i>Commercial / Industrial</i>
LRP II suspension: Suspending the second round of the Large Renewable Procurement (LRP II) process and the Energy-from-Waste Standard Offer Program to save up to \$3.8 billion in electricity system costs relative to 2013 LTEP	8% rebate: 8% rebate to five million electricity consumers in the residential, small business and agricultural sector	
Decreasing FIT pricing: Reducing Feed-In-Tariff (FIT) prices through annual price reviews, saving ratepayers at least \$1.9 billion relative to the 2013 LTEP	RRRP: The Rural or Remote Rate Protection (RRRP) program reduces electricity delivery costs for approximately 330,000 customers located in rural areas	ICI expansion: Industrial Conservation Initiative (ICI) expanded to include all electricity consumers over 1 MW
Extending asset lifespan: Approving Ontario Power Generation's plans to enable the ongoing operation of Pickering up to 2024, which is expected to save ratepayers as much as \$600 million		
Renegotiating GEIA: Renegotiating the Green Energy Investment Agreement, reducing contract costs by \$3.7 billion		

2. Planning for the future **with Ontario's Long-Term Energy Plan**

Ontario Power Outlook (OPO)

- The OPO provides the IESO's planning outlook for the 2016 through 2035 period and includes a range of demand outlooks.
- The range of future electricity demand is influenced by a wide variety of factors including:
 - growth in household numbers
 - conservation (programs, building codes, and product standards)
 - commercial and industrial sector activity
 - uptake of electric vehicles
 - electrification of energy systems (heating, mass transit)

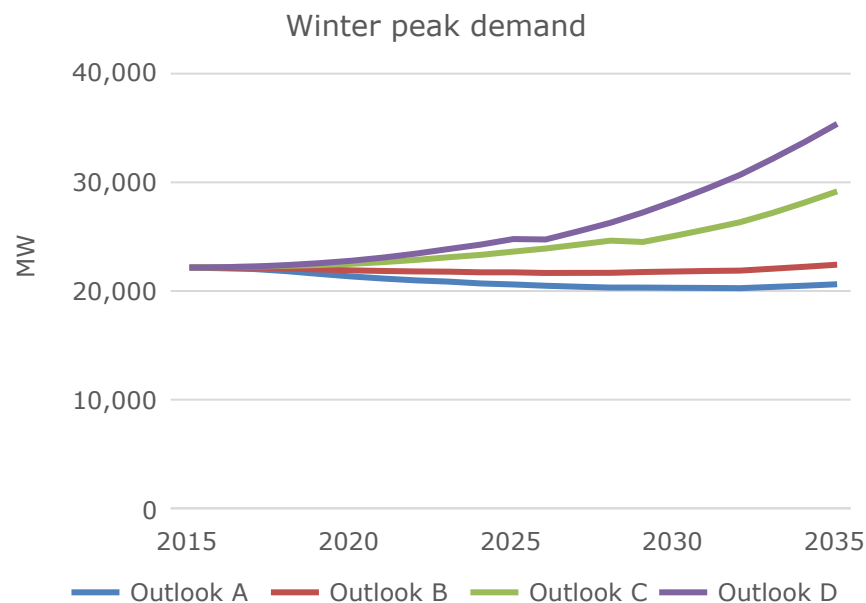
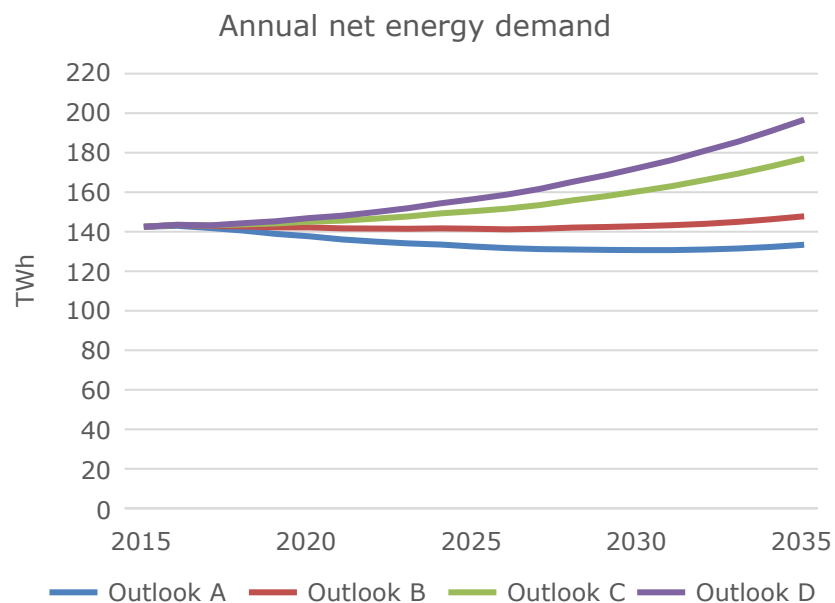


Source: IESO

Ontario Power Outlook (OPO) cont.

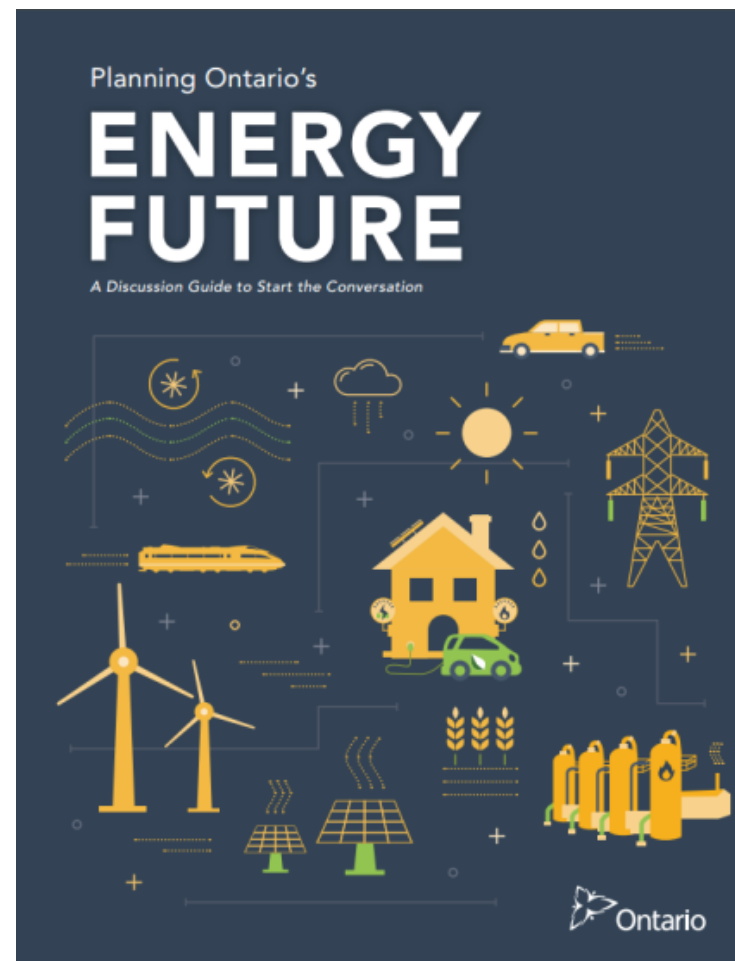
- Four demand outlooks have been developed to provide context for long-term integrated planning and discussion:

Outlook	Description
A (or "low demand outlook")	Explores the implications of lower electricity demand
B (or "flat demand outlook")	Long-term demand that roughly matches the level of demand that exists today
C and D (or "higher demand outlooks")	Higher levels of demand driven by different levels of electrification associated with policy choices on climate change.



LTEP 2016

- The Ministry of Energy is consulting and engaging with Ontarians, First Nation and Métis communities and energy stakeholders to get views on the choices that need to be made for Ontario's energy future.
- The next LTEP will also expand the discussion of Ontario's energy future by including a comprehensive review of the province's fossil fuels sector and the supply of oil, gasoline and natural gas.
- On October 13, 2016, the Ministry published a discussion guide for 2017 LTEP, titled "Energy Future: A Discussion Guide to Start the Conversation".



LTEP Engagement Map

- The Ministry of Energy has held consultations and engagement sessions with Ontarians, First Nation and Métis communities and energy stakeholders across the province.



Produced by Ontario Ministry of Energy, December 2016

LTEP Process

- The 2016 LTEP will be developed through the following four stage process:



Phase 1 Technical Reports

Publication of two technical reports on the current state of Ontario's electricity and fuels sectors, each of which also contain 20-year outlooks to guide LTEP engagement and development.



Phase 2 Engagement

The Ministry of Energy is actively seeking feedback from stakeholders and the public through in-person sessions, online tools, and the *Environmental Registry*.



Phase 3 Development

The Ministry of Energy will review all feedback collected through the LTEP engagement phase as well as information provided in the technical reports to develop the Long-Term Energy Plan.



Phase 4 Implementation

The Ministry of Energy's agencies, the Independent Electricity System Operator (IESO) and Ontario Energy Board (OEB) will develop plans for implementing the Long-Term Energy Plan's objectives.

We are here

Discussion guide questions for consideration

- The LTEP discussion guide has developed a series of questions across a broad range of subjects for participants to consider. A sample of these questions is provided below:

Supply Mix

- To meet a higher demand, what mix of new electricity resources would best balance the principles of cost-effectiveness, reliability, clean energy, community engagement, and an emphasis on Conservation First?
- What policies will Ontario need to adapt to a transformation in the fuels sector?

Clean Energy Supply

- What role should distributed renewable energy generation play in the ongoing modernization and transformation of Ontario's electricity system?
- What strategies should Ontario pursue to harness the potential of its nuclear sector to meet its future energy needs?

Regional Planning

- In areas expected to undergo a transformation from rural to suburban, through intense development, how could the province help to ensure that corridor lands are reserved/set-aside before development occurs to minimize the potential costs and inconvenience of acquiring and clearing developed lands in the future?

Innovation and Economic Growth

- Which innovations offer the greatest benefit to your community and the energy system as a whole?
- How should the public and private sectors cooperate to encourage innovation in the energy section?
- What actions could the government take to support the adoption of alternative fuels?

3. What we heard and what we're doing (or something like that)

Technological, regulatory and consumer change

- The future electricity system will be influenced by changes in market structure, technology, consumer behavior, environmental considerations and connections with neighbouring markets:

Market renewal

- Introduction of new market mechanisms to improve system transparency and cost effectiveness for supplies and consumers

Demand response

- Demand Response (DR) initiatives provide price or financial incentives to consumers to shift or reduce their electricity usage away from peak periods

Cap and Trade

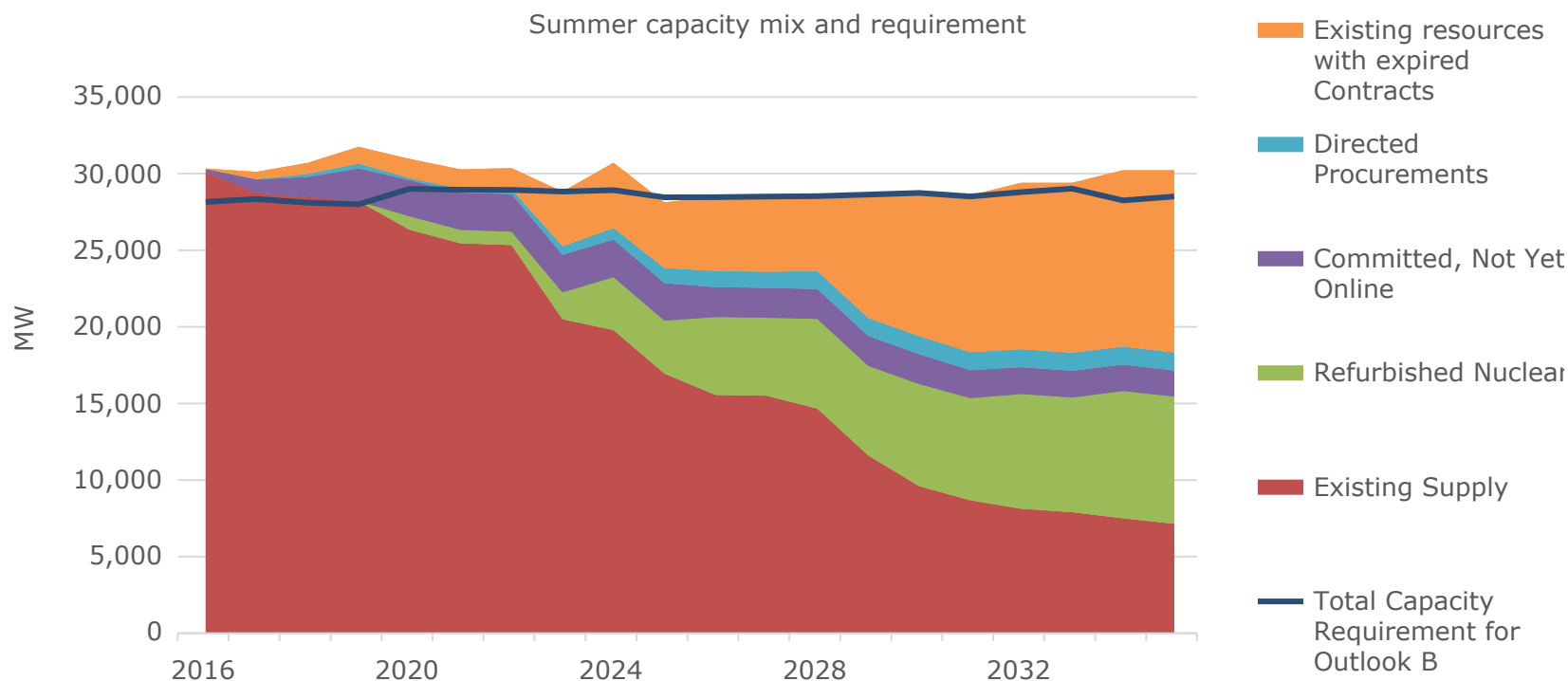
- Ontario will introduce a cap and trade as a mechanism to support the province's climate change plan and to help meet Ontario's greenhouse gas reduction targets

Electricity Trade

- In Aug 2016 Ontario and Quebec agreed to expand electricity trade between the two provinces to reduce GHG emissions, provide value to both provinces and align with each jurisdiction's policy initiatives

Future capacity

- Ontario is expected to have sufficient supply to meet a flat demand outlook.
- The capacity mix is expected to evolve over time as contracts with existing generators expire and are replaced with different types of supply.



Market renewal: Initiatives

- In 2016 the IESO initiated a Market Renewal stakeholder engagement and presented a work plan that included the following initiatives:

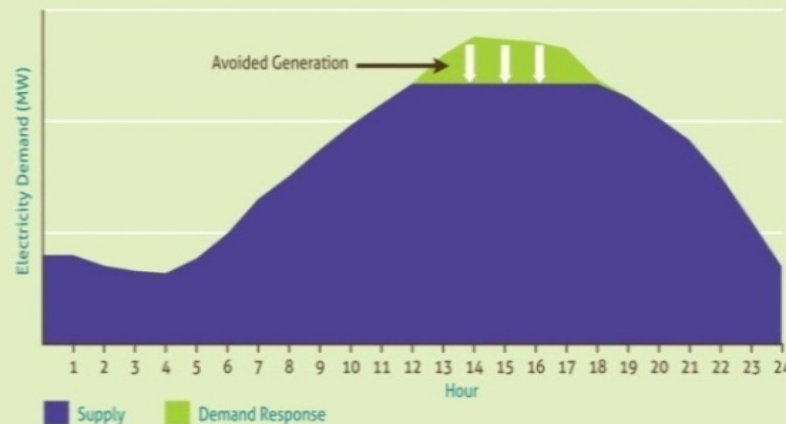
Work stream	Primary objectives	Initiatives
Energy	Reduce cost and gain efficiency scheduling energy to meet provincial demand	- Single Schedule System - Day-Ahead Market - Enhanced Real-Time Unit Commitment
Capacity	Reduce cost of procuring resources to meet long-term demand	- Capacity Trade - Incremental Capacity Auction
Operability	Increase flexibility to reliability and cost-effectively integrate renewable resources	- More Frequent Intertie Scheduling - Investigate other opportunities

- These are the projects that are being assessed through ongoing benefits case analysis

Demand Response (DR)

- DR initiatives provide price or financial incentives to consumers to shift or reduce their electricity usage away from peak periods.
- 2013 LTEP committed to using DR to meet 10% of peak demand by 2025, equivalent to ~2,400MW under forecast conditions.
- Annual DR auctions replace the practice of multi-year contracting for DR.
- DR auction participation is open to resources with peak load greater than 1 MW (e.g. industrial consumers, aggregators etc.)
- Since 2015, the IESO has held two DR auctions for capacity in the year ahead summer/winter commitment period.
- The most recent demand response auction held in Q4 2016 resulted in both increased participation, and prices for demand response capacity that are 12 to 17 percent lower than those achieved in 2015 auction.
- Commercial and Industrial participants include: Pulp and paper, steel industry, etc.

Demand Response programs can reduce the need to build costly peaking generation that would only be required during the highest demand hours of a hot summer day.



Source: 2013 LTEP

Cap and Trade

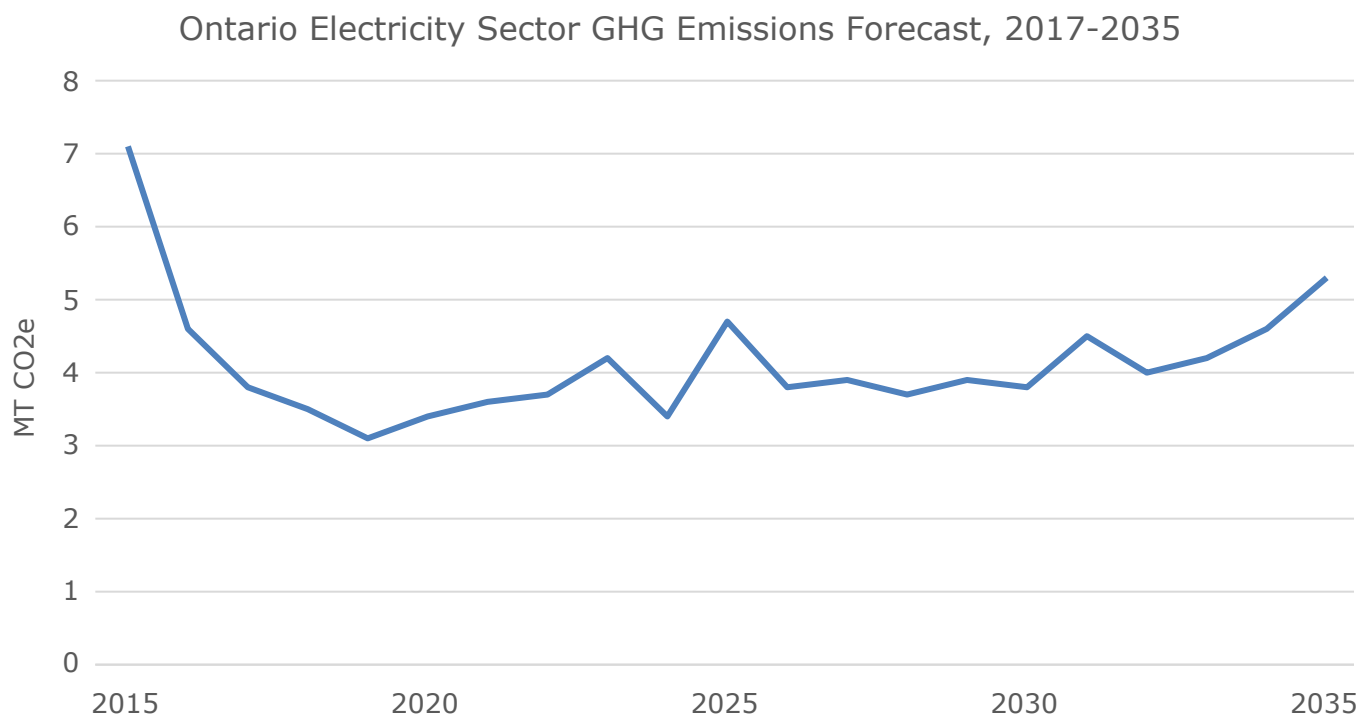
- On April 13, 2015, Premier Wynne announced that Ontario would be putting a limit on greenhouse gas pollution through a cap and trade program.
- Ontario intends to use cap and trade as a mechanism to support the province's climate change plan and to help meet Ontario's greenhouse gas reduction targets of:
 - 15% below 1990 levels by 2020;
 - 37% below 1990 levels by 2030; and
 - 80% below 1990 levels by 2050.
- A cap-and-trade program is a flexible, market-based program with targets (caps) that increase and get more stringent over time.
- Ontario intends to join the cap and trade program that Quebec and California have implemented and which was developed under the Western Climate Initiative.
- The cap and trade program is effective from January 1, 2017 with the first auction of emission credits taking place in Q1 2017.



Source: MoECC

Ontario electricity sector GHG emissions

- Ontario electricity sector GHG emissions are projected to decline in the near term as additional renewable generation enters the generation mix.
- Emissions average 4 MT per year over the outlook period with a moderate increase from the mid-2020s as the Pickering nuclear plant is retired



Source: IESO

Ontario – Quebec electricity trade agreement

- On August 5, 2016, Ontario (IESO) and Quebec (Hydro Quebec) signed an agreement on the principle terms of an agreement to expand electricity trade between the two provinces.
- The agreement has three components which will result in benefits to both provinces:
 - Quebec will provide 2 TWh of energy to Ontario to offset natural gas generation and reduce GHG emissions;
 - Ontario will provide 500 MW of capacity to Quebec to help support Quebec's winter requirements; and
 - Ontario will send 500 GWh of energy to Quebec to store in off-peak, lower-priced periods and withdraw 60% of that energy back in on-peak, higher priced periods.
- This continued partnership is in keeping with the spirit of cooperation between the two provinces and builds upon their shared and individual actions to address climate change.



Source: IESO, Ministry of Energy

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