

ONTARIO SUPPLY MIX

ISSUE:

Ontario’s electricity supply mix continues to evolve in order to effectively meet demand in a reliable, flexible and cost effective manner, while ensuring our electricity system is clean and low-emissions.

RESPONSE:

1. SUGGESTED RESPONSE ON CURRENT SUPPLY MIX:

- Altogether, approximately 90 per cent of the power generated in Ontario during 2016 came from clean sources of energy such as water, nuclear and non-hydro renewables.
- Nuclear currently provides approximately 60 per cent of our power and is the backbone of the electricity system. Continued investment in nuclear is required to ensure long-term reliability.
- In the first quarter of 2017, 75 MW of new supply came into commercial operation on the transmission and distribution systems – primarily in the form of wind and solar generation.
- Currently, approximately 7,500 MW of non-hydro renewable generation (i.e., wind, solar and bioenergy) is connected to both the transmission and distribution networks in Ontario.
- In 2016, transmission-connected non-hydro renewables produced approximately 10.25 terawatt hours (TWh) of energy.

Commented [AL1]: 2 MW of hydro

Commented [AL2]: Verified - OER/IESO

BACKGROUND:

1. BACKGROUND ON CURRENT SUPPLY MIX:

- According to the Independent Electricity System Operator (IESO), there was a total of 36,563 MW of transmission-connected capacity installed in Ontario as of May 12, 2017.
- Ontario generators produced 150.35 terawatt-hours (TWh) of transmission-connected electricity in 2016.

Commented [AL3]: Verified

Figure 1: Existing transmission-connected generation resources as of May 12, 2017.

Fuel Type	Total Installed Capacity (MW)	Forecast Capability at Summer Peak (MW)	Number of Stations	Change in Installed Capacity (MW)	Change in Stations
Nuclear	12,978	10,622	5	0	0
Hydroelectric	8,451	5,803	73	0	0
Oil / Gas	10,277	7,812	31	334	1
Wind	3,983	533	35	0	0
Biomass / Landfill Gas	495	449	9	0	0
Solar	380	38	8	100	2
Total	36,563	25,228	161	434	3

Commented [AL4]: Green electron completed market registration

Commented [AL5]: 2 new solar facilities completed market registration - 50 MW each

*Actual Capability may be less as a result of transmission constraints
*Source: IESO 18 Month Outlook

RECENT CHANGES:

Nuclear

- Ontario is moving forward with refurbishment of four nuclear units at Darlington Nuclear Generating Station and six at Bruce Nuclear Generating Station over the next 16 years.
- On October 15, 2016, OPG began the refurbishment of the first unit at Darlington (i.e., Unit 2 refurbishment). Unit 2 refurbishment is expected to be complete by first quarter of 2020. OPG plans to complete all four Darlington unit refurbishments by 2026.
- The first unit at Bruce will begin refurbishment in 2020, to maximize the existing life of the units. The six Bruce unit refurbishments are expected to be complete by 2033.
- The 2013 LTEP assumed Pickering would operate until 2020. Since then, Ontario approved a plan for OPG to complete confirmatory work and seek regulatory approvals for ongoing operation of the Pickering Nuclear Generation Station up to 2024.
 - Pickering A Units 1 and 4 would operate to 2022 before being shut down and decommissioned.
 - Pickering B Units 5 to 8 would operate to 2024 before being shut down and decommissioned.
- OPG will seek final government approval to proceed with ongoing Pickering operation after these activities have been completed.

Commented [AL6]: Nuclear to review

Hydroelectric

- The Peter Sutherland Sr. Generating Station (GS) is now producing clean, reliable, low-cost electricity. The project, which is a partnership between Taykwa Tagamou Nation (TTN) and OPG, was completed on March 31, 2017 and provides 28 MW of capacity.

Commented [AL7]: Suggest removing as it is no longer very recent

Renewables

- Approximately 7,500 MW of non-hydro renewable generation (wind, solar & bioenergy) is currently connected to both the transmission and distribution networks in Ontario. In 2016, transmission-connected non-hydro renewables produced approximately 10.25 TWh of energy.
- The Niagara Region Wind Farm achieved Commercial Operation in the Q4 2016. The 230 MW facility located close to Smithville in the Regional Municipality of Niagara

Commented [AL8]: CRED should perhaps review - may want to add Bow Lake, which completed market registration in Q1 2017

Non-Utility Generators (NUGs)

- Non-utility generators (NUGs) are private facilities that have legacy contracts with the old Ontario Hydro (contracts are now held by the Ontario Electricity Financial Corporation), or renegotiated contracts with IESO.
- On December 16, 2016, the Minister of Energy directed IESO to enter into negotiations with OEFC thermal NUGs on the feasibility of contracting with IESO for the remainder of their term. Any new contract with IESO must maintain the same contract term and provide ratepayer savings and GHG reductions from the existing OEFC contract.
- IESO has advised the Ministry that it has executed restructured NUG contracts with five legacy NUG facilities (TransAlta's Mississauga Cogeneration facility, Northland Power's Iroquois Falls facility, and Atlantic Power's Kapuskasing, Nipigon and North Bay facilities).
- On January 31, 2017 Northland Power's Kingston Cogen facility closed following the expiry of its PPA.

Commented [ESP9]: According to emails from IESO to MO of December 23, 2016. In that email IESO advised it was close on a short-term agreement for Northland's Iroquois

Commented [AL10]: According to IESO presentation to the Ministry on Jan. 24, 2017, an Iroquois Falls agreement is now in place and a long-term deal is expected to follow.

Commented [AL11]: Revised to cover

Figure 2: Electricity Generation in Ontario (2012-2016)

IESO GENERATION MIX										
	2012		2013		2014		2015		2016	
Fuel	TWh	%	TWh	%	TWh	%	TWh	%	TWh	%
Nuclear	85.6	56.4%	91.1	59.1%	94.9	62%	92.3	60%	91.7	61%
Hydro	33.8	22.3%	36.1	23.4%	37.1	24%	36.3	24%	35.7	24%
Coal	4.3	2.8%	3.2	2.1%	0.1	<1%	N/A	N/A	N/A	N/A
Wind	4.6	3.0%	5.2	3.4%	6.8	4.0%	9.0	6%	12.7	9%
Gas/Oil	22.2	14.6%	18.2	11.8%	14.8	10%	15.4	10%	9.3	6%
Other	1.3	0.8%	1.3	0.8%	N/A	N/A	N/A	N/A	N/A	N/A
Solar	N/A	N/A	N/A	N/A	0.0185	<1%	0.25	<1%	0.49	<1%
Biofuel	N/A	N/A	0.2	<1%	0.3	<1%	0.45	<1%	0.46	<1%
Total Generation	151.8	100%	155.3	100%	154.0	100%	153.7	100%	150.35	100%

Due to rounding, percentages may not add to 100.

*Note: Fuel supply categories have changed as of 2013. The new category Gas/Oil includes dual-fuel facilities. The new solar category includes grid-connected facilities. Almost all solar generation in Ontario is currently connected to distribution systems.

FUTURE CAPACITY NEEDS

- While the system has no energy or capacity needs in the short-term, there is expected to be a capacity shortfall beginning around 2023, primarily related to the nuclear refurbishment at Bruce and Darlington, and the retirement of Pickering.
- Several options exist to meet this capacity requirement, including IESO proposed capacity market, conservation initiatives, and growth in embedded wind and solar.