Ontario

MINISTRY OF
ENERGY

Electricity Sector Efficiencies

Transition 2018 – Top Issue Briefing Deck

Working Draft

April 2018

Purpose

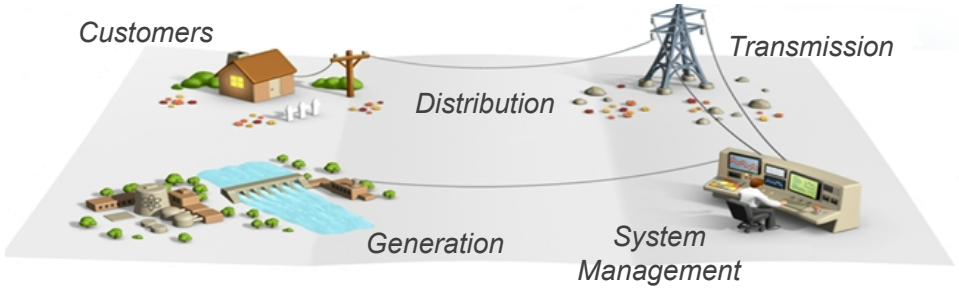
- To provide an overview on electricity sector efficiencies, including:
  - Background on the cost of electricity service;
  - Recent cost mitigation measures; and
  - Considerations for potential future efficiencies and next steps.

Cost of Electricity Service

- In 2018, the cost of electricity service in Ontario is expected to be approximately $21 billion, including ongoing costs related to recent investments in generation and transmission infrastructure.
  - Since 2003, the government has invested nearly $70 billion in the electricity system, including more than $37 billion in electricity generation.
- Finding further efficiencies and cost reductions would reduce electricity prices for consumers, achieve system-wide operational benefits and better prepare Ontario for future changes in emerging technology and increasing consumer choice.
- Additional efficiencies are being explored as part of the Independent Electricity System Operator's (IESO) Market Renewal initiative, an ongoing process to realize cost savings by promoting greater efficiency and increasing the system's ability to adjust to changing conditions.

Cost of Electricity Service (cont'd)

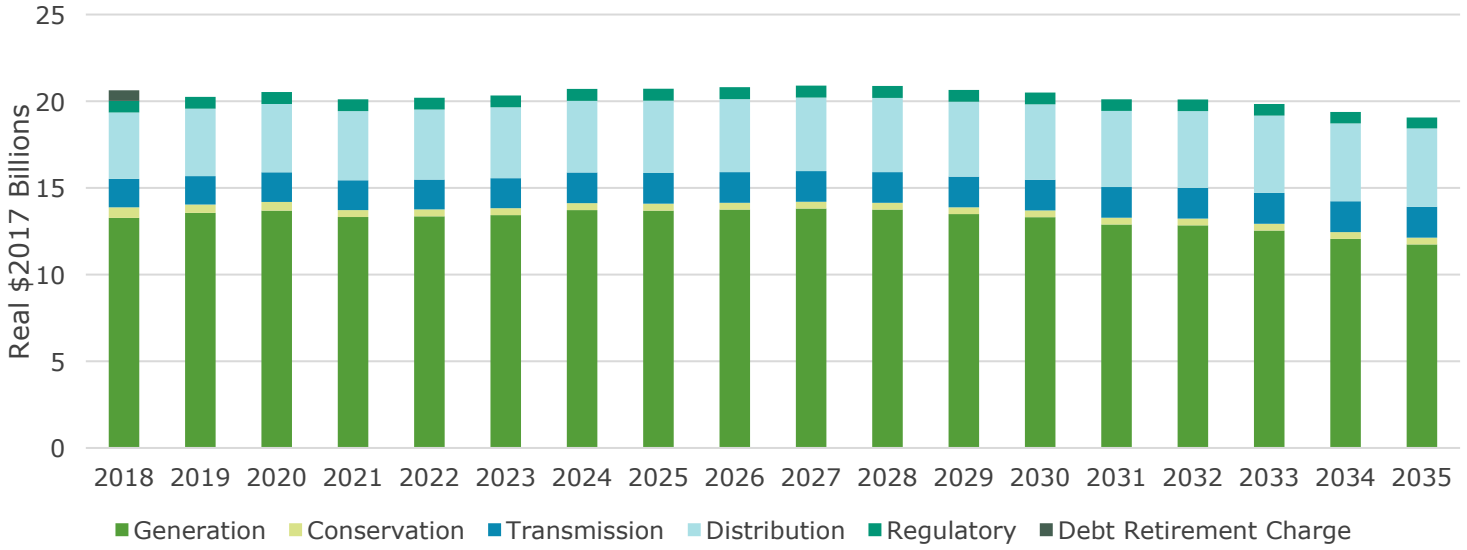
- The cost of providing electricity service can be categorized in the following ways:
  - Generation: The capital cost, fuel cost and operating cost of various forms of generation, such as nuclear, natural gas, hydroelectric, wind, solar and biomass.
  - Conservation: Programs undertaken by IESO and Local Distribution Companies (LDCS) are recovered from customers as part of the commodity (generating) cost.
  - Distribution: The costs associated with building, operating and maintaining/managing the infrastructure to move electricity from the transmission system to the customer point-of-use, as well as customer billing and inquiry. Distribution rates are approved by the Ontario Energy Board (OEB).
  - Transmission: The costs of transmitters, such as Hydro One, to operate and maintain the high-voltage transmission system that carries electricity from generating stations to LDCs and large customers.
  - Regulatory Charges: The administrative cost of operating Ontario's electricity system, including the cost of running IESO.



Total Cost of Electricity Service

- Under the 2017 Long-Term Energy Plan (2017 LTEP), the cost of electricity service is expected to remain relatively flat in real terms (i.e., removing inflationary impacts) as shown in the below figure.

Cost of Electricity Service



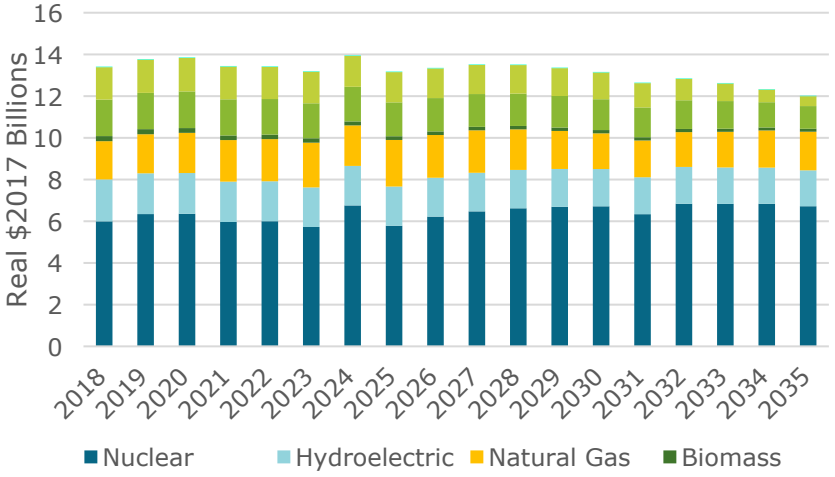
- The Debt Retirement Charge (DRC) was removed from residential users' electricity bills in January 2016 and from all other electricity consumers as of April 1, 2018.
  - DRC represented the former Ontario Hydro's debt/liabilities associated with building electricity generation and transmission infrastructure. Note: Ending the DRC represents the elimination of a $7/MWh charge, equivalent to about $5.25 per month for a typical residential consumer.

Source: IESO, 2017 Long-Term Energy Plan

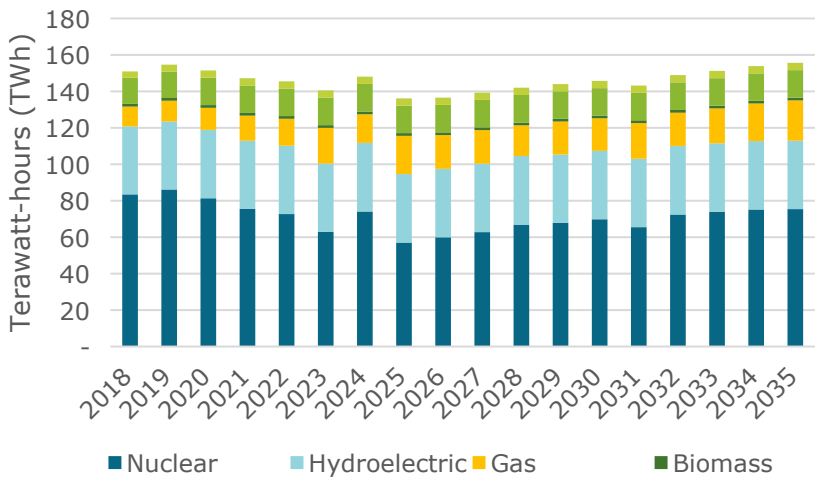
Electricity Generation

- Electricity generation represents the largest portion of the total cost of electricity service. Nearly all of Ontario electricity generation is either contracted with IESO or regulated by the Ontario Energy Board (OEB).
  - Contracted and regulated generation help ensure that Ontario has sufficient capacity and energy to meet North American reliability requirements.
- Total cost and total generation by fuel type is shown below; note that there are variations in cost within each technology type based on different contracts.

Generation Cost by Fuel Type



Generation by Fuel Type



Source: IESO, 2017 Long-Term Energy Plan

Recent Measures to Mitigate Electricity System Costs

- Recent and ongoing measures to mitigate electricity system costs from the electricity consumer rate-base are categorized as impacting generation, transmission, distribution or the regulatory component of bills. Examples include:
  - Generation: Refinancing a portion of Global Adjustment, expansion of the Industrial Conservation Initiative (ICI) and suspending programs (i.e., Large Renewal Procurement (LRP) II, Energy-from-Waste Standard Offer Program (EFWSOP) and Feed-in-Tariff (FIT) 5).
  - Conservation: Programs provide opportunities to all customer sectors to help manage their energy bills, and resulting savings help defer or offset more expensive infrastructure investments. Conservation costs are included in Global Adjustment (GA);
  - Distribution: A new distribution rate protection program to provide distribution charge relief to eligible residential customers; incentives for LDC efficiency through the OEB's rate-setting mechanisms; and
  - Regulatory: Shifting of electricity support programs to the tax-base (e.g., Ontario Electricity Support Program).
- The IESO worked with stakeholders and consultants to develop a benefits case for Market Renewal. The analysis showed that significant benefits can be achieved, with a ten-year present value of net benefits of up to $5.2 billion.

Recent Measures to Reduce Costs – Generation

Refinancing a Portion of Global Adjustment

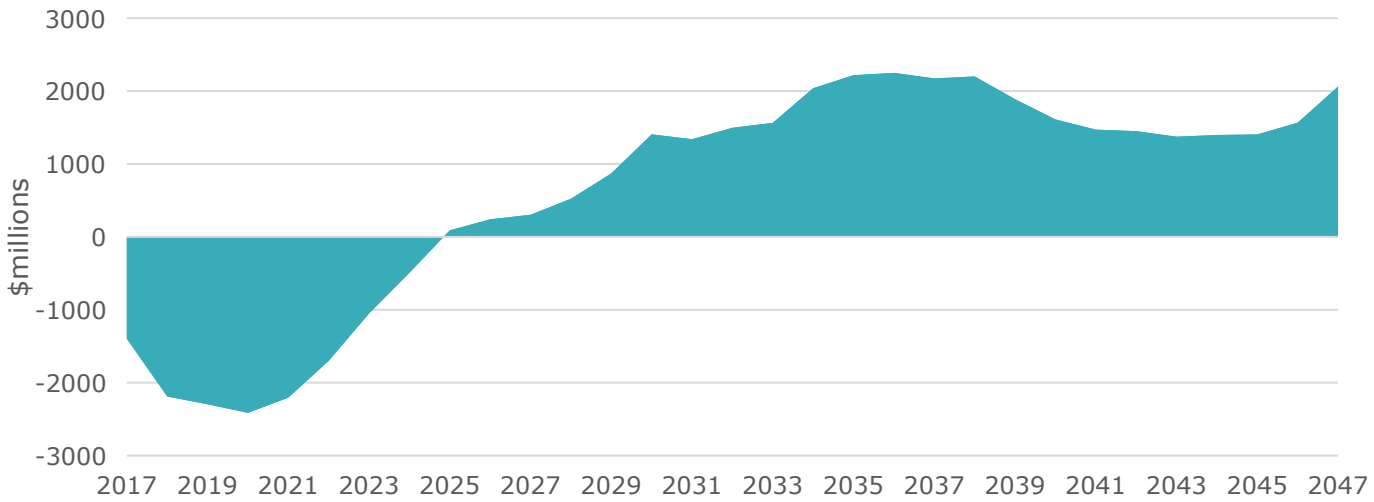
- A portion of Global Adjustment (GA) is being refinanced for eligible consumers, including all residential consumers, most small businesses, farms, long-term care homes and condominiums.
- GA refinancing represents a restructuring of the time period for cost recovery:
  - Eligible consumers are receiving a reduction in costs in the short-term.
  - Debt is being issued in order to finance the deferred GA, i.e. the shortfall between reduced GA collected from ratepayers and IESO's obligations to pay generators.
  - In later years, the cost of refinancing will be recovered from these consumers.
- Under the enabling regulation, rates for the period from May 1, 2018 to April 30, 2019 have been set such that the typical bill increases by the rate of inflation.
  - Given this dynamic, any reduction in electricity system costs will have limited impact on eligible consumers over the short term (absent any amendments to existing regulations), but will impact debt levels and repayment amounts over the long term.

Recent Measures to Reduce Cost – Generation (cont'd)

Refinancing a Portion of GA (cont'd)

- Estimates at the time of the 2017 LTEP forecast peak debt to be approximately $20 billion over the 30-year refinancing period.
- The net impact of borrowing and repayment is shown below.

Borrowing and Repayment under GA Refinancing

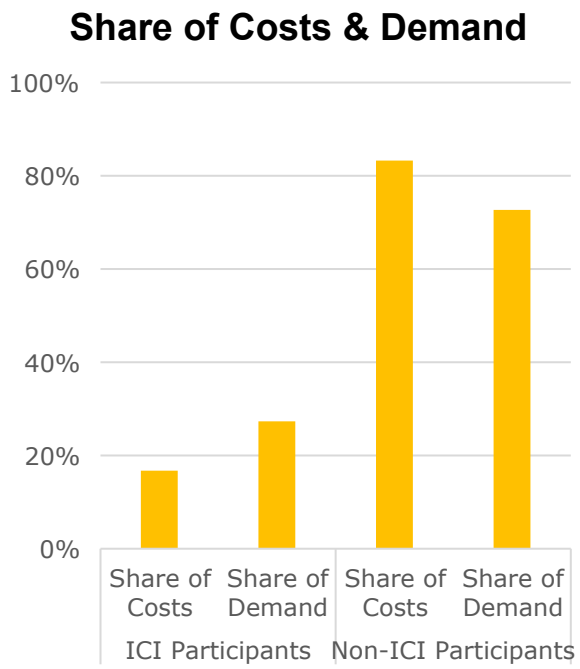


Note: Based on Ministry forecasts consistent with the Fair Allocation Amount provided to OPG in September 2017. Forecasted debt assumes a 5 per cent average interest rate over the 30-year life of the program and includes estimates of OPG fees . Estimates are subject to change based on a number of variables, including interest rates.

Recent Measures to Reduce Costs – Generation (cont'd)

Expansion of the Industrial Conservation Initiative (ICI)

- Reducing demand during peak hours benefits companies financially who participate in ICI and benefits the electricity system by deferring the need for new peaking generation.
- Effective July 1, 2018, ICI was expanded to include smaller manufacturers and greenhouses with peak demand over500 kW, in addition to the consumers over 1 MW who were already eligible.
  - Currently, there are about 1,100 participants in ICI, ranging from food and automotive parts manufacturers to mines and refineries.
- ICI allows eligible electricity consumers to lower their GA by reducing their demand during peak hours. Participants pay GA based on their share of demand during the five highest demand hours of the year.
- Stakeholders including the OEB's Market Surveillance Panel (MSP) and the C.D. Howe Institute have noted that ICI transfers costs from program participants to non-participants such as residential consumers and non-eligible small businesses.



Recent Measures to Reduce Cost – Generation (cont'd)

Suspending Existing Programs

- Suspending the second round of the large renewable procurement process (LRP II) and the Energy-from-Waste Standard Offer Program is expected to save up to $3.8 billion compared to the forecast in the 2013 Long-Term Energy Plan (2013 LTEP).
- The results of the final Feed-in-Tariff (FIT) 5 procurement were announced in September 2017. A highlight of procurement was that prices paid for new projects have been reduced between 50 and 75 per cent since 2009, reflecting the decreasing costs of equipment and ensuring value to ratepayers.

Recent Measures to Reduce Costs – Distribution

Distribution Rate Protection

- In 2017, a new distribution rate protection program was created to provide distribution charge relief to eligible residential customers served by LDCs with the highest distribution costs.
- Roughly 800,000 customers, served by the following LDCs receive benefits from the broadened program: Hydro One (R1 and R2 rate classes), Algoma Power, Atikokan Hydro, InnPower, Chapleau Public Utilities Commission, Sioux Lookout Hydro, Lakeland Power (Parry Sound), and Northern Ontario Wires Inc.
- This program is funded through appropriated provincial funds.

Renewed Regulatory Framework for Electricity (RRFE)

- Through incentive regulation (IR) or performance-based regulation (PBR), which are synonymous, the OEB has a direct mechanism to incentivize LDC efficiency. The OEB uses IR and productivity and cost efficiency benchmarking as part of its rate setting process under its RRFE.
- After setting initial rates by way of cost-of-service once every 5 years, the OEB adjusts LDC distribution rates with a formula that takes into account inflationary factors that affect the sector productivity and "stretch" factors:
    1. Productivity represents how effective an entity is in converting inputs into outputs
    2. The OEB also assesses an additional productivity requirement, called a "stretch" factor, based on cost efficiency benchmarking.

Recent Measures to Reduce Costs – Regulatory

Renewed Regulatory Framework for Electricity (RRFE) (cont'd)

- Beginning in 2017, the cost recovery for two electricity support programs – Rural or Remote Rate Protection (RRRP) and Ontario Electricity Support Program (OESP) – was shifted from electricity bills to provincial revenues, lowering regulatory charges by approximately $3/MWh.
  - RRRP mitigates some of the high costs of electricity distribution in rural or remote areas of the Province and is a legacy program of the old Ontario Hydro.
  - The OESP is an income-tested, application-based program that lowers electricity costs for the most vulnerable consumers through a direct rebate.

Recent Measures to Reduce Costs – Market Renewal (cont'd)

IESO's Market Renewal Initiative

- The IESO is currently undertaking Market Renewal as an opportunity to improve the efficiency and operation of the electricity system and prepare for future changes.

- The IESO is actively engaging with sector stakeholders on the three work initiatives for Market Renewal, which include:

  1. A single schedule market, an enhanced real-time unit commitment program and a day-ahead market to reduce cost and gain efficiency;
  2. Incremental capacity auction to reduce the cost of resource procurement; and
  3. A non-emitting resources subcommittee to ensure that the unique characteristics of non-emitting resources are addressed.

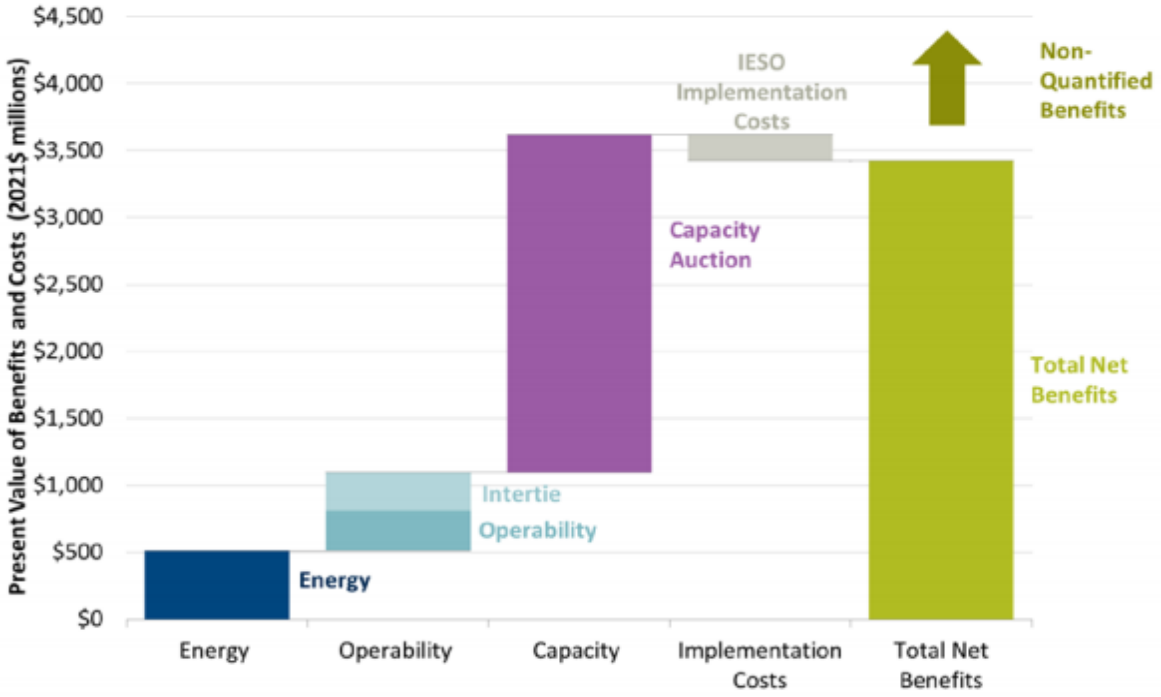
- The IESO has established a variety of stakeholder forums under Market Renewal to enable participation.
  - The IESO is also working toward developing high-level design documents for individual market renewal initiatives. By mid-2018, IESO is expected to initiate the third phase of stakeholder engagement.

Recent Measures to Reduce Costs – Electricity Market Renewal (cont'd)

IESO's Market Renewal Initiative (cont'd)

- According to the report prepared for IESO, Market Renewal is expected to save up to $5.2 billion between 2021 and 2030.

Market Renewal Benefits and Costs (2021-2030)



Source: Brattle Group Project (prepared for the IESO), *Benefits Case Assessment of the Market Renewal Project*.

Considerations

Potential Future Efficiencies – Generation

- Since most generators are contracted or regulated, material cost reductions are difficult to achieve. As an indicative estimate, every $130 million reduction in the cost of generation can lower supply costs by about 1 per cent.

Potential Future Efficiencies – Conservation

- Conservation initiatives include:
  - 2015-2020 Conservation and Demand Management Framework (for distribution-connected customers) and Industrial Accelerator Program (for transmission-connected customers)
  - IESO Conservation Fund.
- Both are funded through Global Adjustment, representing 3.1 per cent of GA over 2018-2026.
  - While incurred as costs in the year that programs are delivered, programs are designed to result in reduced system costs over the long-term.
- The IESO is required to complete its next *Achievable Potential Study* by June 2019. The study will identify cost-effective electricity conservation that can be achieved through programs over the period 2019-2038, and can be used to inform energy efficiency policy and initiatives in the post-2020 period.

Considerations (cont'd)

Potential Future Efficiencies – Conservation (cont'd)

- Reducing conservation spending may result in increased costs due to the need to invest in more expensive generation, transmission or distribution infrastructure.
  - All conservation programs are required to pass cost-effectiveness tests showing that the avoided system costs (benefits) outweigh the costs of program delivery.
  - In 2016, conservation programs were delivered at 2.10 cents/kWh.

Conservation and Fund Costs (Billions $2017)

Conservation Initiatives	2018	2019	2020	2021	2022	2023	2024	2025	2026
Energy Efficiency Program Costs (i.e., Conservation First Framework and the Industrial Accelerator Program) and IESO Conservation Fund	$ 0.551	$ 0.599	$ 0.468	$ 0.487	$ 0.393	$ 0.393	$ 0.393	$ 0.393	$ 0.393

Source: Ministry of Energy – 2017 LTEP Cost Module (March 2018)

Considerations (cont'd)

Potential Future Efficiencies – Distribution

- In the fall of 2017, the OEB released its Strategic Blueprint that sets out its commitment to modernize the OEB's approach to regulation to keep pace with an evolving sector. In it, the OEB concludes that the Renewed Regulatory Framework warrants a relook, particularly to drive a stronger focus by utilities on long-term value for consumers.
- The OEB acknowledges that regulators in other jurisdictions are considering new approaches to the remuneration of utilities and that they need to assess whether similar regulatory reforms are warranted in Ontario and how they might further enhance efficiency.
- One of its strategic goals is to ensure that utilities are delivering value to consumers in a changing environment. An objective to meet this goal is to have a regulatory framework in place that incents utilities to focus on long-term value for money and least-cost solutions.

Potential Future Efficiencies – Regulatory

- The cost of Demand Response (DR) programs are recovered from Ontario consumers by uplift charges* in the regulatory component of bills.
- In a 2017 report, the OEB's MSP, recommended that IESO reassess the value of DR in light of Ontario's current strong supply conditions and the objective of Market Renewal for technology-neutral procurement at least cost.
  - Demand Response contracts are in place to April 2019 and cost reductions would be challenging to achieve before that time.
  - To increase the value of Demand Response to the system:
    - IESO is working to transition demand response to an incremental capacity auction in 2020; this is expected to further align procurement with system needs.
    - IESO has begun implementing rule changes to increase the utilization of hourly demand response resources

Next Steps

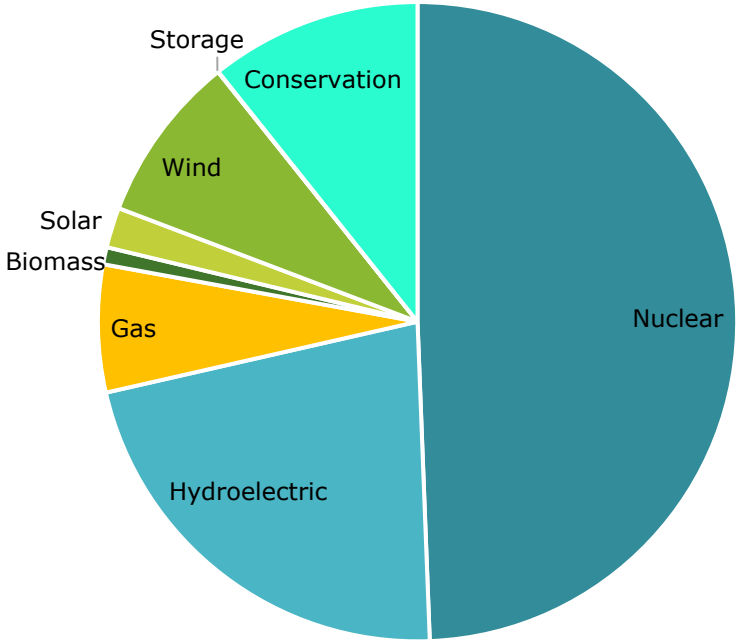
- The cost of electricity service is expected to remain relatively flat in real terms over the forecast period. The Ministry with continue to monitor.
- The Ministry of Energy, in collaboration with IESO and OEB, can explore the potential for additional sector efficiencies.
- The IESO's proposed reforms in its Market Renewal initiative reflect analysis and observations by IESO and stakeholders and aim to promote greater efficiency and transparency. The Ministry with continue to monitor progress.

Appendix

Ontario's Electricity Generation and Conservation

- In 2018, Ontario is expected to meet more than 90 per cent of it's electricity energy needs from emission-free resources (e.g., nuclear and renewables), conservation and storage.

2018 Generation and Conservation



	TWh	%
Nuclear	83	49.4%
Hydroelectric	37	22.0%
Gas	11	6.4%
Biomass	1	0.9%
Solar	3	2.0%
Wind	14	8.5%
Storage	0.04	0.02%
Conservation	18.1	10.7%
Total	169	100%

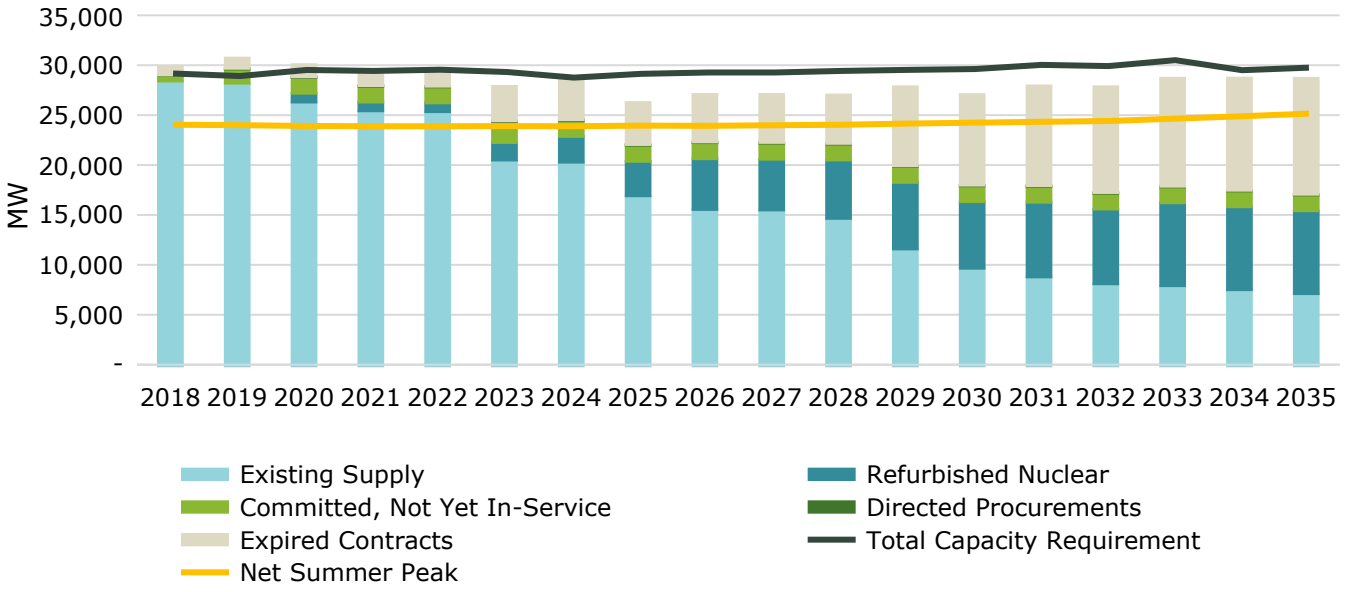
Source: Ministry of Energy

Ontario's Supply and Demand Outlook

- 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 refurbishments at Bruce and Darlington and the retirement of Pickering.

- IESO's Market Renewal initiative aims to develop a new process that would use competitive mechanisms to procure new capacity resources.

Supply and Demand Outlook



Source: Ministry of Energy – 2017 LTEP Module