JULY 22, 2020

Stakeholder Engagement Days

ieso
Connecting Today. Powering Tomorrow.

Agenda: July 22, 2020

Time	Agenda Item
9:00	Opening Remarks
9:10	Opening Address: Chuck Farmer, Senior Director, Power System Planning
9:40	Break
10:00	Forecasting and Planning Update
12:00	Lunch
1:30	Transmission Rights Market Review
3:30	Meeting Adjourned

Agenda: July 23, 2020

Time	Agenda Item
10:00	IESO York Region Non Wires Alternatives Demonstration Project
11:30	Lunch
1:30	Energy Storage Design Project: Long-term design proposals
3:30	Meeting Adjourned

Agenda: July 24, 2020

Time	Agenda Item
9:00	Market Renewal Program (MRP) Update
10:00	Break
10:30	Indigenous Energy Support Programs Review
12:30	Meeting Adjourned

Opening Address

Chuck Farmer
Senior Director, Power System Planning

Questions

Break (9:40 to 10:00)

JULY 22, 2020

Forecasting and Planning Update

ieso
Connecting Today. Powering Tomorrow.

Agenda: July 22, 2020

Time	Agenda Item
9:00	Opening Remarks
9:10	Opening Address: Chuck Farmer, Senior Director, Power System Planning
9:40	Break
10:00	Market, Forecasting and Planning Update • Resource Adequacy and Energy Outlook • Demand and System Operations Insights
12:00	Lunch
1:30	Transmission Rights Market Review
3:30	Meeting Adjourned

Today's Presenters

Chuck Farmer, Senior Director, Power System Planning

Bashir Bhana, Manager, Resource Adequacy

Kausar Ashraf, Senior Manager, Demand and Conservation Planning

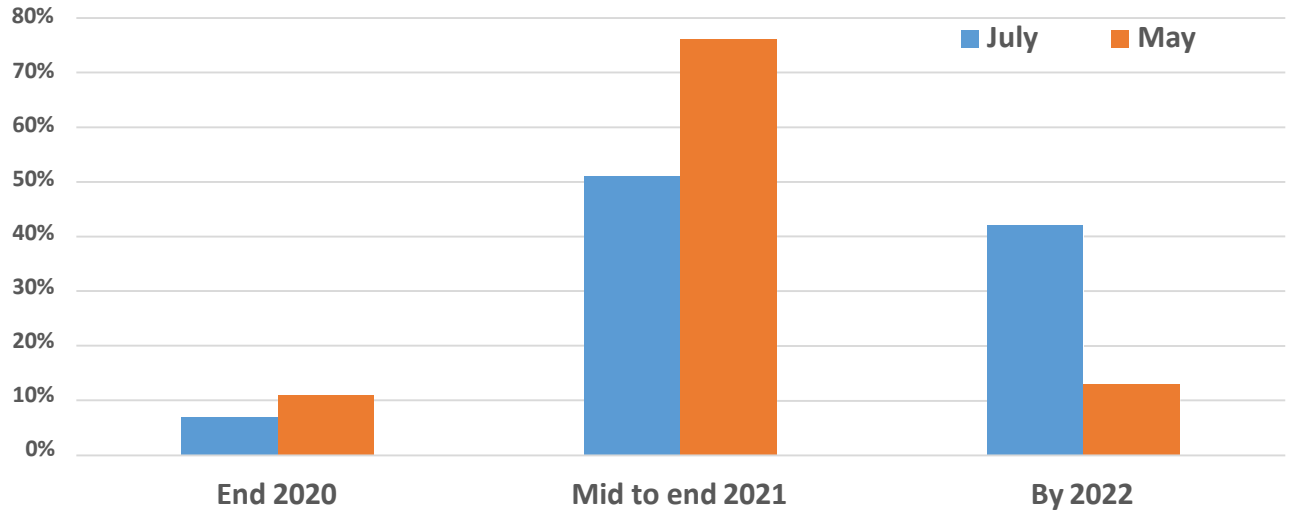
Ioan Agavriloai, Senior Manager, System Operations

Jordan Penic, Senior Manager, Engagement and Indigenous Relations

Polling Trends and Insights

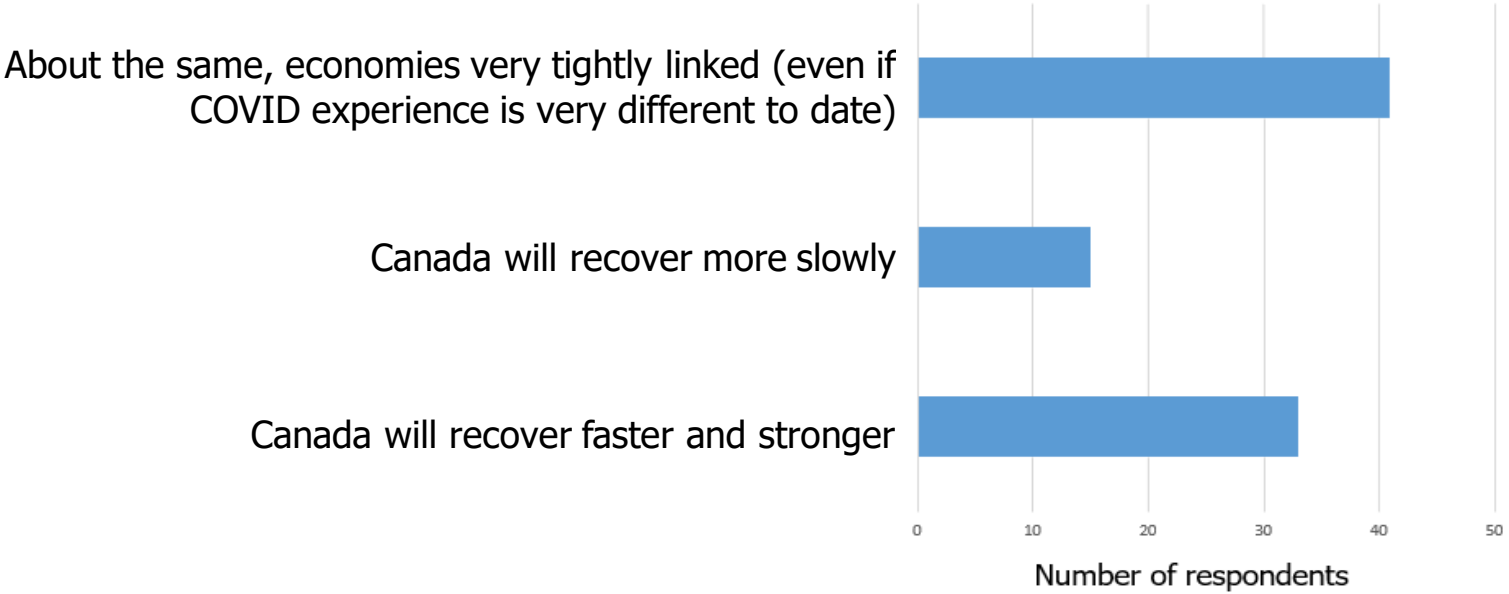
Expected Economic/Demand Recovery July vs. May

What are your expectations for a recovery of general economic conditions and electricity demand?



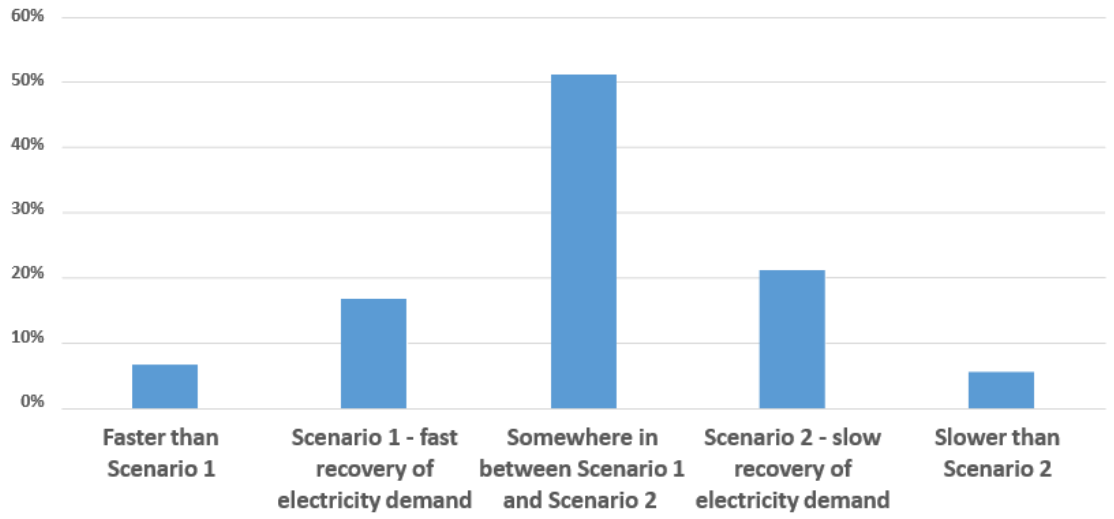
Economy Recovery Expectations: Canada vs. US

Will the Canadian economy lead or lag the US (recover faster or slower than the US?



Updated IESO Forecasts Scenarios

What are your expectations for the recovery of electricity demand, considering the IESO's Scenario 1 and Scenario 2?



Scenario 1 (Faster Recovery)
Scenario 2 (Slower Recovery)

Questions

Resource Adequacy and Energy Outlook

ieso
Connecting Today. Powering Tomorrow.

Introduction

- IESO has updated its analysis from the Annual Planning Outlook (APO)* to consider the impacts of the COVID-19 pandemic
- The updated demand, capacity and energy adequacy assessment considers pandemic impacts under two scenarios for the 2021 to 2026 period:
  - **Scenario 1 (Faster Recovery)**: shallow recession, fast recovery, energy demand lower by about 5% in 2021 recovering to about 4% in 2026**

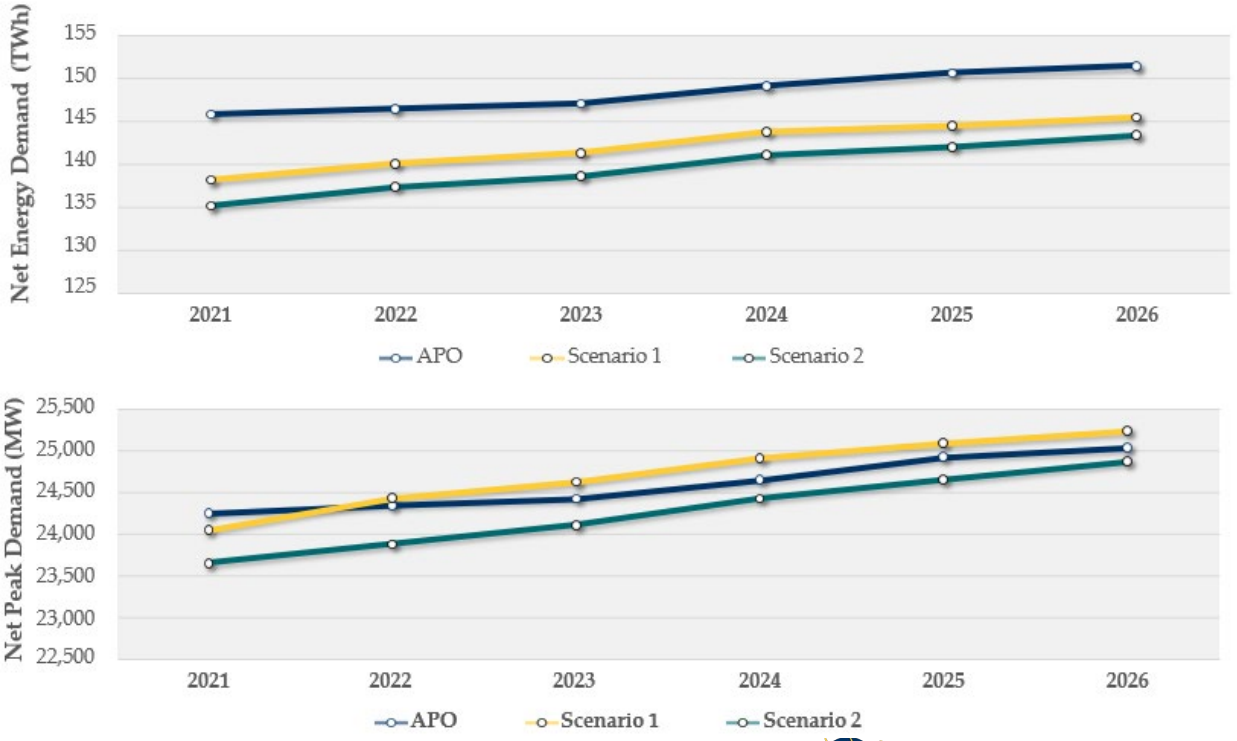
* Released January 2020
** Difference relative to APO demand forecast

Introduction (continued)

- **Scenario 2 (Slower Recovery)**: deep recession, slow recovery, energy demand lower by about 7% in 2021 recovering to about 5% in 2026**
- The updated demand forecast was presented on July 6; the updated capacity and energy adequacy assessment results is today's focus

** Difference relative to APO demand forecast

Updated Demand Forecast Summary



Note: The APO (released January 2020) assumed 1,600 MW peak reduction due to ICI.
The updated demand forecast does not assume peak demand reduction due to ICI.

Summary – Adequacy and Energy Outlook

- Updated outlook is similar to the APO* with a summer capacity need emerging in the early to mid-2020s that can be met by existing and available resources:
  - Decrease in demand is offset by reductions in available supply
  - Continue to see limited need for capacity in the winter until the middle of the decade

* Released January 2020

Summary – Adequacy and Energy Outlook (continued)

- Ontario is expected to remain energy adequate over the course of the planning outlook:
  - Decreases in demand are offset by reduced gas fleet production
  - Shortfalls may emerge if a number of resources exit the market

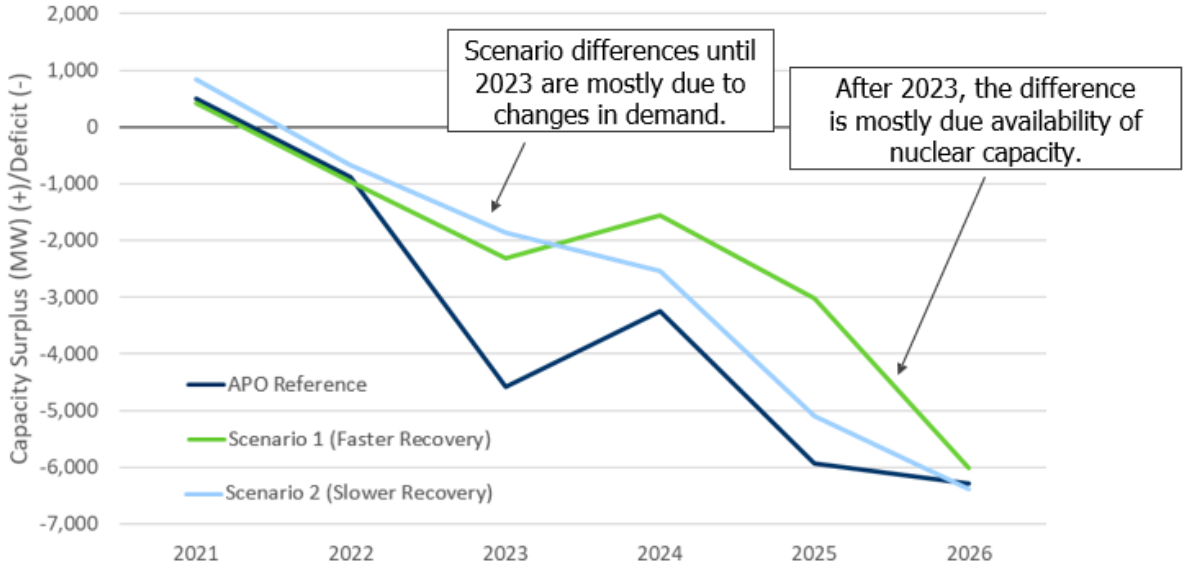
Supply Outlook – Key Uncertainties

- APO* supply outlook was used as starting point
- In this update, a number of uncertainties affecting the supply mix have been considered:
  - Refurbishment outage starts and durations
  - Extent to which Pickering's life is extended
  - Changes in forced outage rates
  - Availability of demand response and off-contract resources
- Many of these uncertainties existed prior to the pandemic

* Released January 2020

Capacity Adequacy – Summer Surplus/Deficit

Without resources post contract/commitment



The APO (released January 2020) reference forecast did not include Pickering extension (i.e. Pickering A retirement in 2022 and Pickering B in 2024) and had no future energy efficiency programs.

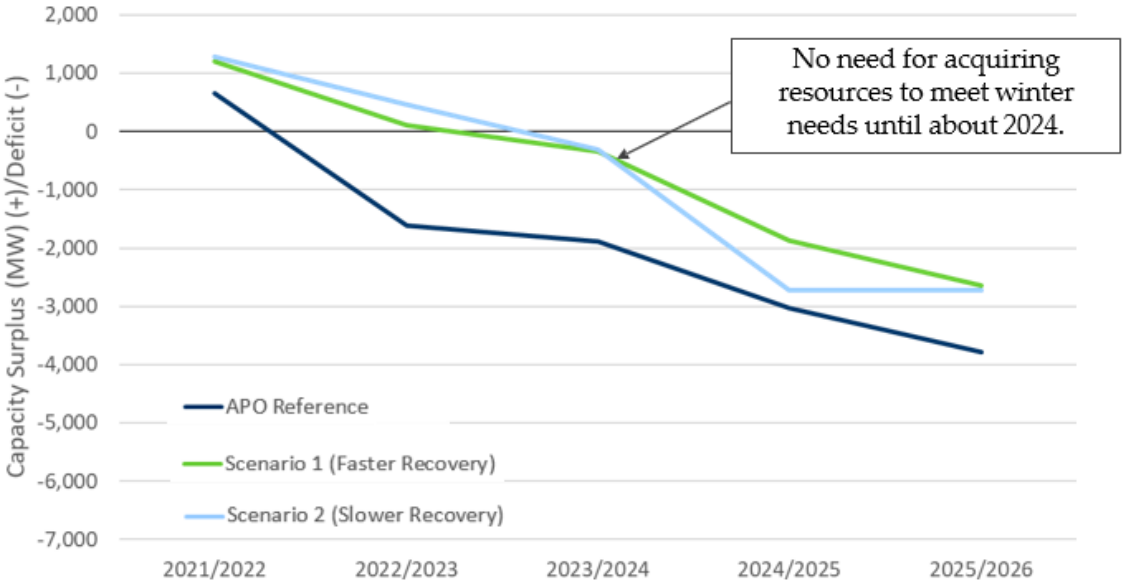
Capacity Adequacy – Summer Surplus/Deficit (continued)

Scenario	2021	2022	2023	2024	2025	2026
APO	509	-886	-4,583	-3,246	-5,931	-6,286
Scenario 1 (Faster Recovery)	429	-955	-2,314	-1,561	-3,027	-6,008
Scenario 1 (Slower Recovery)	836	-669	-1,869	-2,539	-5,091	-6,378

The APO (released January 2020) reference forecast did not include Pickering extension (i.e. Pickering A retirement in 2022 and Pickering B in 2024) and had no future energy efficiency programs.

Capacity Adequacy – Winter Surplus/Deficit

Without resources post contract/commitment



The APO (released January 2020) reference forecast did not include Pickering extension (i.e. Pickering A retirement in 2022 and Pickering B in 2024) and had no future energy efficiency programs.

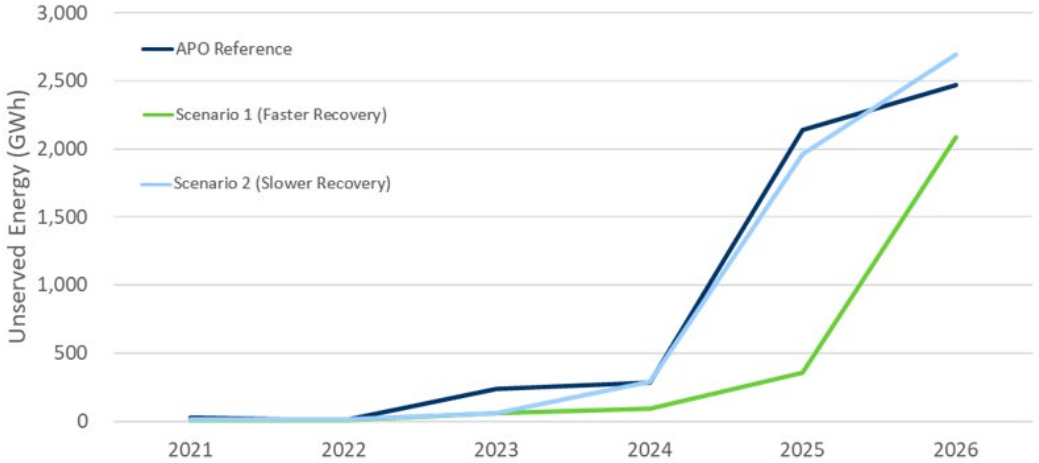
Capacity Adequacy – Winter Surplus/Deficit (continued)

Scenario	2021/2022	2022/2023	2023/2024	2024/2025	2025/2026
APO	659	-1,613	-1,887	-3,023	3,786
Scenario 1 (Faster Recovery)	1,203	112	-343	-1,878	-2,646
Scenario 1 (Slower Recovery)	1,280	460	-313	-2,717	-2,722

The APO (released January 2020) reference forecast did not include Pickering extension (i.e. Pickering A retirement in 2022 and Pickering B in 2024) and had no future energy efficiency programs.

Energy Adequacy – Unserved Energy

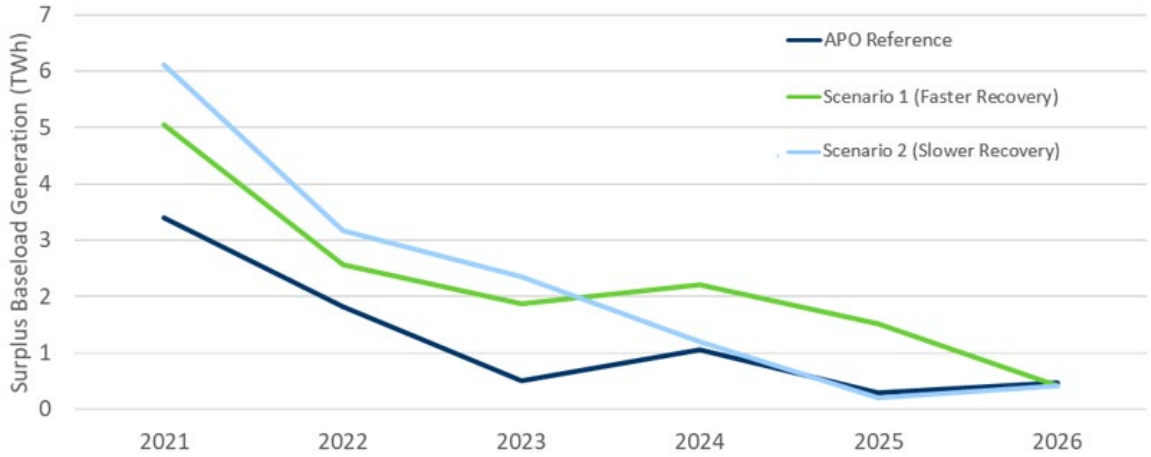
- Unserved energy is an indication of the energy that must be provided by new capacity. By 2025, there is potential for unserved energy if existing resources are unavailable following end of contract/commitment.



Note: APO Reference (released January 2020). The lines above reflect the Unserved Energy without availability of resources post contract/commitment.

Energy Adequacy – Surplus Baseload Generation

- Surplus baseload generation (SBG) is higher than the APO in the near term; but is still expected to decline in the coming years.
- Existing tools expected to be sufficient to manage SBG.



APO Reference (released January 2020). SBG shown before management activities. SBG can be managed through exports and/or generator curtailment.

Energy Production Outlook

- Energy production outlook trends for the update scenarios is generally consistent with the APO*.
- Expect reduced energy production from the gas fleet. However, energy production is still expected to increase in the years ahead.
- Continue to expect Ontario to become a net importer of electricity starting in the early 2020s, driven by market economics (less nuclear, more gas on the margin).

* Released January 2020

Summary – Adequacy and Energy Outlook (continued)

- Marginal cost of electricity production expected to be lower, due to reduced demand and lower fuel price forecast.
- GHG emissions expected to increase though lower demand and reduced gas production leads to less GHG emissions overall.

Questions

Available Resources to Meet Future Needs

- Generation whose contracts/commitments expire in the coming years (or have already expired) can help meet future needs.
- Extent to which these resources are available depends on a number of factors including asset age and condition, need for capital investment, market conditions, and available acquisition tools.

Available Resources to Meet Future Needs (continued)

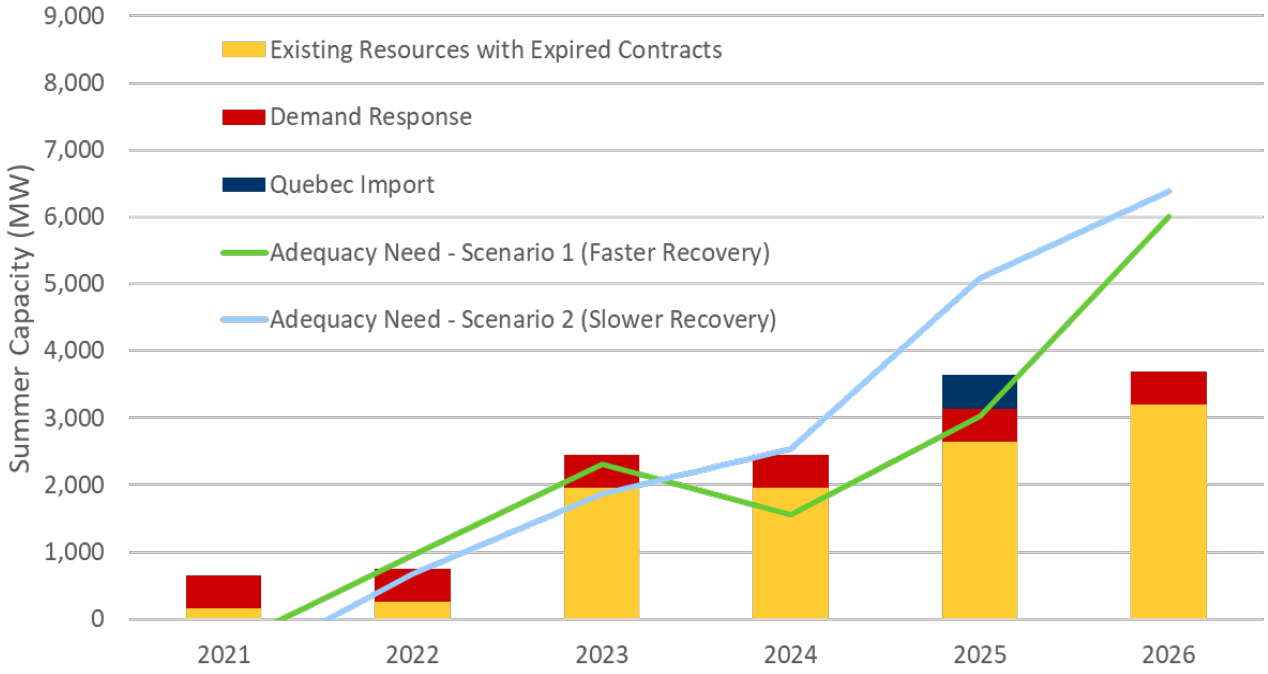
- To determine what resources can be counted on to meet the needs identified in each scenario*, available resources are classified into three groups representing different levels of certainty in their availability:
  - **Low Certainty**: Contract has expired. No longer operational and is retired/mothballed.
  - **Medium Certainty**: Some demand response, existing merchant generators, and resources with an expiring contract which have indicated plans to mothball/retire after contract expiry.

* Scenario 1 (Faster Recovery); Scenario 2 (Slower Recovery)

Available Resources to Meet Future Needs (continued)

- **High Certainty**: Contract is expiring and the resource has indicated that it is planning to continue operating after contract expiry.

Potential Options to Meet Adequacy Needs



Capacity figure represents effective capacity of resources and the capacity needs on an unforced capacity (UCAP) basis.

Capacity Auction

- Based on the updated forecast needs, the 2020 Capacity Auction will be held on December 2, 2020
  - For obligation periods starting on May 1, 2021
- Target capacities for the Summer 2021 and Winter 2021/22 obligation periods will be announced later this summer
  - Further information regarding the auction, including proposed timelines and key dates, is available on the Capacity Auction web page

Capacity Auction (continued)

- All further updates regarding the capacity auction will be published on this web page
- New participants are encouraged to diligently undertake any needed market registration and auction enrollment processes

Conclusion and Next Steps

- Despite the impact the pandemic has had on the demand and supply outlook, the needs identified in this update are consistent with those identified in the APO*
- Have enough existing and available resources to meet capacity needs until the mid-2020s
  - Summer needs begin to emerge in the early to mid-2020s
  - Continue to see no need to acquire resources in the near term for the winter
  - Need is primarily capacity driven – limited need for energy

* Released January 2020

Conclusion and Next Steps (continued)

- IESO is working towards releasing the next APO by end of 2020
  - This will include further information on assumptions and associated data
- The 2020 Capacity Auction will be held on December 2, 2020

Questions

Demand and System Operations Insights

ieso
Connecting Today. Powering Tomorrow.

Recent System Demand Trends

Residential: This sector showed significant 10 to 15 % increase (~1000 to 1500MW) in daily peak values during heat waves (relative to pre-COVID demands during a heat wave). A significant increase in residential air conditioning usage during hot days was noticed.

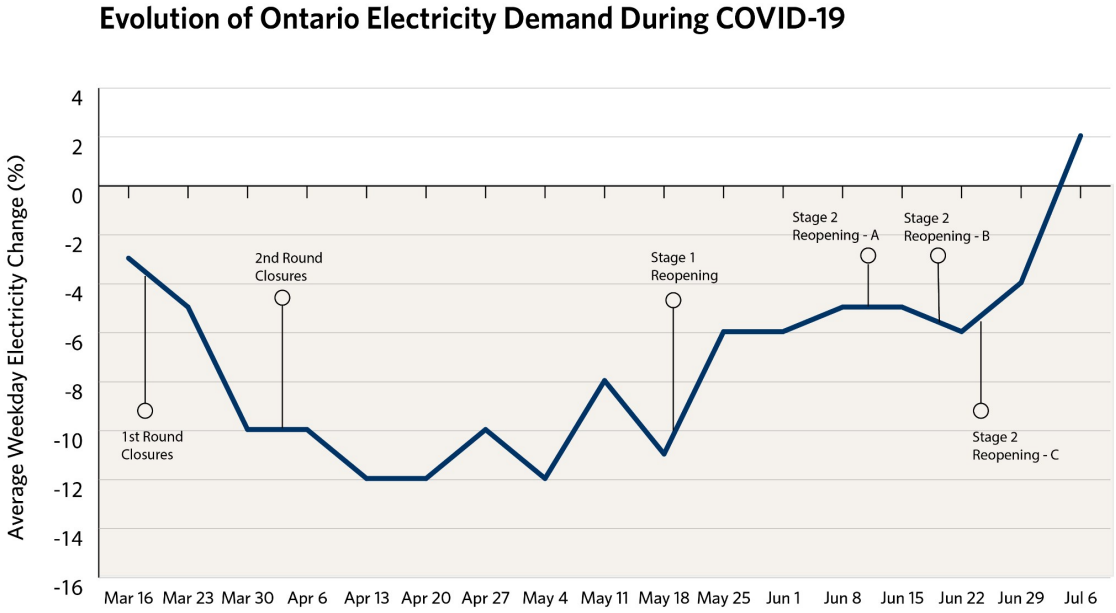
Small Commercial: This sector still shows reductions compared to pre-COVID period. Daily peak and energy reductions in the range of approximately 4% (~75MW at peak and ~1670 MWh on Daily Energy) were still observed in this sector last week.

Recent System Demand Trends (continued)

Distribution connected commercial and industrial: This sector showed significant and promising increases in consumption levels since the stage 2 reopening. However, demand for this segment is still below pre-COVID levels.

Transmission connected wholesale: This sector continued its increasing consumption levels which began a few weeks ago, due to both the economy reopening and suspension of the ICI program on June 26th.

COVID-19 Impacts on Ontario Electricity Demand



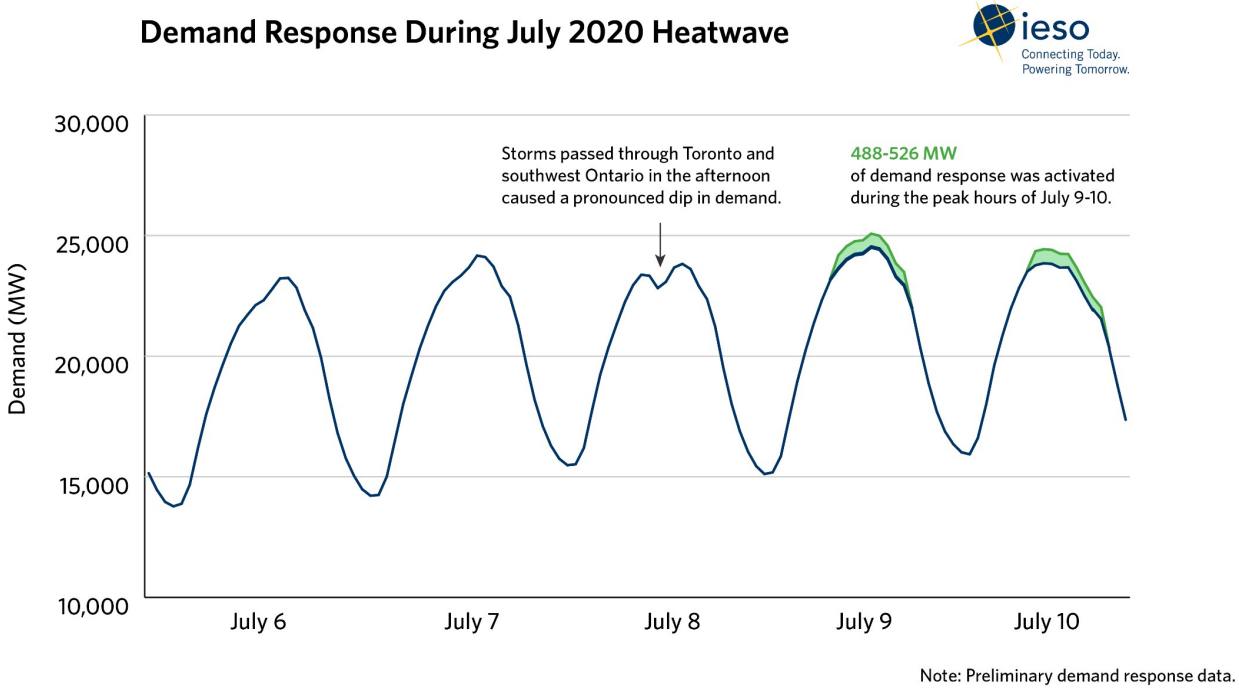
The systems began to see demands increase in July. This is attributed to multiple factors:

i. Persistent heat wave, resulting in weather sensitive loads increasing their cooling loads
ii. Parts of the province being permitted to re-open
iii. ICI program hiatus

Early July Heat Wave

- Ontario experienced its first heat wave of the summer at the beginning of July
- Daily maximum temperatures were well into the 30s with some days exceeding extreme peak temperatures forecasted in the Summer 2020 Reliability Outlook
- A heat warning was issued for Toronto by Environment Canada from July 2 to10

System Demand Week of July 6



Preliminary demand response reflected are unverified participant bid

Questions

Preparedness

- Issued an Extreme Conditions Alert for July 8 to 10 and increased Operating Reserve requirements based on system conditions
- Worked with Market Participants (transmitters) to bring equipment back ahead of schedule and defer outages
- Collaborated with generator fleet to get up-to-date information on availability and any limitations
- Conducted system studies to enhance power flows on the transmission system as much as possible

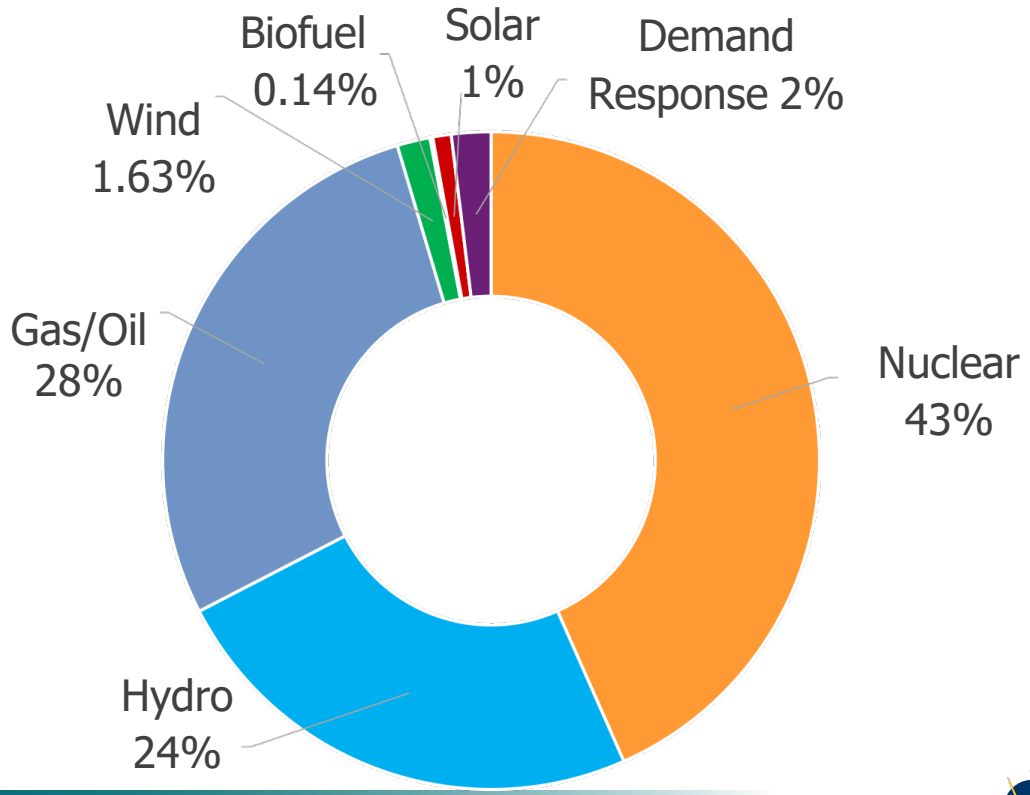
Preparedness (continued)

- Coordinated with neighbouring areas on interties capability and available support

Operations

- While the system was strained, the majority of resources performed well to meet peak demands
- Issued a NERC Energy Emergency Alert level 1 on July 8, 9 and 10
  - Indicating that all available resources are in use or expected to be in use
  - This is standard operating practice, making sure we remain coordinated with neighboring System Operators
- Activated Hourly demand response on July 9 (600MW) and July 10 (500MW)

Resource Output at Peak - July 9



Summary

- Ontario's electricity system is well-positioned for the summer, with adequate supply to meet demand and to manage the expected increased peak demand due to ICI hiatus
- Updated Adequacy and Energy Outlook is similar to the APO*
  - Summer capacity need emerging in the early to mid-2020s that can be met by existing and available resources
  - Continue to see no need to acquire resources in the near term for the winter

* Released January 2020

Summary (continued)

- Ontario is expected to remain energy adequate over the course of the planning outlook
- IESO is working towards releasing the next APO by end of 2020
- Capacity Auction will be held on December 2, 2020; target capacities for the Summer 2021 and Winter 2021/22 obligation periods will be announced later this summer

Staying Connected

@IESO Tweets

engagement@ieso.ca

OntarioIESO

ieso.ca – subscribe to News and Updates

Linkedin.com/company/ieso

1-888-448-7777
customer.relations@ieso.ca

Demand Forecast Scenario Assumptions

Scenario 1 – fast recovery, shallow recession

Time	
2021 Q1	COVID-19 measures phased-out
2021 Q2 to Q4	Acceleration of economic recovery
2022 Q1	Economic recovery realized Electricity demand remains lower than 2020 APO (~4%)
2022 to 2026	Rate of electricity demand growth consistent with 2020 APO

Demand Forecast Scenario Assumptions (continued)

Scenario 2 – slow recovery, deep recession

Time	
2021 Q1	COVID-19 State-of-Emergency persists, including full social-distancing measures in place
2021 Q2 to Q4	COVID-19 measures slowly phased-out
2022 to 2024	Slow economic recovery
2025 Q4	Economic recovery realized Electricity demand remains lower than 2020 APO (~6%)
2026	Rate of electricity demand growth consistent with 2020 APO