Stakeholder Engagement Days

May 20-21, 2020

Webinar

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Agenda: May 20, 2020

Time	Agenda Item
9:00	**Introductory Remarks**
9:10	**Opening Address, Terry Young, VP Policy, Engagement, and Innovation**
9:40	*Break*
10:00	**Electricity System Impacts of COVID-19**
12:00	*Lunch break*
1:00	**Energy Storage Design Project Long Term Design Proposals**
3:00	*Break*
3:15	**Variable Generation Forecasting Tool**
4:15	*Meeting Adjourned*

Opening Address

Terry Young, Vice President of Policy, Engagement & Innovation

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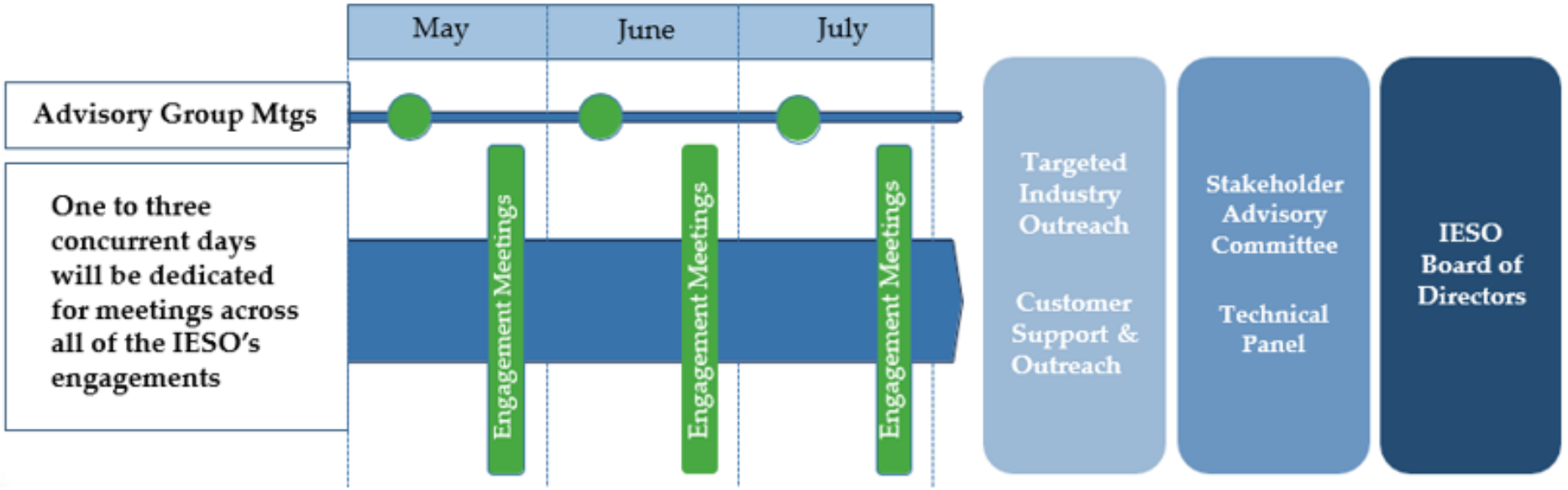
Stakeholder Engagement Framework



Questions

BREAK (9:40-10:00)

Electricity System Impact of COVID-19

May 20, 2020

10:00am to 12:00pm

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Today's Webinar Presenters

Terry Young, Vice President of Policy, Engagement and Innovation

Jordan Penic, Sr. Manager, Engagement and Indigenous Relations

David Robitaille, Sr. Director, Market Operations

Tam Wagner, Sr. Manager, Operational Effectiveness

Chuck Farmer, Sr. Director of Power System Planning

Kausar Ashraf, Manager, Demand & Conservation Planning

Mike Risavy, Manager, Reporting & Economic Analysis

Bashir Bhana, Manager, Resource Adequacy

Overview

- Economic disruption from COVID-19 is widespread but stakeholders are generally optimistic about the outlook ahead.
- Provincial energy demand is down and peaks are lower relative to typical for this time of year:
  - Weekday energy and peak demand down up to 14% and up to 10% on weekends typical demand for this time of year
- The IESO has updated the demand and supply forecast to reflect post COVID-19 conditions and we expect Ontario's electricity system to be adequate under normal weather and extreme weather scenarios over the outlook period.
- COVID-19 has significantly changed system conditions, now and for the foreseeable future, and we are revising forecasts to prepare for the next Annual Planning Outlook.

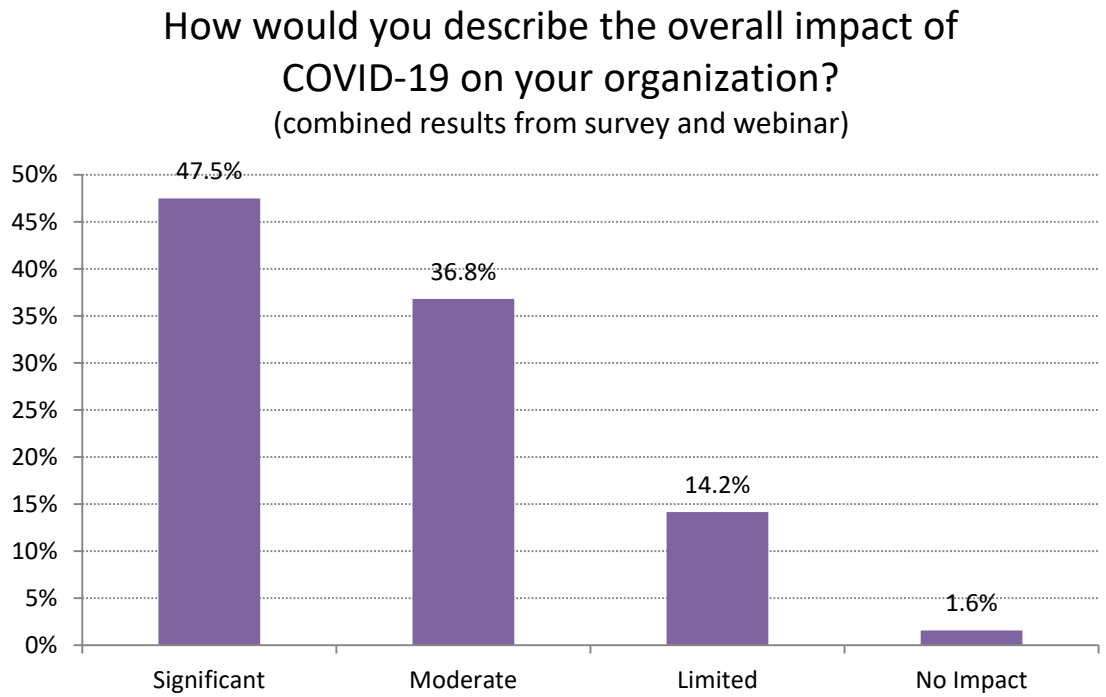
Measuring the impact of COVID-19

Stakeholder feedback on the impact of COVID-19 was collected through three outreach initiatives:

1. Stakeholder Advisory Committee member survey
2. Energy sector survey
   - Delivered through SurveyMonkey from April 16 - 26
3. Polling during the April 23 IESO webinar on the "Electricity Impacts of COVID-19"
   - 426 webinar participants
   - Approximately 200 responses to a number of polling questions during webinar

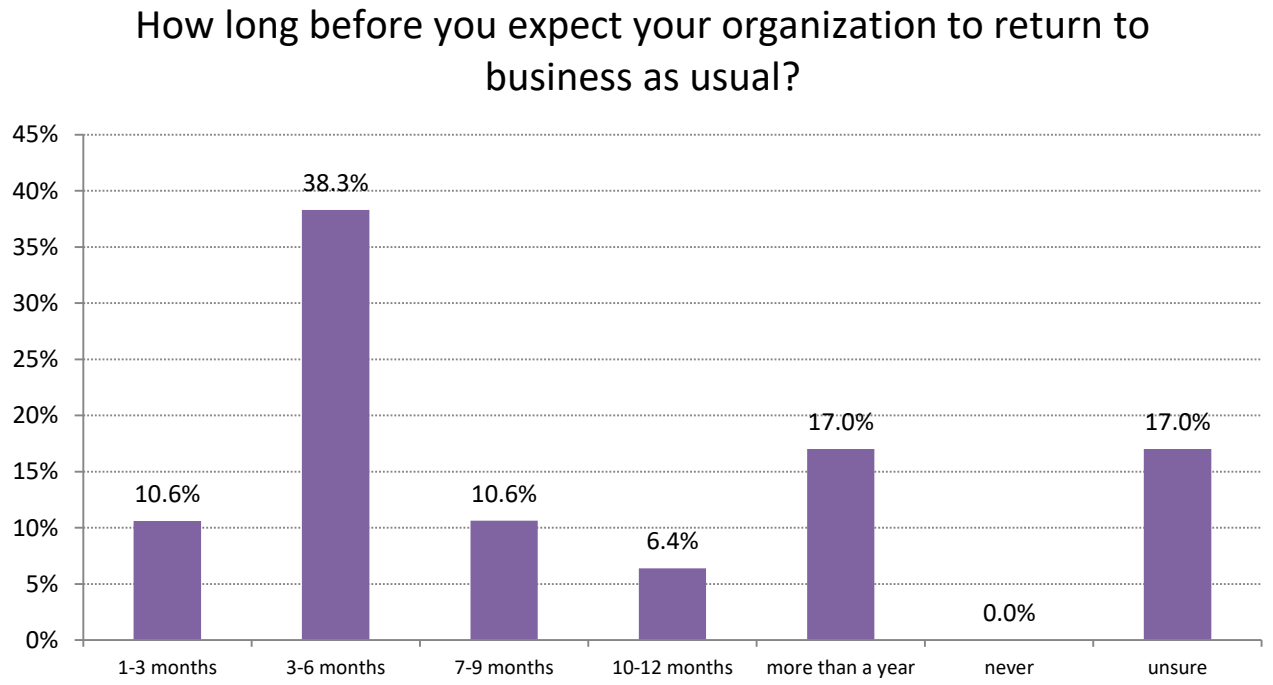
Overall Impact of COVID-19

- Close to half of respondents indicated a "Significant" impact from COVID-19, with another 51% indicating a "moderate" or "limited" impact, and 1.6%% indicating no impact



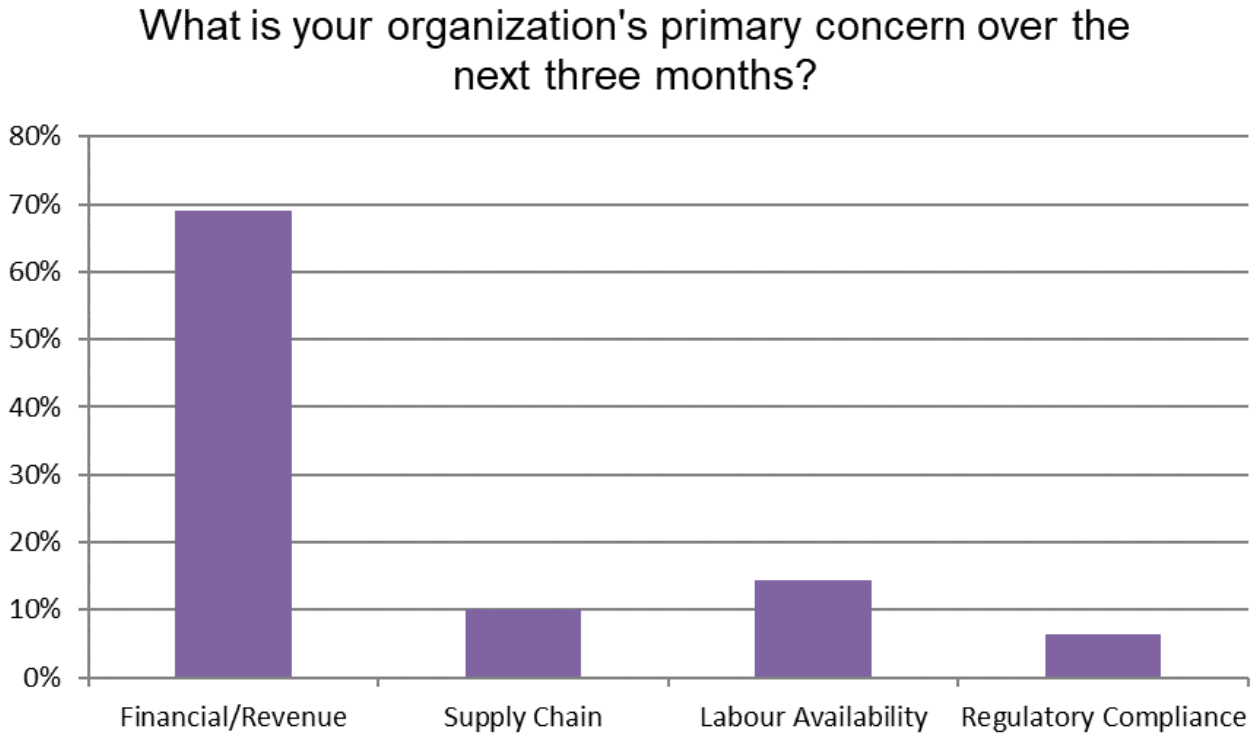
Recovery outlook

- Close to half of the respondents (48.9%) expect to return to business as usual within 1 – 6 months, with 17% indicating it will be more than a year



Returning to Business As Usual

- Over the next three months, close to 70% identified financial/revenue as their primary concern



PANDEMIC OPERATIONS

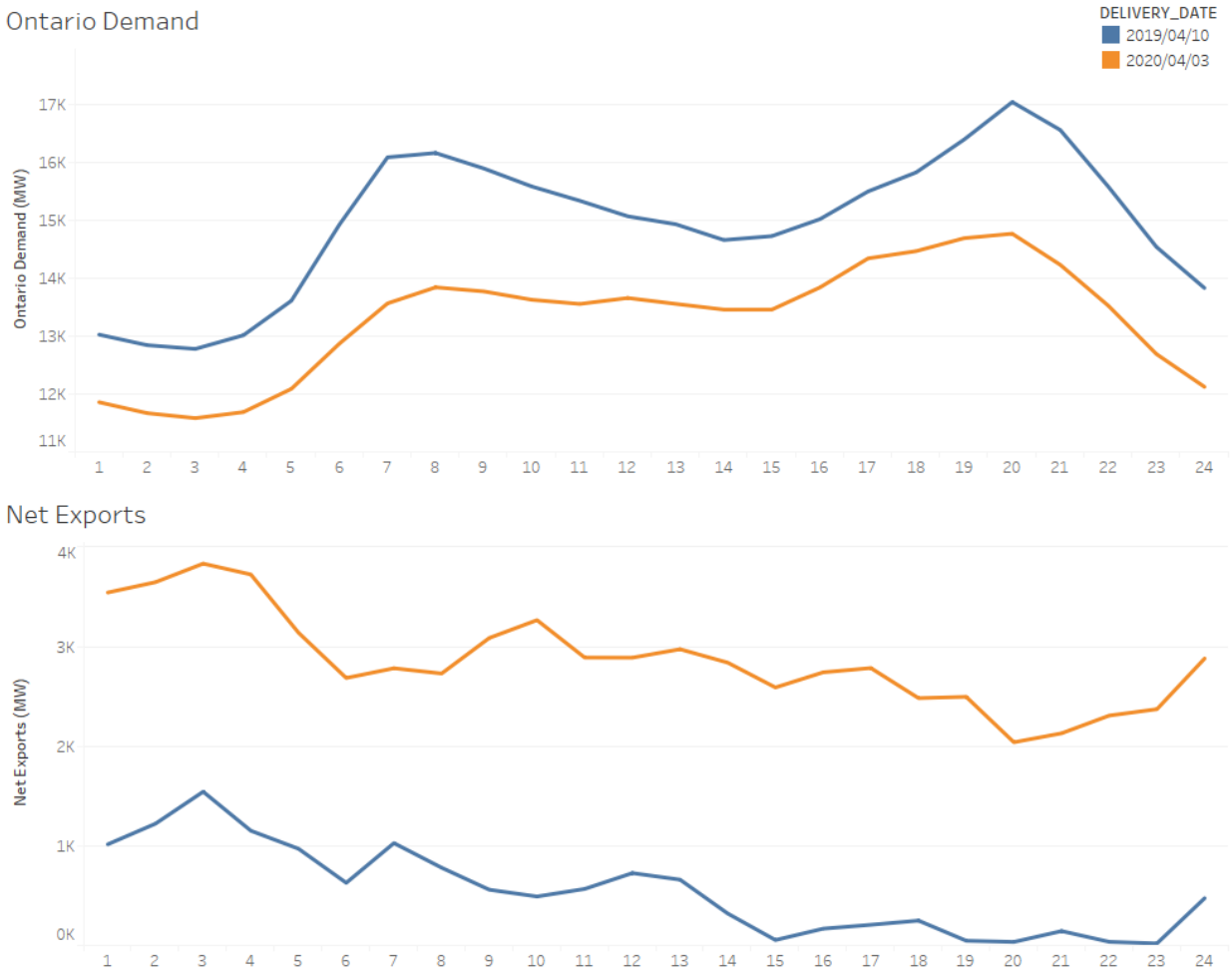
Recall: Early Operational Response to Pandemic

- The IESO's internal pandemic plans were executed to safeguard essential staff; control room operator teams remain physically separated
- Uncertainty in demand patterns and the need to respond to unanticipated events caused by potential workforce limitations, led to close coordination with market participants to develop revised operational plans to maintain system resilience
- As system conditions normalize, the IESO will work with market participants to transition back to regular outage planning and operational practices

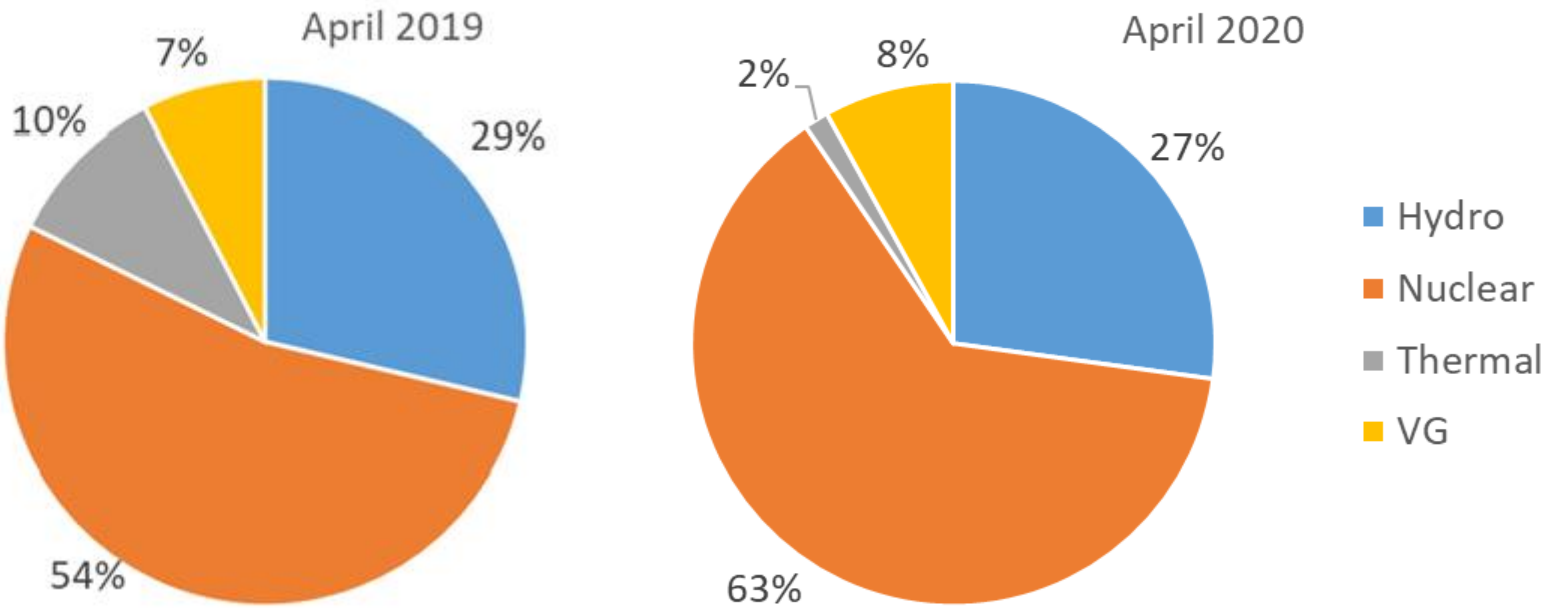
Evolving Operational Response to Pandemic

- The transition to regular outage planning and operational practices has begun in a controlled manner as we look to return to normal from a power system perspective:
  - Working with transmitters, the IESO is allowing transmission outages to proceed that were previously on hold
  - Generation outages continue to proceed
- Because of the outage management principles that were deployed, we do not anticipate a material increase in forced outages due to ongoing outage deferrals specifically because:
  - part of the principles that we put in place from the beginning was to take outages that would prevent forced outages in the near future
  - relatively small amount of deferral time for preventative maintenance outages
- Operational plans continue to evolve as we continue to manage Ontario demand uncertainty now and into the summer

Year-over-Year Comparison: Hourly Demand and Net Exports



Year-over-Year Comparison: Daily Generation Mix (Output by fuel type)



The higher proportion of nuclear power is due to the combined effects of lower demand and increased nuclear capability between April 2019 and April 2020

Managing Surplus Baseload Generation Conditions

- The IESO continues to update its assessment of surplus baseload generation (SBG) conditions and SBG management options through spring/early summer
- As generators return to service in order to support summer operations, SBG conditions may be exacerbated
- Market-based mechanisms continue to be used to manage SBG conditions:
  - Exporting economically to neighbouring jurisdictions
  - Curtailing variable generation
  - Maneuvering nuclear units
- If demand remains low as a result of COVID-19 measures, there is a potential for nuclear unit shutdowns to manage SBG

Pandemic Response and Recovery

- Measures to safeguard employee safety and maintain reliability remain in effect at the IESO
- As the IESO develops a return-to-office strategy, the health and safety of all employees and their families as well as continuing to operate the power system reliably will remain our top priorities
- With organizations across the sector working to develop and implement return-to-office strategies, information sharing continues to be critical to ensure actions are coordinated
- The Crisis Management Support Team (CMST) continues to meet regularly to share recovery plans and navigate through potential challenges associated with physical distancing and personal protective equipment (PPE) needs
  - Expertise across the group has proven to be invaluable throughout this pandemic

CMST: A forum for key Ontario electricity industry representatives to provide early warnings of events that may affect the reliability of the electricity

Questions

COVID-19 DEMAND IMPACTS

COVID-19 Impacts on Demand

The stay in place policies in conjunction with the closure of non-essential business have had the following **system wide** impacts on grid demand:

	Avg. Daily Energy Reductions		Avg. Daily Peak Reductions	
	Weekday	Weekend	Weekday	Weekend
Overall System Impacts	7-14%	6-10%	8-14%	5-10%
1st Round of Closures	3 -11%	2-8%	3-13%	4-7%
2nd Round of Closures	7-14%	6-10%	8-14%	5-10%

Overall, we expect energy, minimum and peak demands to be lower

Residential Demand Impacts

	Avg. Daily Energy Increases		Avg. Daily Peak Increases	
	Weekday	Weekend	Weekday	Weekend
1st Round of Closures	1-8%	1-8%	1-7%	1-6%
2nd Round of Closures	1-14%	1-7%	1-9%	1-9%

- Increased consumption during mid-day
- Delayed morning peak and using on average 13% more electricity during morning peak vs. pre-COVID-19 levels
- Daily minimums have increased 5% on average
- Impacts vary depending on weather trends
- Looking forward: returning to pre-COVID residential demand will be gradual

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Small Commercial (<50kW) Demand Impacts

	Avg. Daily Energy Reductions		Avg. Daily Peak Reductions	
	Weekday	Weekend	Weekday	Weekend
1st Round of Closures	6-15%	5-12%	7-21%	9-18%
2nd Round of Closures	11-19%	5-14%	18-24%	10-20%

- Reduced consumption in all hours
- Contribution to morning peak has been reduced by 15%
- Greatest reductions occurred during the week following Easter
- Looking forward: the longer lockdown measures are in place, there is a likelihood that a portion of this load may not recover
- This segment is a weather sensitive load, therefore impacts will range depending on weather forecasts

Distribution Connected Industrial/Commercial Customers

	Avg. Daily Energy Reductions		Avg. Daily Peak Reductions	
	Weekday	Weekend	Weekday	Weekend
1st Round of Closures	9-19%	10-14%	9-22%	12-16%
2nd Round of Closures	18-22%	13-18%	17-23%	10-16%

- Contribution to morning peak has been reduced by 15%
- Greatest reductions occurred during the week following Easter
- Looking forward: Similar to small commercial, the duration of the lock down measures will have enduring impacts on their ability to return to pre-COVID-19 levels
- Majority of commercial load is weather sensitive, therefore impacts will range depending on weather forecasts

Transmission Connected Wholesale Customer Demand

	Avg. Daily Energy Reductions		Avg. Daily Peak Reductions	
	Weekday	Weekend	Weekday	Weekend
1st Round of Closures	1-12%	1-6%	1-14%	1-9%
2nd Round of Closures	10-25%	8-25%	11-22%	10-23%

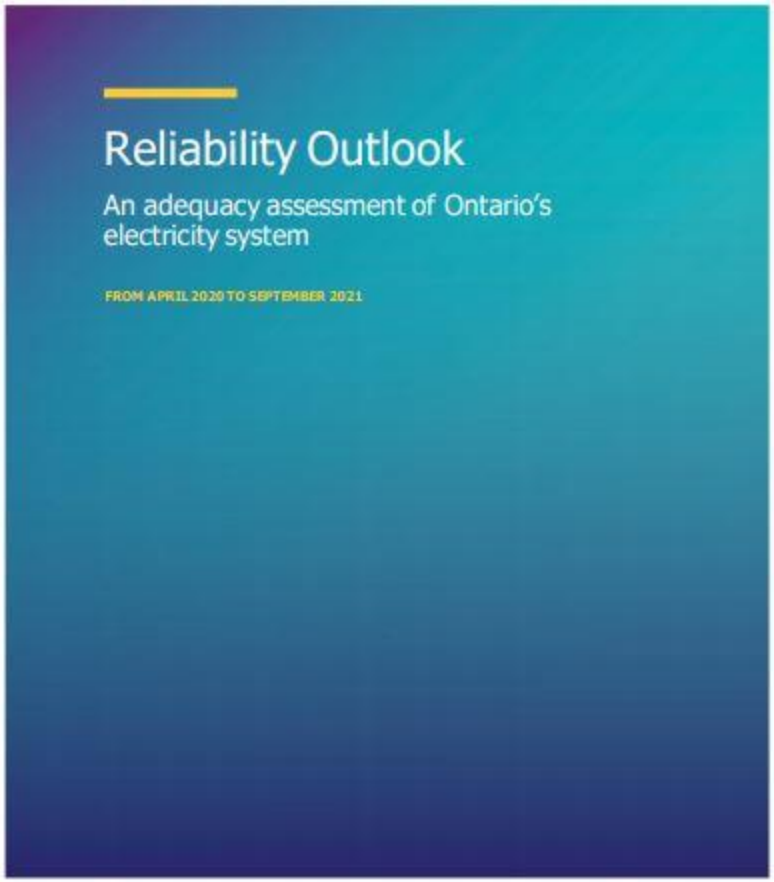
- The automotive sector has been hit the hardest
- Minimal impacts to the majority of the industrial load
- Looking forward: supply chain demand and transportation networks will have a high impact on the ability of these loads to return to pre-COVID-19 levels
- This load is typically not very weather sensitive

Questions

Q1 INTERIM RELIABILITY OUTLOOK

Q1 Interim Reliability Outlook

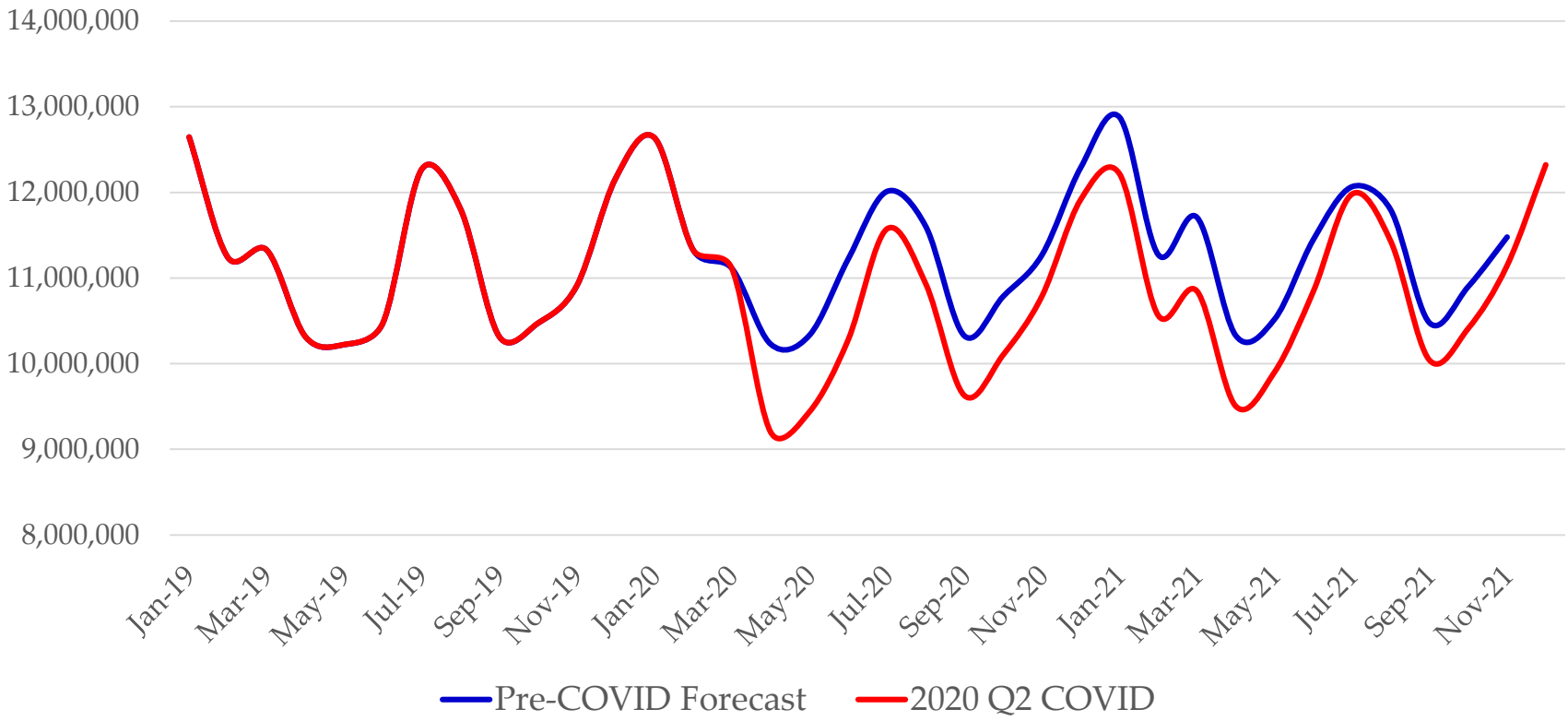
- Historically, an 'interim' update reflects the latest actual and weather corrected demand
- The Q1 Interim update will contain an updated demand forecast for the outlook period
- For this iteration we are updating the information beginning May 2020



Summary

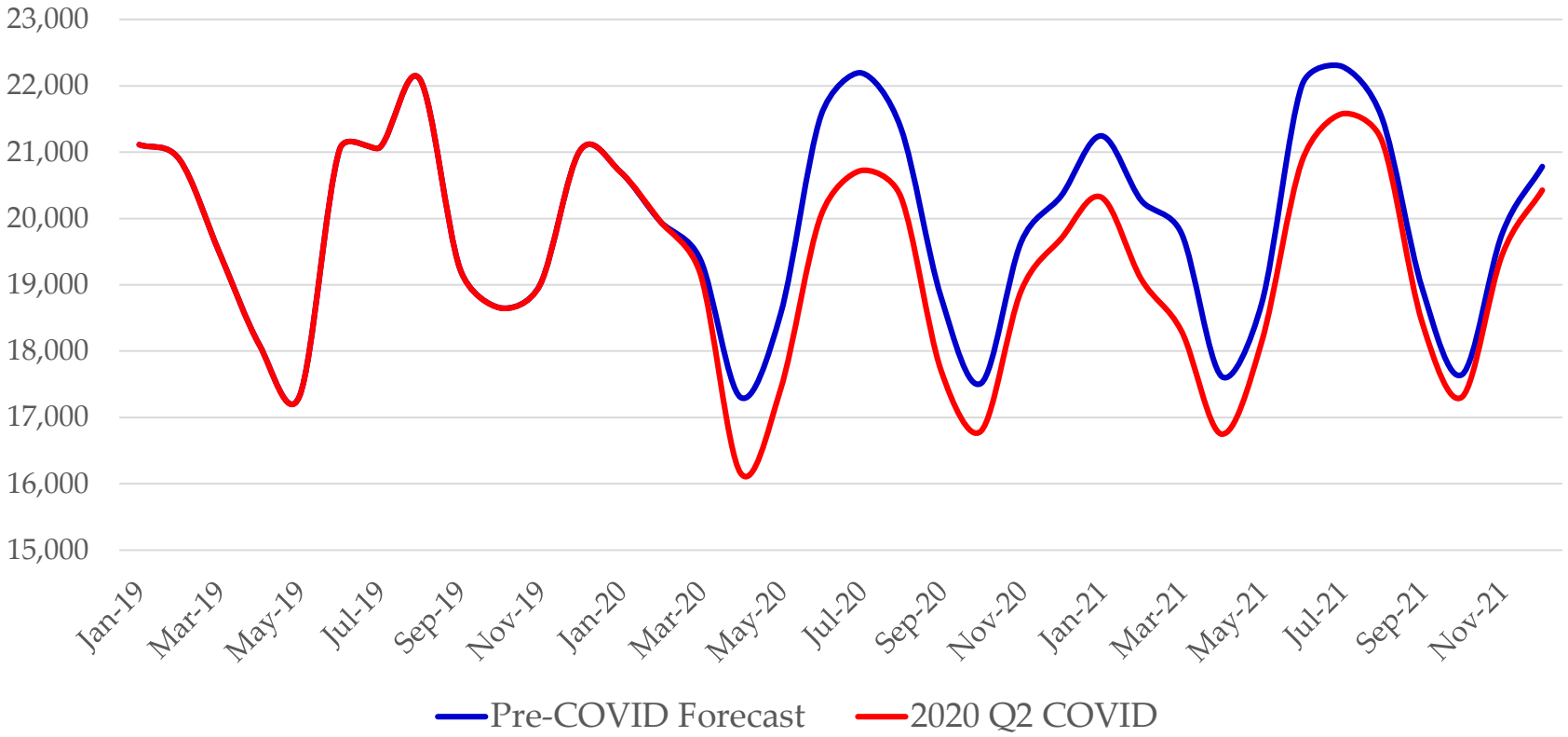
- The IESO has updated the demand and supply forecast to reflect post COVID-19 conditions
- The pandemic has had an impact on demand across all customer segments, these impacts have been reflected in the RO forecast
  - **Energy Consumption**: Decrease by 4.6% in 2020 and 4.1% in 2021
  - **Peak Demand**: Decrease by 6.6% in 2020 and 3.2% in 2021
- IESO expects decreasing demand will put upward pressure on Global Adjustment costs
- While assumptions have been made for economic recovery, the forecast does not account for changes in future government policy, which may have an impact on economic recovery
- Expect Ontario's electricity system to be adequate under both the normal weather and extreme weather scenarios over the outlook period

Monthly Energy



Energy	Q1 Forecast (TWh)	Interim Q1 (TWh)	Forecast Change (% ,TWh)
2020	135.1	128.9	-4.6%, (-6.2 TWh)
2021	136.8	131.2	-4.1%, -(5.6 TWh)

Monthly Peaks



Peak	Q1 Forecast (MWh)	Interim Q1 (MWh)	Forecast Change (%, MW)
2020	22,195	20,722	-6.6%, (-1,473 MW)
2021	22,293	21,577	-3.2%, (-716 MW)

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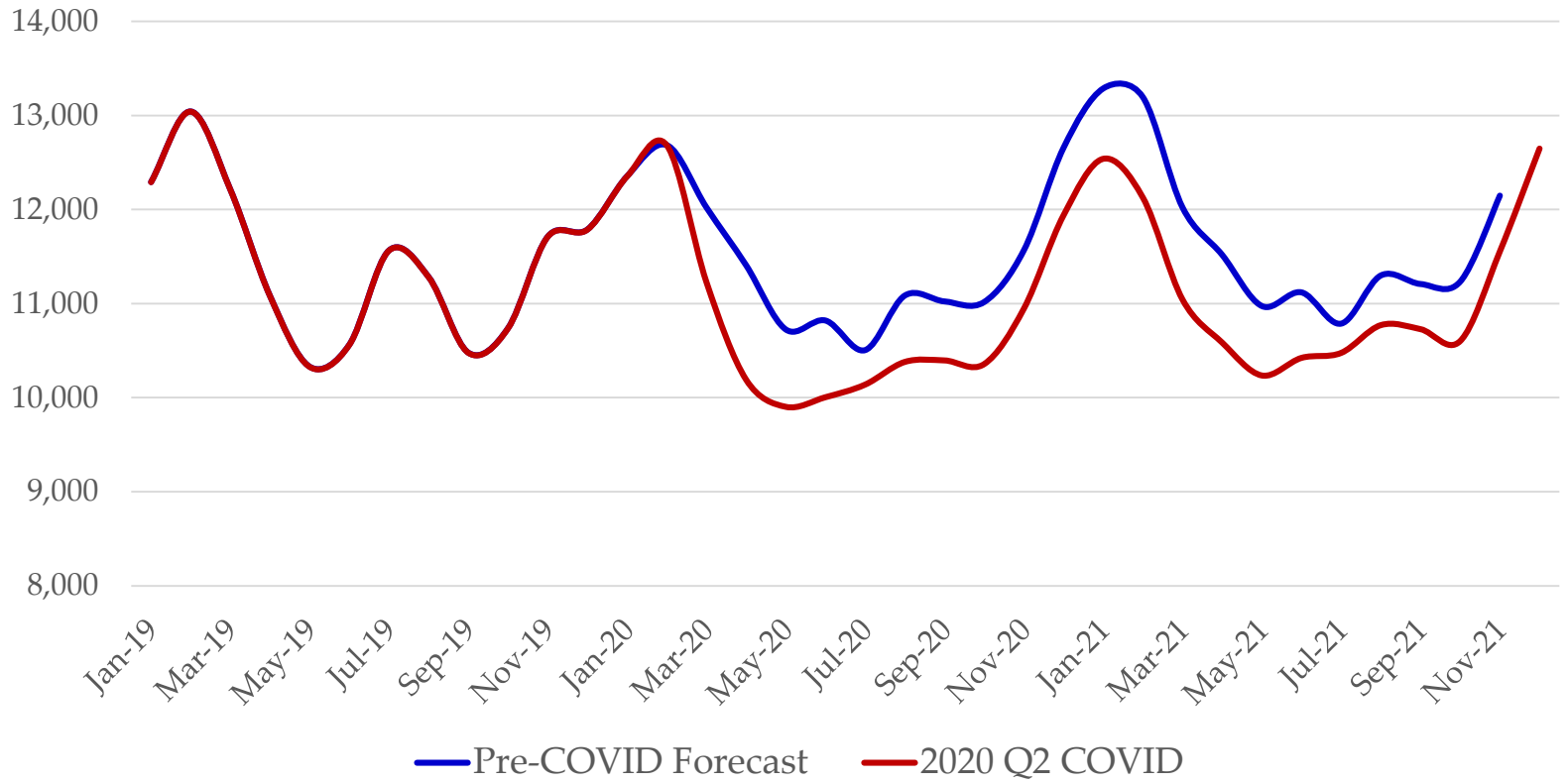
Monthly Minimums



Minimums	Q1 Forecast (MWh)	Interim Q1 (MWh)	Forecast Change (%, MW)
2020	10,505	9,904	-5.7%, (-601 MW)
2021	10,786	10,237	-5.1%, (-549 MW)

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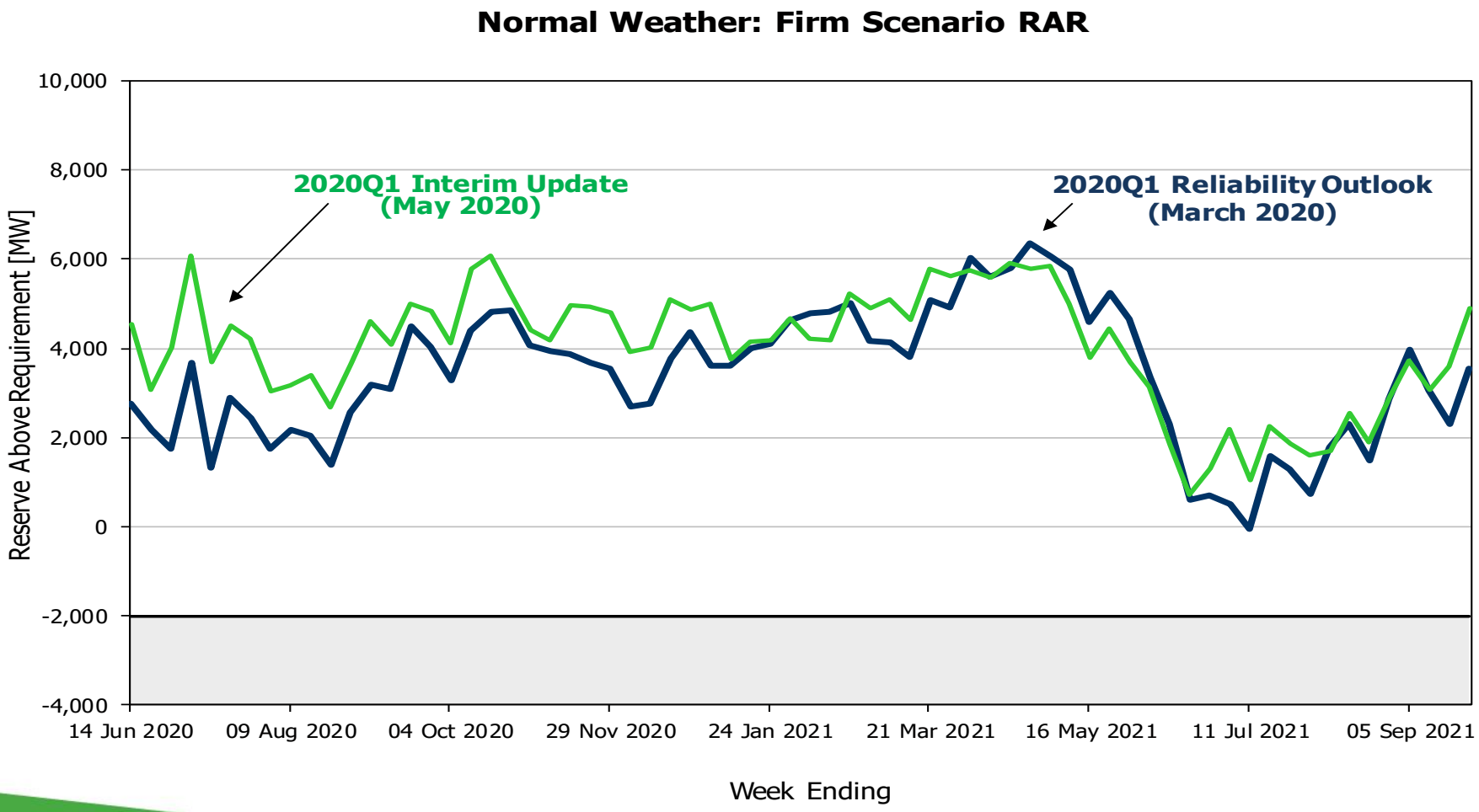
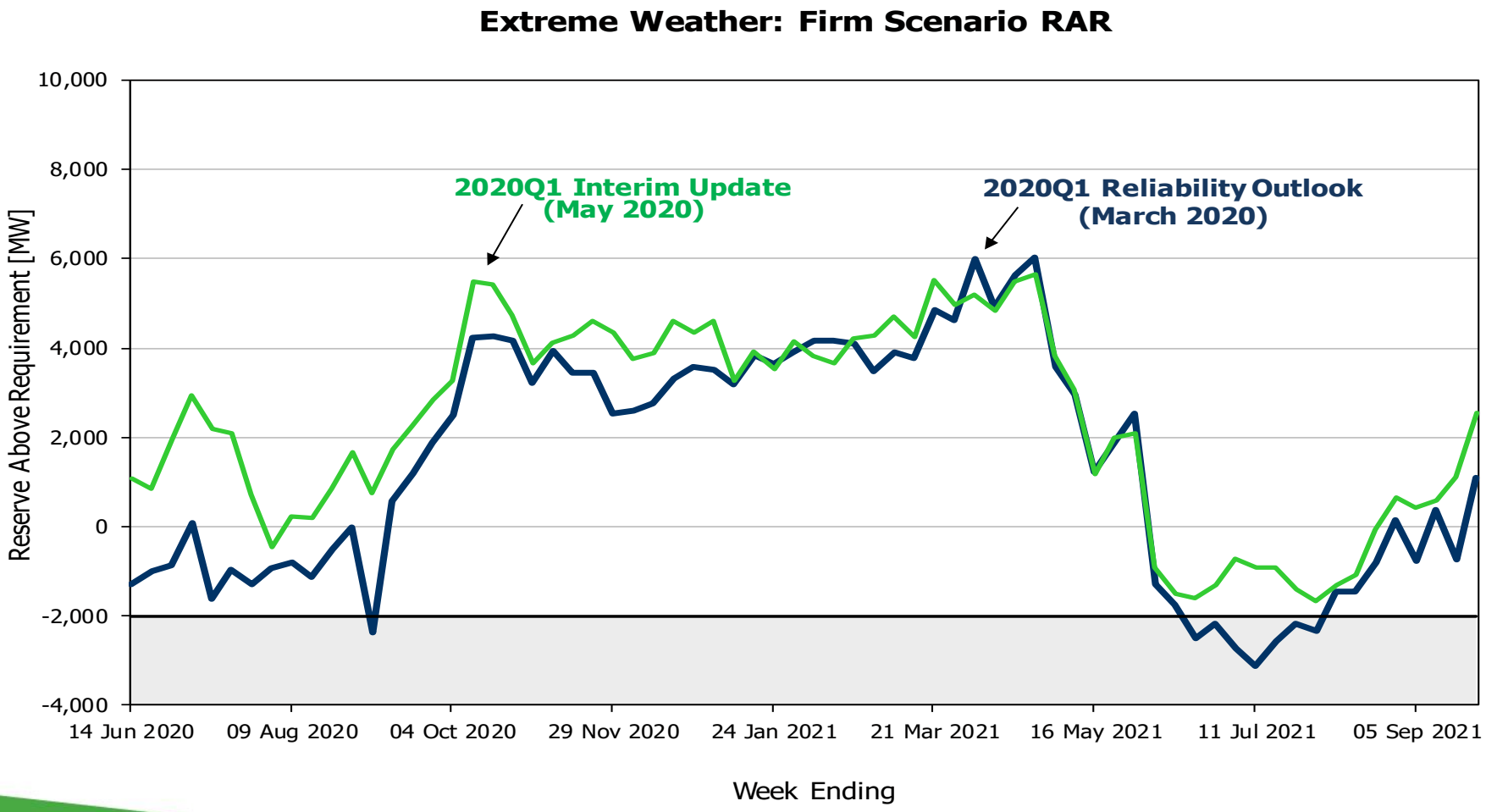
Reserve Above Requirement – Normal Weather



Reserve Above Requirement – Extreme Weather

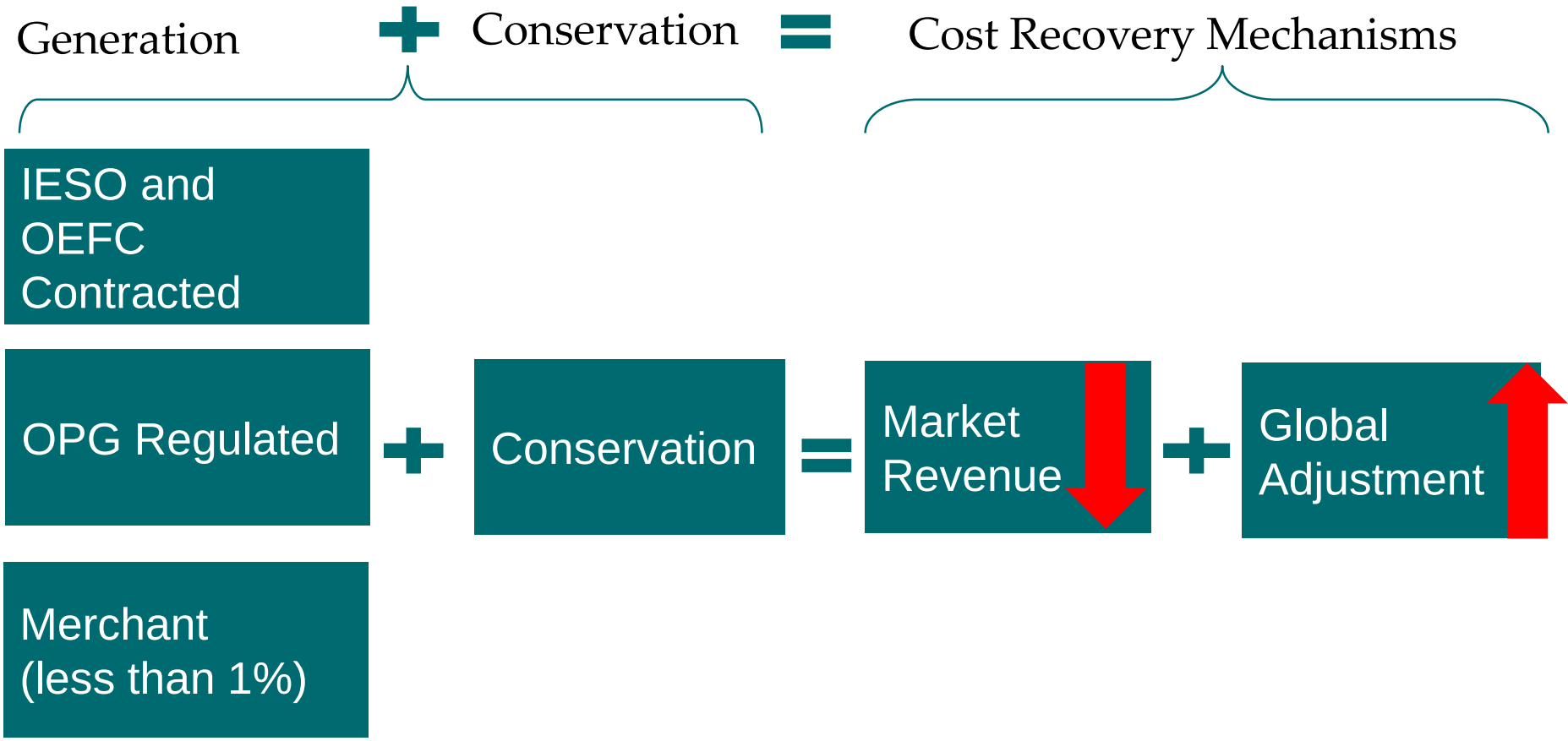


Questions

Implications of COVID on Electricity Costs

- Most system costs are fixed; total system costs are unlikely to change materially in the near-term
- The global adjustment (GA) is the component of the cost of electricity that covers the cost of building new electricity infrastructure in the province and to maintain existing resources
- All generators continue to be paid in full for electricity supplied each month as per contracts and regulated rates.
- COVID-19 measures has resulted in lower demand levels, and thus a decline in the market clearing price.
- Lower market revenue drives up cost recovery from the GA, as almost every generator is under contracted or regulated rates (less than 1% of generation supply is merchant generators)

Generator and Conservation Cost Recovery from Market Revenue and Global Adjustment



INTERIM ANNUAL PLANNING OUTLOOK

Annual Planning Outlook

- First Annual Planning Outlook (APO) released January, 2020
- Onset of COVID-19 has significantly changed system conditions, now and for the foreseeable future
- IESO is revising forecasts and these will be available in upcoming monthly webinars

Approach

- Given level of uncertainty, the updates will not include a single Reference forecast, but will be based on scenarios
- Two scenarios will be prepared representing the range of likely COVID-19 policy responses and resulting economic conditions
- Ontario demand, supply, and transmission system assumptions follow from policy and economic conditions
- Scenario summary:
  1. Tortoise – deep recession, slow recovery
  2. Rabbit – Shallow recession, fast recovery

Scenario Highlights – Rabbit

- Demand continues to be low for 4 - 6 months in response to COVID-19 measures and recovers through 2021 as the economy recovers supported by high levels of stimulus
- Nuclear refurbishments delayed; as measures are lifted, maintenance proceeds and access to capital and supply chains enables construction to continue with slight delays

Scenario Highlights – Tortoise

- Demand continues to be low for an extended period
- High levels of bankruptcies emerge causing liquidity issues and significant unused capacity in the economy, a global recession takes hold on the scale of the 2007/8 Financial Crisis
- Economy restructures over time as global conditions and new domestic conditions take hold
- Further nuclear refurbishment delays and high forced outage rates persist

Looking Ahead

- Q1 Reliability Outlook Interim Update
  - Data tables posted May 20
- End of June – Q2 Reliability Outlook (July 2020 to December 2021)
- Interim APO engagement:
  - **Demand forecast** to be presented during June engagement webinar
  - **Capacity and energy adequacy** assessment results to be presented during July engagement webinar

Summary

- Expect Ontario's electricity system to be adequate under both the normal weather and extreme weather scenarios over the Q2 Reliability Outlook period (July 2020 to December 2021)
- Reliability Outlook can be found on the IESO website: http://www.ieso.ca/en/Sector-Participants/Planning-and-Forecasting/Reliability-Outlook
- Upcoming monthly COVID-19 webinars will include updated revised long term demand forecasts, capacity and energy adequacy assessment results

Question?

What information from the IESO would you like to see in future updates on the electricity system impacts of COVID-19?

Please submit your response using the 'Ask a Question' feature.

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1-888-448-7777
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LUNCH BREAK (12:00-1:00)