



# Market Operations Awareness Session

**June 18, 2021**

## Webinar Participation (including audio)

- To interact, click the “Show Conversation” icon (message bubble symbol) to submit a written question or click on the “Raise hand” icon (hand symbol) at the top of the application window to indicate to the host you would like to speak
- Audio should be muted at all times. To unmute audio, click on the microphone icon at the top of the application window

# Webinar Participation (Connection Issues)

- If you experience issues logging in:
  - Disconnect from remote server connections (VPN) and try logging in again
  - Download the mobile app and join through mobile
- Need help? Contact [Microsoft Office Support](#)

# Agenda

	Agenda Item	Start Time
1	<b>Opening remarks</b> Dave Robitaille, Senior Director, Market Operations	10:00 a.m.
2	<b>Winter Operations Review</b> Jonathan Scratch, Manager, Operational Assessments	10:05 a.m.
3	<b>2021 Texas Winter Event and Ontario Extreme Weather Preparedness</b> Elvin D'Souza, Senior Engineer, Power System Limits	10:20 a.m.
4	<b>2021 Summer Operations</b> Mauro Facca, Manager, Operations Planning	10:40 a.m.
5	<b>Pandemic Operations Review</b> Tim Spratt, Manager, Operations	10.55 a.m.
6	<b>Q&amp;A</b>	11:15 a.m.



**JUNE 18, 2021**

# MARKET OPERATIONS AWARENESS SESSION: WINTER OPERATIONS RECAP

Jonathan Scratch – Manager, Operational Assessments

# Topics

- Overall Review
- Peak Demand and Daily Consumption
- Demand and Temperature Relationship
- Supply Mix
- Intertie Trade

# Winter 2020/21 - Review

- Winter operations were relatively uneventful, a result of preparations and strong performance from both suppliers and transmitters
- IESO preparations for the winter included:
  - Testing of generators for readiness
  - Coordinating outage and operational plans with transmitters, gas pipeline operators and neighbouring areas
  - Frequent conversations with neighbouring jurisdictions on operating conditions, through day-to-day interactions and external working groups

# Winter 2020/21 - Peak Demand & Daily Consumption

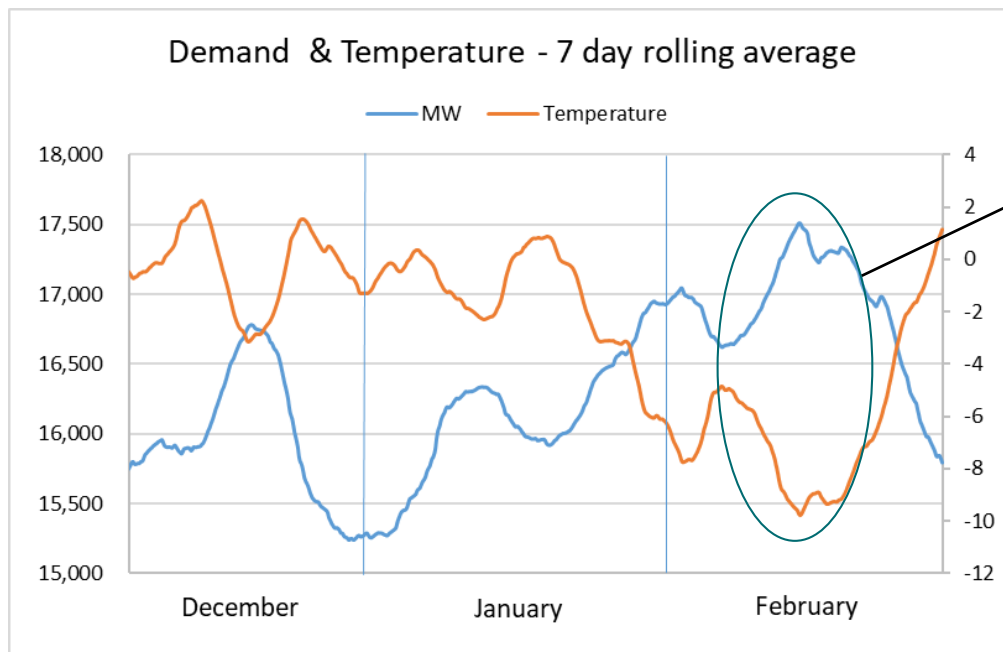
- Energy demand in many sectors, including manufacturing, has returned to pre-COVID levels
- Energy use per day was roughly the same this year as the same period in 2019/2020

Month	Peak Demand (MW)	Peak-Day Temperature (°C)	Energy/Day (GWh)
December	20,738	-7	380
January	20,150	-1	390
February	20,318	-9	400



# Relationship Between Temperature and Demand

- February had the highest periods of sustained demand, driven by consistently cold temperatures in mid-February



Demand increased as temperatures decreased

## Winter 2020/21 – Supply Mix

- Nuclear generation continued to provide the majority of the province's supply this winter, albeit contributing less output than the same period last year
- Wind output was also lower than a year prior
- Additional output from hydro and gas-fired resources made up for the reduction in nuclear and wind generation

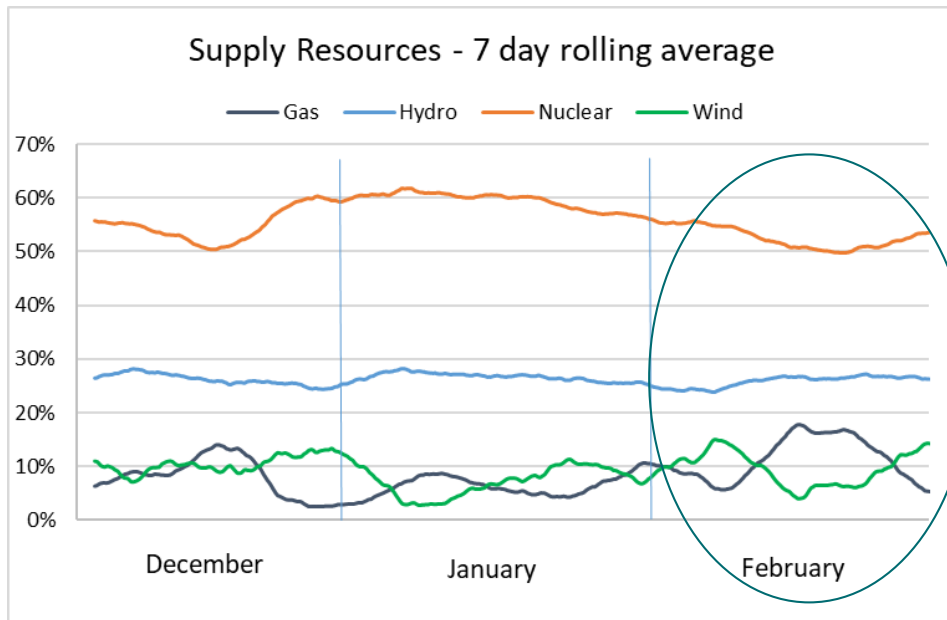
## Winter 2020/21 – Supply Mix

	Nuclear (GWh)	Hydro (GWh)	Gas (GWh)	Wind (GWh)	Solar (GWh)	Bio Fuel (GWh)
<b>December (2020)</b>	6,835	3,278	960	1,392	20	39
<i>Previous Year</i>	8,031	3,041	820	1,306	19	34
<b>January (2021)</b>	7393	3,366	937	918	25	32
<i>Previous Year</i>	8,403	3,251	899	1,184	19	41
<b>February (2021)</b>	6,089	3,061	1,283	1,192	47	29
<i>Previous Year</i>	6,974	3,164	811	1,363	42	25

# Monthly Supply Contribution by Fuel Type

- Coincident with, but not caused by, the cold temperatures, nuclear and wind output decreased in mid-February. This was due to:
  - Planned and unplanned nuclear outages
  - Low wind conditions
- Hydro and gas-fired resources provided additional supply enabling the IESO to reliably operate the grid during the highest sustained demand periods of the winter

# Monthly Supply Contribution by Fuel Type (continued)



↓ Nuclear  
↓ Wind

↑ Hydro  
↑ Gas

# Winter 2020/21 - Intertie Trade

- Ontario remained a net exporter this winter
- However, net exports decreased from a year prior due to an increase in economic imports as well as a decrease in export capacity resulting from maintenance on intertie transmission lines

Month	Imports (GWh)	Exports (GWh)	Net Exports (GWh)
<b>December (2020)</b>	913	1,604	691
<i>Previous Year</i>	465	1,740	1,275
<b>January (2021)</b>	1,067	1,611	545
<i>Previous Year</i>	380	1,986	1,606
<b>February (2021)</b>	941	1,405	463
<i>Previous Year</i>	601	1,728	1,127



**JUNE 18, 2021**

# 2021 Texas Winter Event & Ontario's Extreme Weather Preparedness

**Elvin D'Souza**

Senior Engineer, Power System Limits, Engineering Studies

# ERCOT Event: Summary

- In mid-February Texas and the surrounding region experienced an extreme cold weather event resulting in significant customer interruptions
- ERCOT - the Texas market and system operator - had to direct customer load shedding to maintain supply-demand balance
- Factors contributing to the situation included: record demands, lack of winterized equipment, fuel shortages and limited interconnection capability
- Ontario operates and plans to more stringent standards and is equipped to operate in extreme winter weather conditions, and is characterized by strong intertie capability, diverse supply mix, robust winter readiness program and winterized equipment



# ERCOT Overview

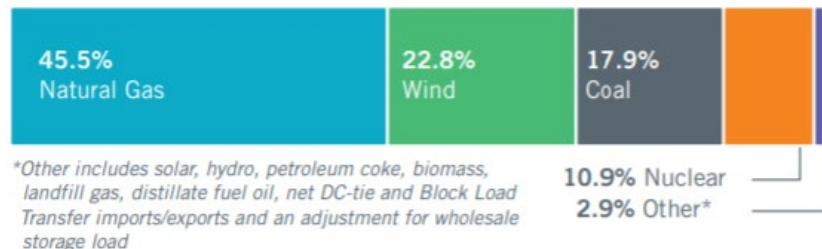
- Serves +26 million customers
- **Peak demand** of ~75 GW in 2020; Texas is summer peaking
- **Installed generation capacity** of ~ 107 GW
- 2020 energy demand of 381 TWh
- ERCOT is not synchronously connected to rest of North American grid - it has ~1,200 MW of intertie capacity, most of which is with Southwest Power Pool (SPP)
- ERCOT is not federally regulated through FERC but is subject to NERC reliability standards

## 2021 Generating Capacity

*Reflects operational installed capacity based on the December 2020 CDR report*

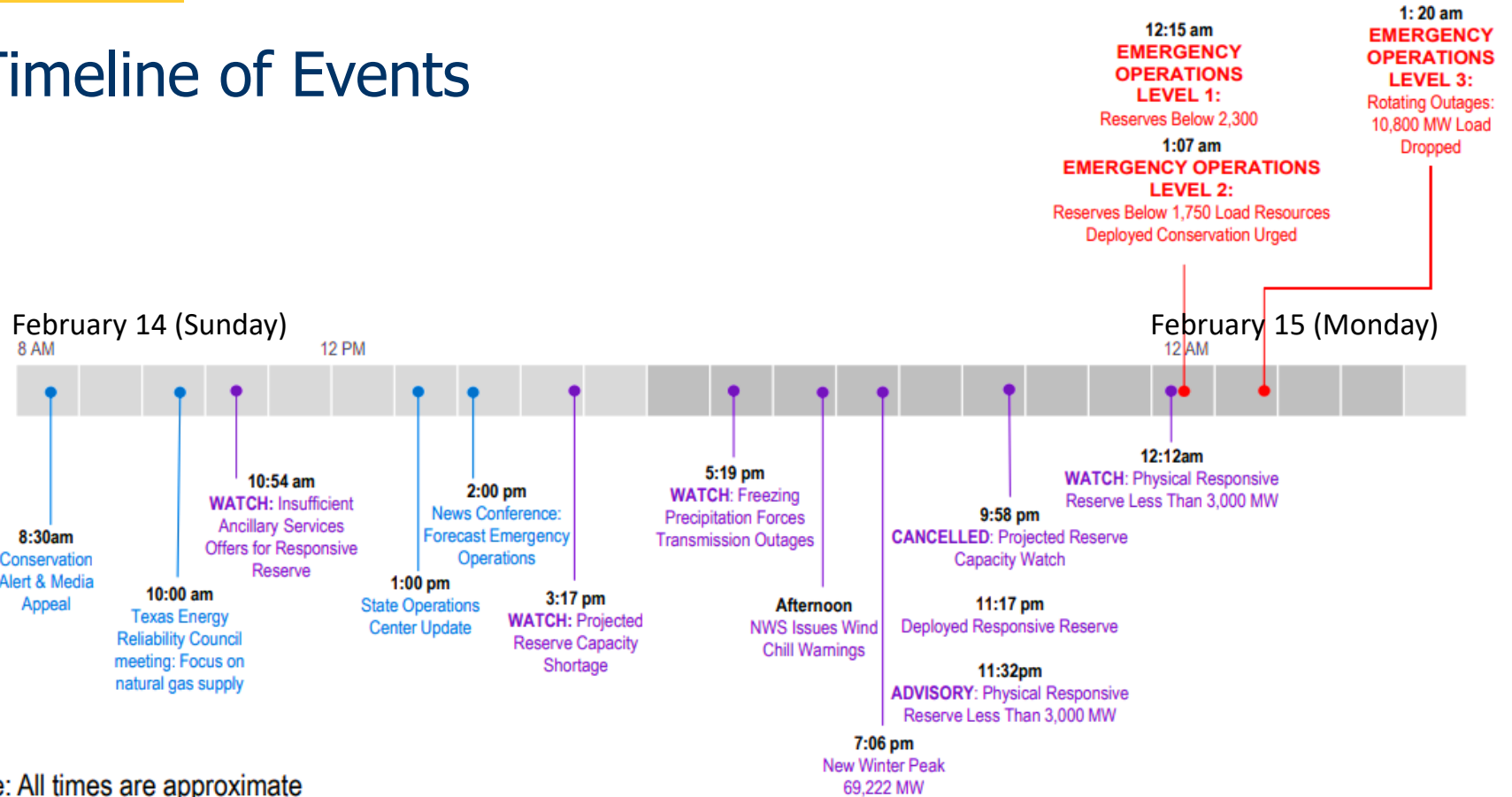


## 2020 Energy Use



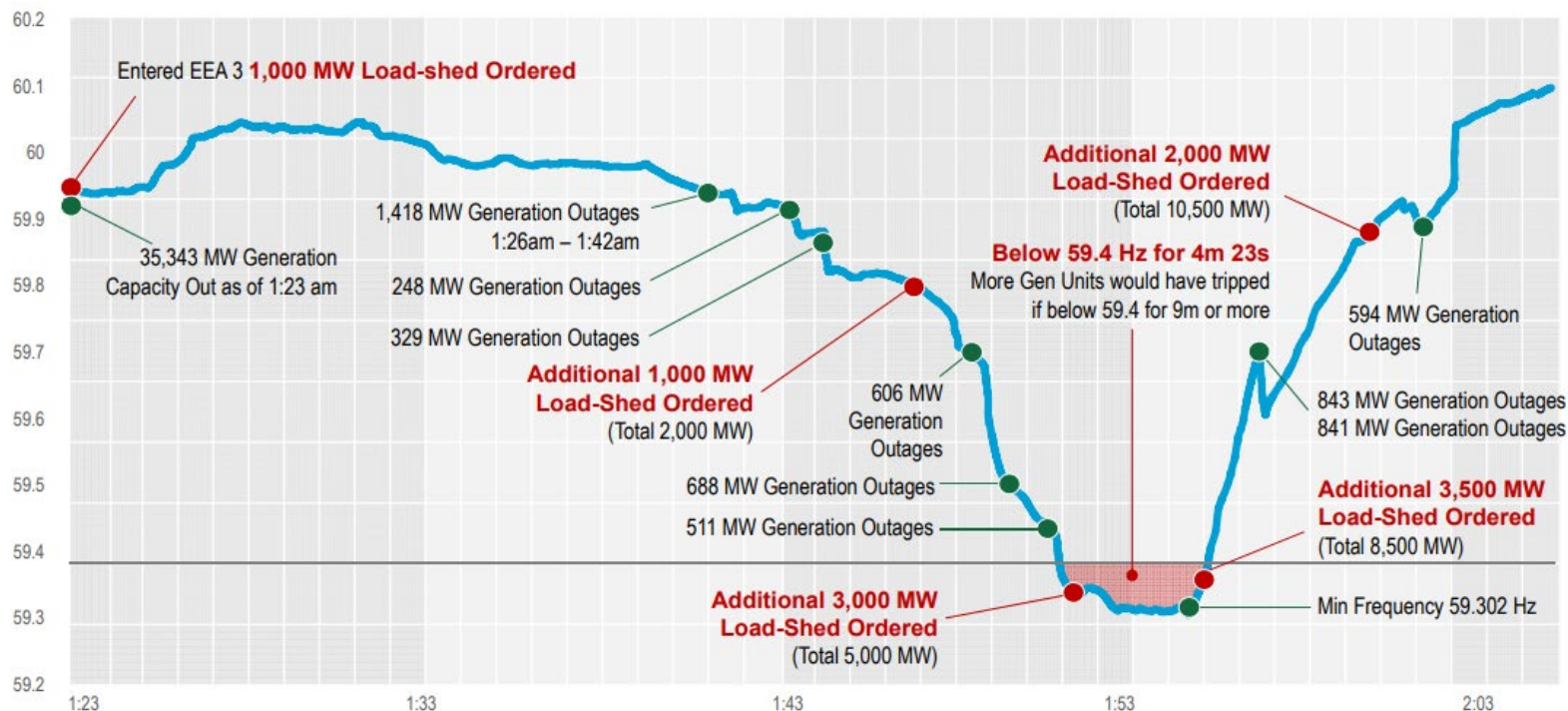
Source: ERCOT Fact Sheet, Feb. 2021

# Timeline of Events



Note: All times are approximate

# Sequence of Events – February 15



# Operations – Texas Reliability Observations

- **Limited inertie capability:** ERCOT's inertie capability is 1,200 MW compared to Ontario's robust 5,000 MW
- **Weaker fuel security:** Majority of supply mix is from fuel sources that are not guaranteed to be onsite or available (46% Gas, 23% wind); In contrast, Ontario has >50% nuclear capacity with onsite fuel
- **Lack of winterized equipment:**
  - Gas wells froze, reducing supply to power plants
  - Generation plants experienced icing and freezing of equipment causing unprecedented forced outages (gas plants and wind turbines)

NERC - North American Electric Reliability Corporation

# Winter Operations in Ontario

- **Equipment in Ontario is built to operate under extreme cold weather:**
  - Wind turbines are equipped with de-icing and built-in heating
  - Most thermal generators are situated indoors (unlike Texas or other warmer climates)
  - Transmission and distribution equipment is designed for extreme cold (i.e. Structure design, additional heaters, insulation, etc.)
- Generation and transmission owners are familiar with unique issues with sustained cold weather operations
- Actively work with participants to correct cold weather related equipment issues and share lessons learned through IESO-led Operations Awareness sessions

NERC - North American Electric Reliability Corporation

# Actions in Advance of Extreme Weather Conditions

- IESO implements a number of actions to prepare for extreme weather conditions:
  - **Stringent outage management** process that ensures the largest amount of generation units and transmission equipment available for peak seasons
  - **Maintain close relationships** with market participants, interconnections (intertie capabilities and regional issues) and gas pipeline operators (gas storage levels and pipeline outages) leading up to and during peak system operations
  - **Unit Readiness** tests of generators before the peak season or an anticipated extreme weather event
  - **Schedule gas units to run in advance** of extreme weather conditions to ensure the fleet is capable of running smoothly

# Incenting Investment

- ERCOT is an Energy-Only market; it does not directly plan for capacity but relies on very high prices in the real-time market to signal investment needs
- Energy-only markets work if there is tolerance for high spot electricity prices and customers are accepting of a higher risk of blackouts
- Asset owners will recover majority of their fixed costs during a few hours in the year
- In comparison, Ontario incents investment in resources through procurements based on forecasts:
  - Having multiple separate products such as energy, ancillary services and capacity will provide more stable revenue to suppliers
  - Ontario relies on regulation, contracts and market-based mechanisms to drive investments
  - This allows for outlining clear obligations on suppliers to ensure equipment and infrastructure are operational or there could be implications on current/future revenues such as non-performance penalties and/or reduced capability for future participation

# Resource Adequacy Planning in Ontario

- The IESO adheres to planning standards laid out by NERC, NPCC, and IESO standards
- NPCC and ORTAC define specific parameters such as the Loss of Load Expectation (LOLE) of no more than 0.1 days/year across the range of demand/supply side risks
- ERCOT's reserve margin targets would not meet NPCC's requirement (0.1 day per year LOLE) that the IESO plans and must adhere to
- Policy changes made in 2016, was to have ERCOT report planning reserve margin levels that consider the economic trade-off of maintaining capacity reserves vs. the cost of avoiding load shedding → this resulted in an effectively lower reserve margin target that is currently used at ERCOT

ORTAC - Ontario Resource and Transmission Assessment Criteria



# Extreme Weather Resilience Review

- The IESO does not take reliability for granted; we keep learning from past events and from forward-looking analyses, and continue to refine our policies, processes and tools to enhance reliability and resiliency of the grid
- While Resiliency has always been built into the industry's reliability standards, it continues to be examined at NERC, NPCC and the IESO
- After the Texas extreme weather event in February, in addition to the regular event review exercise, we decided to re-examine our resilience to all extreme weather risks and consider opportunities for enhancements

# Extreme Weather Resilience Review Scope

## Scope of the initiative:

- Phase 1: **Re-evaluate** vulnerabilities of Ontario's power grid to extreme weather conditions and identify existing and potential mitigating solutions beyond the current practices that would further ensure the IESO and the Ontario power system are well prepared to manage those conditions
- Phase 2: **Implement** feasible mitigating actions through changes to IESO policies, processes and tools

# Phase 1 – Review of Vulnerabilities

- The preliminary review of existing practices concluded that the IESO and the sector are well positioned to manage extreme weather events
  - The review identified areas of impact (e.g. energy shortfalls), weather risks (e.g. icing), root causes (e.g. collapse of towers), and evaluated current policies, processes, and procedures
  - We evaluated grid performance during Ontario extreme weather events over the last 20 years, and considered results from forward-looking assessments
- The team identified additional possible opportunities to further mitigate vulnerabilities and enhance grid resiliency, some already being pursued

# Next Steps – Extreme Weather Resilience Review

- Finalize Phase 1:
  - Review recent NERC and NPCC lessons learned, recommendations and guidelines related to extreme weather events
  - Summarise and prioritize proposed new mitigating measures, and develop an action plan
- Start Phase 2:
  - Implement policy and procedure changes
  - Continue to monitor weather events at NERC and NPCC and implement lessons learned

**JUNE 22, 2021**

# 2021 Summer Operations

**Mauro Facca**

Manager, Operations Planning

# Agenda

- Summer Outlook and Preparation
- New System Advisory Notices
- “Improving Awareness of System Operating Conditions” Stakeholder Engagement

# Summer Outlook

- The summer weather outlook forecasts that summer 2021 will have above normal temperatures and stormy conditions
- Energy demand in most sectors has returned to pre-COVID levels
- The forecast peak for summer 2021 is 22,500 MW (under normal weather conditions) and 24,518 MW (under extreme weather conditions)
- Summer 2020 demand peaked at 24,446 MW on July 9<sup>th</sup> under extreme hot weather conditions during a prolonged heat wave (with Demand Response activated and no Industrial Conservation Initiative contribution)

## Summer Outlook (cont'd)

- The total nuclear generation on outage will be ~2,700 MW. Compared to last summer, there is one additional nuclear unit (~800 MW) on outage
- With minimal snow pack and rainfall to date, the IESO is preparing for a low-water summer, resulting in reduced hydroelectric generation. Summer rainfall may improve the low-water conditions
- The IESO expects Ontario's electricity system to be adequate over the upcoming summer season



# Summer Preparation

- To prepare for the upcoming summer season, the IESO is implementing readiness processes/procedures:
  - Testing of generation units for readiness when they have not been online recently (e.g. after four weeks)
  - Testing of capacity auction resources to verify they are capable of satisfying their capacity obligations
  - Coordinating outage plans with the generators, transmitters, neighbouring areas, and gas pipelines operators

## Summer Preparation (cont'd)

- The IESO will also continue to monitor potential risks to stressed grid operations and issue advisory notices as necessary for continued situational awareness.

# New System Advisory Notices

- Good communications are critical for situational awareness and can help to posture the grid to be more resilient in advance of potential power system issues
  - Today, the IESO communicates anticipated system and market conditions to stakeholders through advisory notices and grid operating states
  - Operating events this past summer (e.g. extreme weather) have highlighted opportunities to improve IESO communication to stakeholders
- The IESO has introduced two new advisory system notices this summer related to severe weather and capacity margins to enhance situational awareness for sector participants in advance of potential concerns

# Improving Awareness of System Operating Conditions Stakeholder Engagement

- The IESO has launched an engagement with stakeholders on revising the advisory notice framework and adding new operating states
- The goal of this engagement work is to provide greater clarity on situational awareness when market participant actions may be needed
- To get more details on this engagement or to participate in this engagement, visit the IESO webpage on Active Engagements



**JUNE 2021**

# IESO Operations - Pandemic Review

**Tim Spratt**  
Manager Operations

# Guiding Principles

Using statements from the World Health Organization, communications with neighbouring Reliability Coordinators and following local health units recommendations, IESO operations created its plan based on two key principles:

- Keeping our staff safe
- Maintaining grid reliability

Our plan was flexible and changed as conditions and recommendations changed

# Control Room Operations

Plans put in place mid March 2020

- Non-essential staff to work from home
- All training/travel canceled for March and April
- Control Room (CR) schedule changed to ensure 14 days between working with different crews
- Nurse facilitated screening of all staff entering buildings, until IESO app was developed in August 2020
- Control Room began split operation

# Control Room Split Operation

The IESO surveyed entities inside and outside of the province to ensure we were following the best practices. Within the electrical sector the most common protective measure was to utilize split operation:

- Dayshifts from Main Control Room
- Nightshifts from Back-up Control Room

Isolates crews from each other reducing cross contamination and allowing for enhanced cleaning while the rooms are empty



# Plans, Plans and more Plans

As operators, we are trained to look for possible issues and have plans in place to deal with them, for example:

- RV's were rented for a few months last year in case sequestering was needed (Both PJM and New York ISO sequestered crews)
- Shift schedules were created/adjusted several times, as needed:
- 14 days between crews was reduced to 7
- Ending the COVID type schedules was set for May 30<sup>th</sup>, then extended to June 30<sup>th</sup>, now end of summer
- Ran several pilot training/simulator exercises using different locations and with instructors in person or remote

# COVID Brought its Own Set of Operational Issues

- Extremely low demand in May 2020 9,900 MW's – this leads to high voltages and Surplus Baseload Generation (SBG) issues (average spring low PD 11,500 MW)
- Extremely high demand, two months later we hit around 24,600 MW; levels not seen since 2013

But the system still needed to be managed

- Since March 2020 – The CR has answered over 116,000 phone calls, coordinated over 32,000 outages, and monitored approximately 103,000 generation dispatches
- NW Ontario - Extreme cold this past winter with limited resources, forest fires this spring
- Rebuild of 3 major transmission stations

## IT Support of the Control Room

- Created a temporary 6 person control room in 10 days referred to as the TCR (Third Control Room)
- Created a mini control room at our back-up center which accommodates 1 operator called the FCR (Fourth Control Room)
- Using TEAMS we can have staff from different crews work the same shifts without being in the same room, allowing coverage for COVID tests, illnesses, and vacations
- Laptops have been provided to all CR staff, for training and off-shift support

# Training Department Support of the Control Room

As a NERC Continuing Education Provider we must provide 70 hrs of training/simulator to each operator, every year

- April 2020 - Computer-based training (CBT) modules were developed to ensure continuous training
- Sept 2020 - Instructor led virtual training, with crews reporting to the classroom and instructors working from home
- Jan 2021 - All training moved to remote (stay-at-home order in effect)
- Simulator days previously at the BOC became remote from home

# The Cleaning Staff Support of the Control Room

- Both the Clarkson control room and the Back-up control room are deep cleaned daily; this is a critically important measure the IESO has taken to protect its staff
- The BOC was even cleaned twice a day when we tested out running simulator training from 7:30am to 4:00pm
- Both TCR and FCR require cleaning when utilized before other staff can work out of them

# Enduring Benefits for Operations

- Training has created excellent CBT training modules. In the future more CBT's will be produced, and reuse older ones for new staff training
- Laptops will continue to allow control room staff to meet all of our obligations. Hybrid work models will likely be part of the future with staff needing to be able to work and train from home
- Group created for testing new CR tools by on-shift staff has resulted in better support and tool integration

## In Summary

Management's decision to put operator's health as our first priority, while  
maintaining grid reliability

+

The incredible dedication our staff showed by following all the provincial and  
local health unit guidelines

+

a little bit of luck

=

No CR COVID-19 cases (so far) & no increase in reliability events

## Some Bright Spots Through the Pandemic

- Our staff showed great flexibility and understanding as we changed their schedules and work locations, they kept themselves healthy and maintained reliability
- Our Training department have continually adapted and adjusted to meet ever changing needs while keeping high standards
- IT created 2 additional temporary control rooms, procured, set-up, and maintained laptops for every CR Operator
- Operations owe the cleaning staff a great thanks, their work and dedication have gone a long way to ensuring our operators stay healthy



# Thank You

[ieso.ca](http://ieso.ca)

1.888.448.7777

[customer.relations@ieso.ca](mailto:customer.relations@ieso.ca)

[engagement@ieso.ca](mailto:engagement@ieso.ca)



[@IESO Tweets](https://twitter.com/IESO)



[facebook.com/OntarioIESO](https://facebook.com/OntarioIESO)



[linkedin.com/company/IESO](https://linkedin.com/company/IESO)