
JUNE 27, 2022

IESO Operations Awareness

Agenda

1	Opening remarks (David Short, Senior Director, Power System Assessments)	10:00 a.m.
2	May 21, 2022 Extreme Weather Event – Derecho Wind Event (Matt Vos, Manager, Control Room Support)	10:10 a.m.
3	2022 Summer Operations (Joseph Ricasio, Senior Manager, Market Forecasts & Integration)	10:40 a.m.
4	IESO Operations Update (Muhammad Bilal, Engineering Manager Power Systems, Operations Planning / Bryan Hartwell, Manager, Operations Integration)	11:10 a.m.
5	IESO Training Resources (John Antonakos, Supervisor Customer Response)	11:40 a.m.
6	Closing Remarks (Stephen Nusbaum, Senior Manager, Performance, Applications and Integration)	11:50 a.m.



May 21st 2022 Derecho Storm Event

Matt Vos
Manager – Control Room Support

Extreme Weather Events

- Extreme weather events are Tornados, Forest Fires, Ice storms, very high/low temperatures etc.
- These extreme events seem to be happening more frequently
- The North American Electric Reliability Corporation (NERC) sees extreme weather events as a key risk to the electricity sector
- Managing these events require a coordinated approach within the electricity sector – Communication, training and awareness

Operational Challenges

- Forecasting Extreme events can be challenging. We know they're going to happen but it's difficult to gauge the impact and where exactly they'll hit
- We often need to posture the system in a conservative state to minimize the impacts of these extreme events
- Loss of transmission during extreme events results in difficulty serving load
- When load is lost during an extreme event, the IESO must take additional actions to reduce generation to balance supply and demand
- We need to maintain reliability in Ontario but also ensure that any events within Ontario don't adversely impact our neighbours

May 21st Storm

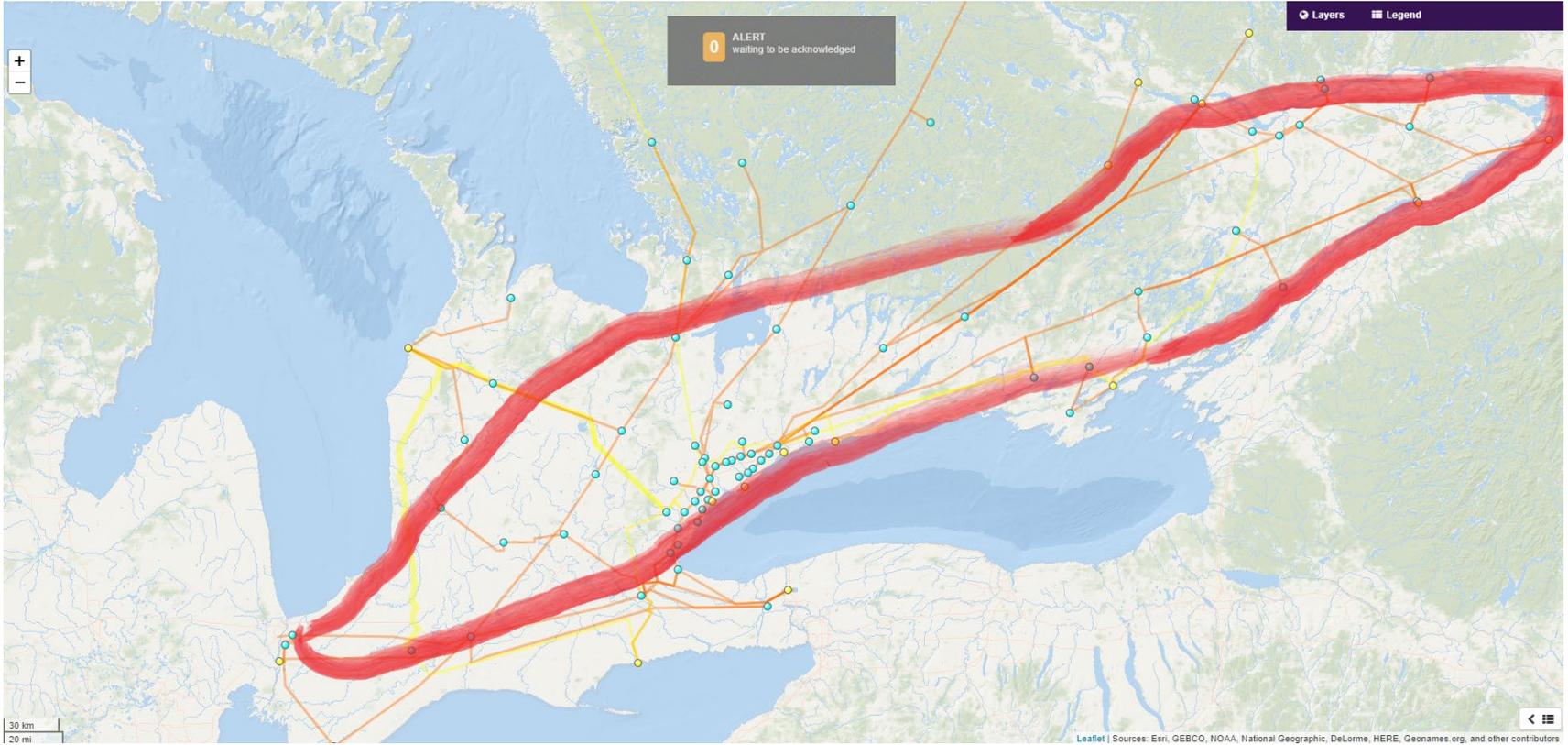
- A significant storm formed near Sarnia mid morning of May 21st, progressed east across southern Ontario impacting all major cities in it's path into Quebec before dissipating over the Atlantic region
- Peak wind gusts recorded in Kitchener/Waterloo airport at 132 km/h, storm moved east at an average speed of 100 km/h, striking Toronto at 1:30pm, Ottawa at 3:50pm, Montreal at 5:30pm, and Quebec city at 6:30pm.
- Confirmed EF2 tornado occurred in Uxbridge, ON, two EF1 tornadoes confirmed in London, ON. Potentially more awaiting after the fact examination
- A severe downburst in parts of southern Ottawa produced wind speeds up to 190 km/h
- This storm was eventually classified as a 'Derecho' storm

What is a Derecho storm?

- Widespread, straight-line wind storm associated with a fast-moving group of severe thunderstorms
- Derechos can cause hurricane or tornadic-force winds, actual tornadoes, heavy rains, and flash floods
- Derechos move rapidly and are often hard to forecast
- A warm-weather phenomenon, derechos occur mostly in summer, especially during June, July, and August in the Northern Hemisphere

Derecho's approximate path through southern Ontario and southwestern Quebec on May 21





May 21st Storm - Summary

- Power outages affected over 1.1 million customers, with 586,000 outages in Ontario and 550,000 Hydro-Québec outages.
- Communities of Uxbridge and Peterborough declared states of emergency
- Total storm duration was 9 hours and covered a total length of 1000km
- 23 Transmission circuits were lost due to the storm
- A Nuclear unit was directed out of service for reliability
- 1,600 MW of imports from Quebec lost
- 2,200 MW of load in Ontario lost over several hours

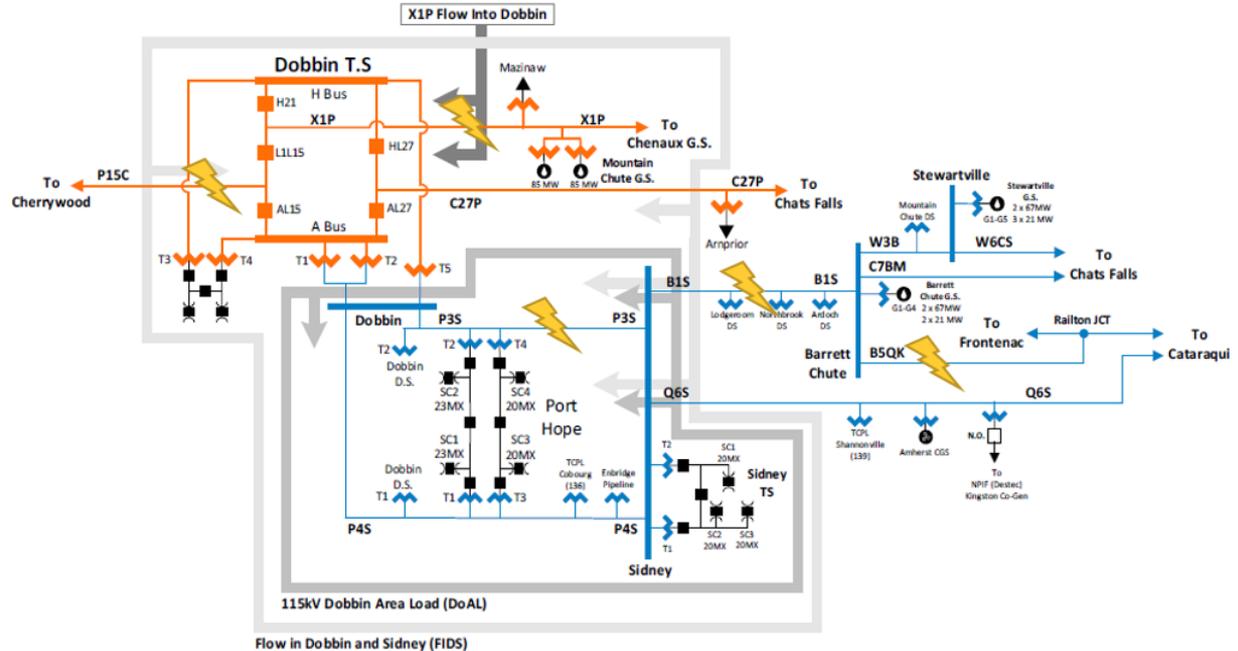
GTA Impact

- At 12:40 pm, the storm was over Burlington resulting in the loss of several 230kV circuits. Nearby nuclear and gas generators reported their units responding to faults on the system.
- Shortly after noon as the storm progressed through the GTA, several 230kV circuits emanating from Cherrywood TS (Pickering area) were lost. Due to the lack of transmission remaining in the area as a result of the storm, a nuclear unit was directed out of service
- Demand dropout was starting to become noticeable as load was being lost to storm damage. IESO had to manually intervene with the economic dispatch as additional generation was required down to balance load and generation within Ontario¹

¹ IESO is required by reliability standards to balance load and generation

Eastern Ontario Impact

Between 2:40pm – 3:10pm, several 230kV and 115kV circuits were lost just east of Peterborough. This resulted in several hydroelectric stations in Eastern Ontario being held to 0 MW for system limits



Ottawa Area Impact

- The transmission system in Ottawa was hit the hardest during the Derecho storm
- Several circuits in the area were damaged during the storm



Ottawa Area Impact

- X522A and M30A were already out of service for planned work
- Between 3:46pm and 4:04pm, four 115 kV and four 230 kV circuits were lost due to the storm
- This left the Ottawa area transmission system in a weakened state as there were only minimal paths remaining to supply the area
- ~1,600 MW of imports from Quebec were lost. 1,200 MW was lost directly due to losing intertie circuits and ~400 MW was curtailed to respect limits in the area.
- ~200 MW was also reduced on a large generating station along the St. Lawrence river to respect limits in the area as well

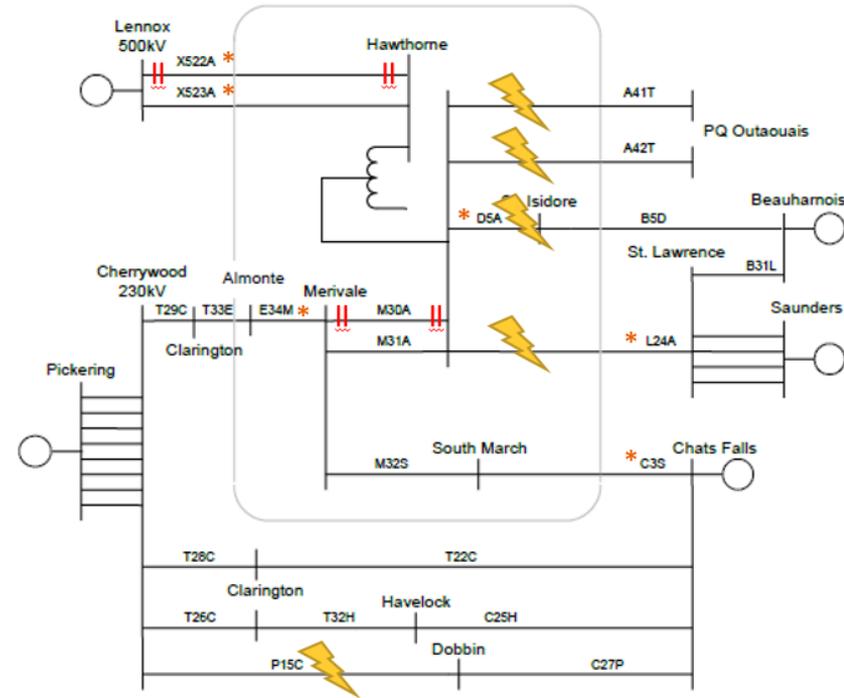


Figure 1-1: One Line Diagram - Ottawa Area

Ottawa Area Impact

- The return to service of faulted transmission elements was unknown given the severity of the storm
- IESO directed Hydro One to immediately bring the X522A circuit back in-service from a planned maintenance outage to strengthen the transmission system in the Ottawa area.

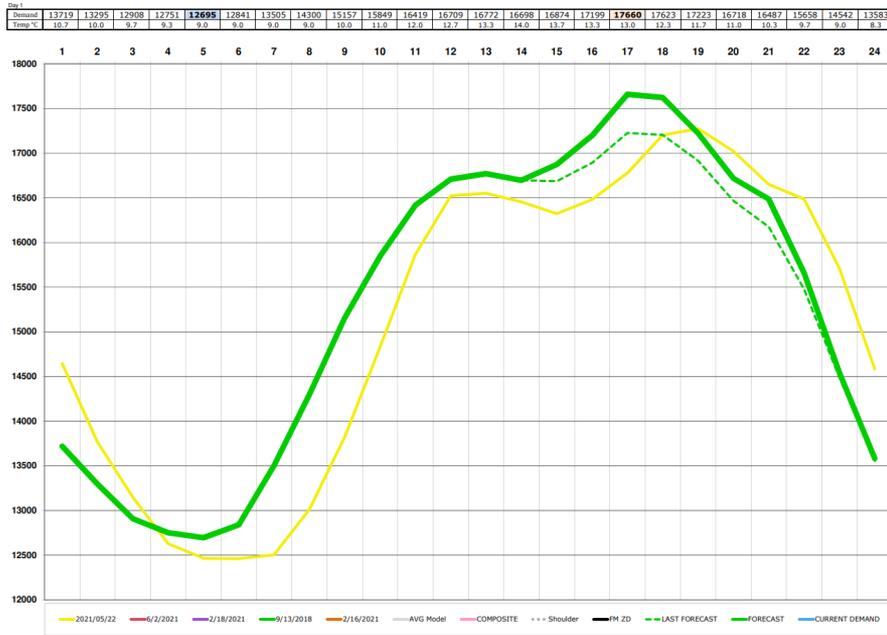


After the storm

- There were several transmission circuits that suffered tower damage that were unavailable for several days while repairs were made
- Distribution systems across the province also suffered significant damage and were still being repaired weeks after the storm
- IESO and market participants worked together to maintain system reliability during this extreme event

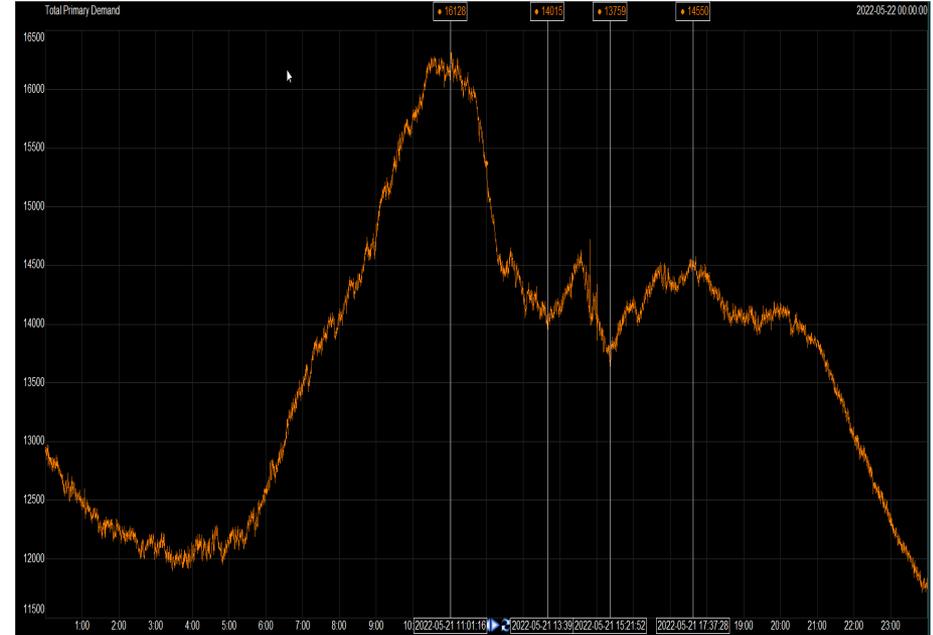


Ontario Demand – Dayahead Forecast vs Actual



↑
11:00

Dayahead forecast had peak of 17.6k MW HE17
 Peak demand was actually 16k in HE11
 Evening peak was 14.5k, 3,000 MW under forecast



↑
11:00



Questions?

2022 Summer Outlook

Joseph Ricasio

Senior Manager – Market Forecasts and Integration

Agenda

- What are we expecting this Summer?
 - Weather Forecast
 - Ontario Demand Forecast
 - Supply Conditions
 - Adequacy Outlook
 - Interconnection Outlook
- How have we prepared for this Summer?
 - Readiness Activities
 - Major Ontario Grid Projects

Weather Forecast

- Ontario is forecasted to be warmer than normal this summer with August anticipated to be the hottest month.
- With the anticipated warmer summer, there is a higher likelihood of intense storms and tornadoes.
 - We have already seen these storms – May 21st Derecho Storm event.
- Forecasted dryer than normal conditions increases the possibility of wildfires across northern Ontario.
 - We have already seen an active forest fire season with fires in northeast Ontario. Some of which approached transmission facilities.

Ontario Demand Forecast

- With economy reopening, Ontario demand is expected to increase.
- Although energy demand has returned to pre-COVID levels, there remains uncertainty in demand forecast due to supply chain disruptions and geopolitical tensions.
- The forecast peak for summer 2022 is 22,546 MW (under normal weather conditions) and 24,675 MW (under extreme weather conditions). This is 150 MW more than what was forecasted for summer 2021.
- For reference, summer 2021 actual demand peaked at 22,986 MW on August 24th.

Supply Conditions

- There are three nuclear units undergoing refurbishments, which is one additional nuclear unit on outage compared to last summer.
- A stronger freshet leads to greater hydro availability compared to last summer. However, hydro fleet is expected to run heavily due to the nuclear generator outages which along with anticipated dryer conditions could lead to reduced hydro availability late summer.

Adequacy Outlook

- From the latest Reliability Outlook, the IESO expects Ontario's electricity system to be adequate over the upcoming summer season under normal weather.
- There are some weeks over the summer where IESO may have to defer outages and rely on imports to supply load under extreme weather.

Interconnection Outlook

- There is ongoing coordination with neighboring jurisdictions to understand their adequacy outlook for this summer.
- New York and Quebec have energy available to provide us under normal and extreme conditions.
- MISO however is forecasting shortfalls and has indicated that they will be importing to meet their needs even during normal weather conditions.

Readiness Activities

- As we approach the peak summer season, the IESO is taking action to ensure that reliability will be maintained.
- Generators are tested for readiness when unavailable for more than four weeks.
- There is ongoing communication with gas pipeline operators who have confirmed no gas supply concerns for the summer.
- Instructor-led training was provided to operations staff covering various scenarios such as operating through the peak season and being energy limited, managing emergency conditions, and simulating the load shedding exercise.

Readiness Activities (cont.)

- New types of advisory notices (Alert, Warning, and Actions) will be introduced this summer for better situational awareness, and a new Conservative operating state will help posture the grid to be more resilient in advance of power system issues.
- The IESO will also continue to monitor risks to grid operations and issue advisory notices as necessary for continued situational awareness.
- There is continuous dialogue as part of outage management.

Major Ontario Grid Projects

- There is more than double the typical amount of major grid projects this year.
- These major grid projects include replacing aging equipment, sizeable maintenance outages, or transmission expansion for future needs.
- Extensive preparation efforts and coordination conducted, both internal and external, to ensure reliability is maintained for complex outage submissions and projects.
- Project plans have changed numerous times due to failed equipment and supply chain disruptions.
- There is a potential for outages to be recalled this summer and projects to be put on hold under extreme weather to maintain reliability.

Key Takeaways

- The IESO is prepared for this summer which is expected to have warmer temperatures, higher demands, and significant planned outages.
- Extensive preparation efforts and coordination conducted, both internal and external, to ensure reliability is maintained throughout the summer.
- The IESO may have to defer some outages and rely on imports under extreme weather.
- Ontario is entering a period during which outages will be difficult to accommodate.
- Advance coordination and planning is required to ensure adequate resource and transmission is available to serve Ontario needs as we look beyond 2022.



Questions?

Improving Awareness of System Operating Conditions

Muhammad Bilal

Engineering Manager - Operations Planning, MFI

Purpose and Summary

- The purpose of this session is to:
 - provide an overview of the new advisory notifications
 - changes to advisory notice framework, and
 - a new conservative operating state
 - highlight updates to implement these changes

Purpose and Summary (II)

- Past summer operations highlighted the need to
 - Improve stakeholder awareness of system operating conditions to better allow the IESO and market participants to respond to changing system conditions.
 - Provide transparency in terms of the actions required by the IESO to maintain reliability.
 - To enhance grid resilience during stressed system conditions and aligning Ontario with best practices in other jurisdictions.

Agenda

- Background
- What has changed?
 - Phase 1: Added two new advisory notices
 - Phase 2: Changes to advisory notice framework and a new conservative operating state
- Stakeholder Engagement
- Engagement and Implementation



Background

Background

- The IESO informs market participants of system and market conditions through publishing advisory notices and the use of grid operating states.
- The IESO has the authority under existing market rules to take actions where necessary to maintain reliability.
- Past operating events over the summer (e.g. extreme weather) highlighted opportunities to improve IESO communication to stakeholders and clarify IESO authority to take actions.
 - Tighter system conditions and more frequent extreme weather events have increased the potential adverse impact on power system reliability.
- Being aware of these situations allows MPs to be informed, and prepare their operations and take action accordingly to maintain reliability and enhance grid resilience.



What has Changed?

Phase 1 – Two New Advisory Notices

These notices inform market participants that we may be leading into either an extreme conditions alert or a capacity shortfall during stressed system operating conditions.

The triggers for Severe Weather Alert include:

- Extreme temperatures (hot or cold)
- Ice storm
- Severe thunderstorms
- Hurricane

Severe Weather Alert

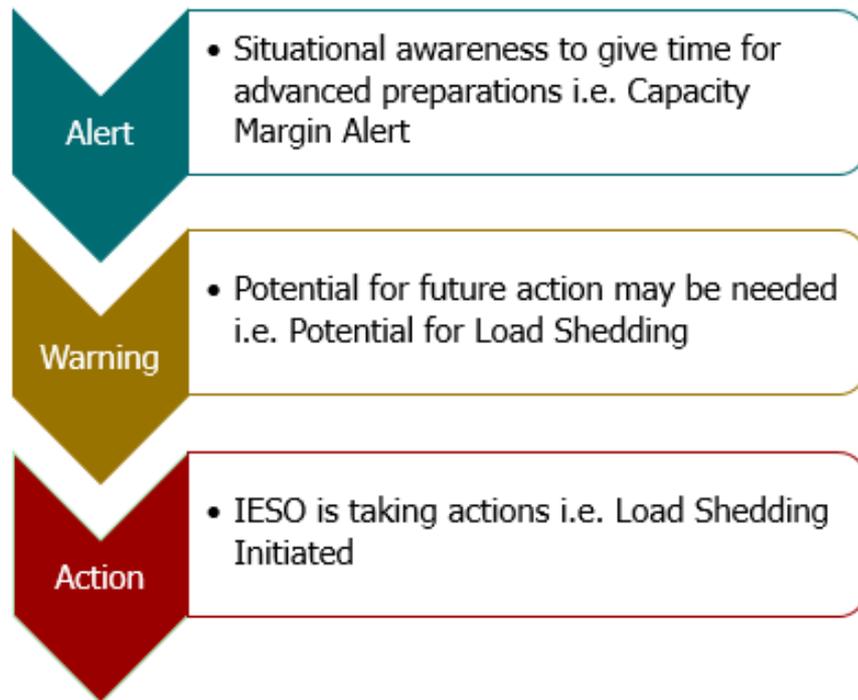
To be issued when forecasted weather in days 2 to 5 are leading to a potential extreme conditions alert.

Capacity Margin Alert

To be issued when capacity margins are less than 500 MW for four consecutive hours or more in days 2 to 10.

Phase 2: New Advisory Notice Framework

Replace the four advisory notice types (system advisory, major change advisory, system emergency and market suspension/resumption) with Alert, Warning and Action as the new advisory notice types.



Phase 2: Conservative Operating State

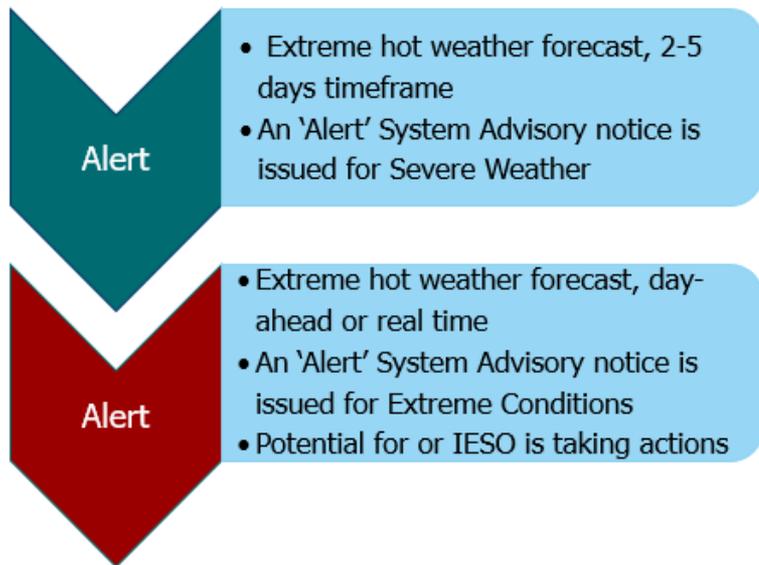
- A Conservative Operating State would be declared when there is a need to minimize potential risk to the grid or if there is a need to enhance the grid's resiliency due to actual or forecasted stressed system operating conditions.
- System conditions during a Conservative Operating State include:
 - Equipment is operating within its normal ratings.
 - Stressed system conditions where contingencies could adversely impact system security and thus a heightened level of awareness is necessary.
- Consistent with today, the IESO will publish an advisory notice to notify market participants when changing to a different operating state.

Phase 2: Conservative Operating State - Triggers/Actions

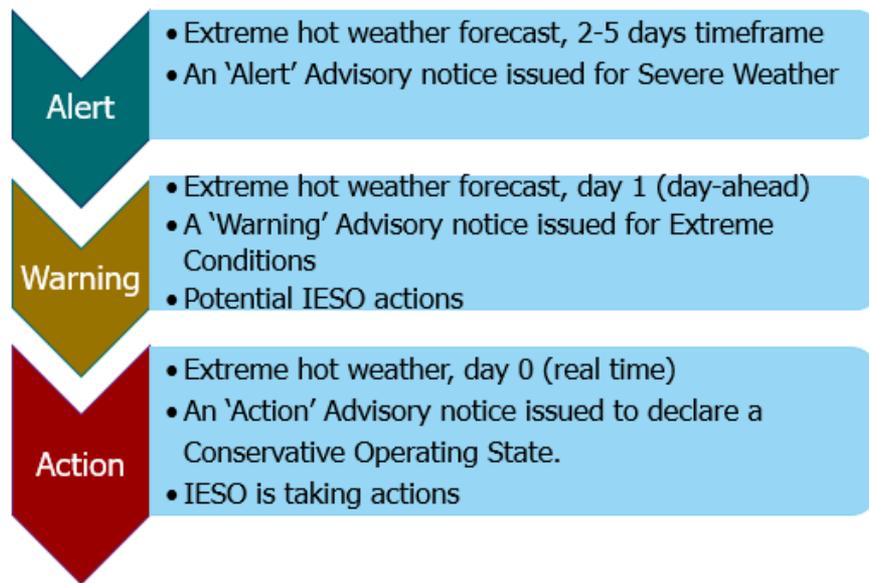
- Extreme hot or cold weather, tight supply conditions, geomagnetic disturbances, outages to IESO IT applications or tools that affect system security, and/or evacuation of the IESO primary control centre
- What does this mean?:
 - Non-urgent maintenance of equipment and switching activities that could impact the grid will be suspended by the IESO
 - Certain planned outages may not proceed.
 - Equipment already out of service may need to be returned to service.
 - Market participants may need to implement manual workarounds to fulfill their obligations (e.g., receive and execute verbal dispatch instructions), and/or;
 - The IESO may request the transmitter or neighbouring entities to monitor the IESO-controlled grid or the interties, respectively, on behalf of the IESO.

Example

Current Framework



New Framework





Engagement and Implementation

Engagement and Implementation

- The IESO launched a stakeholder engagement in Q1, 2021. The IESO also held 1:1 meetings with various market participants.
- No feedback from stakeholders, expressing concerns with the IESO's proposal were received during the engagement process.
- Following Technical Panel recommendation, the IESO Board approved the changes on June 1st. Implementation date is June 27th.
- Improve webpage/RSS feed
 - Add instructions to subscribe
 - Add advisory notice type (Alert, Warning, Action) to RSS feed



Questions?



Appendix

Market Rule Changes

- MR Chapter 5, Section 2: IESO-Controlled Grid and Operating States
 - Added new Conservative Operating State, the conditions when it can be declared, the triggers, and potential actions.
- MR Chapter 5, Section 6: Outage Coordination
 - Updated Section 6.4.9 to add the Conservative Operating State where advance approval can be revoked if Conservative Operating State is occurring or is reasonably likely to occur.
- MR Chapter 7, Section 12: Status Reports, Advisories, and Protocols
 - Updated to reflect new advisory notice framework

Market Manual Changes

- Market Manual 7.1, Section 2.3: Grid Operating States
 - Updated to add description of the Conservative Operating State.
- Market Manual 7.1, Section 2.4.1: Extreme Conditions
 - Updated to show that an extreme conditions advisory notice may be issued one day in advance (day-ahead timeframe) of extreme conditions.
- Market Manual 7.1, Appendix B: Emergency Operating State Control Actions
 - Added the declaration of Conservative Operating State to the list of emergency control actions.
- Market Manual 7.2, Section 3: Advisory Notices
 - Updated to reflect new advisory notice framework
- Market Manual 7.4, Section 2.4: Grid Operating States
 - Updated principles and added new Conservative Operating State to existing list of operating states.

Market Manual Changes [cont.]

- Minor updates to the following Market Manuals to incorporate new changes
 - Market Manual 7.3, 4.2, 4.3, 4.4, 4.5



Registering Power System Changes

Bryan Hartwell
Manager – Operations Integration

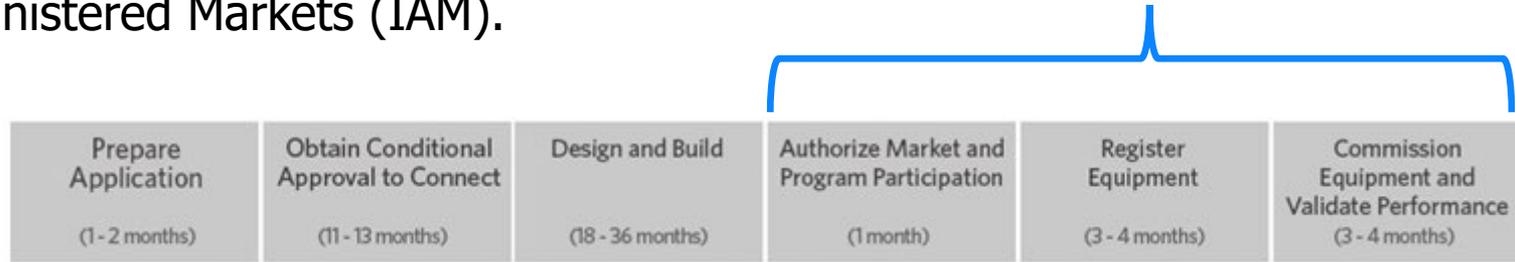
Purpose

- To review what “registration” is and why it is important
- To provide a summary of an initiative that will:
 - Provide revised (registration) timelines for better planning.
 - Provide rigor around how the new timelines will be administered.

The Connection Process

A market participant with a new or modified facility must go through some or all of the steps below before the change can participate in the IESO Connected Grid (ICG) and IESO Administered Markets (IAM).

Registration refers to both authorization and register equipment; however, completion of the registration process includes the completion of commissioning.



Overview of the Connection Process

<https://ieso.ca/en/Sector-Participants/Connection-Process/Overview>

Why is registration important?

To operate the IESO Connected Grid and IESO Administered market, we must have detailed information of every participating asset and load that is incorporated into our tools - used to monitor system security and accurately develop market schedules. This is administered via the registration process.

There are up to 19 distinct areas of expertise that must be consulted and perform tasks to integrate a change into the IESO.



Challenges

- The IESO requires a certain amount of effort to implement different types of changes. The “minimum period” is the time to complete a change without issues or delays.
- Initiating registration close to or within the minimum period can lead to human error, or an inability to meet the desired effective date. Late registration requests result in procedural inefficiencies, which can increase total overall effort.
- Once cost recovery is implemented, IESO effort to resolve the issues in the previous bullet could lead to increased participant costs.

Opportunity

- The IESO believes that providing greater clarity and rigour around registration timelines will help minimize participant registration costs, optimize IESO effort, and facilitate desired in-service dates.
- Given the increasing volume of work associated with the upcoming significant procurement initiatives to address supply gaps, we believe this is the right time for a change to help the IESO and the sector be better prepared, and to maximize efficiency and minimize costs.

Opportunity *(continued)*

- A potential framework for putting this opportunity into practice could include:
 - Establishing minimum periods for each type of system change required to go through registration
 - *e.g., a like-for-like switching device may take 20 business days, while commissioning could take 130 business days*
 - Defining minimum periods informed by historical experience for each type of change
 - *e.g., could be set by calculating an average, minimum, or percentile for each type*
 - Developing guidelines for handling late registration requests
 - *e.g., deferring by the minimum period*

Next Steps

- The IESO will provide stakeholders the opportunity to comment on a document that will cover the following topics:
 - Defining registration timelines and establishing minimum periods by change type.
 - Guidance to participants regarding how to initiate registration with sufficient notice to ensure desired outcomes.
 - IESO approach for handling late submissions



Questions?

IESO Training Offerings & Capabilities

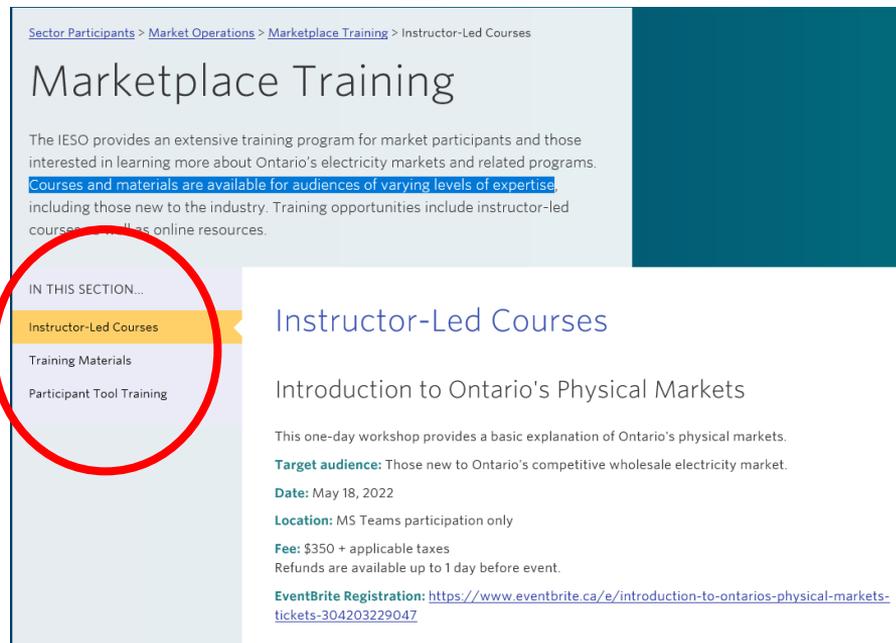
John Antonakos

Supervisor – Customer Response

Market Place Training

IESO Training

- Extensive training programs for market participants
- Courses and materials are available for audiences of varying levels of expertise
- Training opportunities include instructor-led as well as online



Sector Participants > Market Operations > Marketplace Training > Instructor-Led Courses

Marketplace Training

The IESO provides an extensive training program for market participants and those interested in learning more about Ontario's electricity markets and related programs. **Courses and materials are available for audiences of varying levels of expertise** including those new to the industry. Training opportunities include instructor-led courses as well as online resources.

IN THIS SECTION...

- Instructor-Led Courses**
- Training Materials
- Participant Tool Training

Instructor-Led Courses

Introduction to Ontario's Physical Markets

This one-day workshop provides a basic explanation of Ontario's physical markets.

Target audience: Those new to Ontario's competitive wholesale electricity market.

Date: May 18, 2022

Location: MS Teams participation only

Fee: \$350 + applicable taxes
Refunds are available up to 1 day before event.

EventBrite Registration: <https://www.eventbrite.ca/e/introduction-to-ontarios-physical-markets-tickets-304203229047>

Instructor-Led Training

- **Introduction to Ontario's Physical Markets**

- Full day workshop provides a basic explanation of Ontario's physical markets

- **Settlements/Commercial Reconciliation**

- Half-day course includes both a presentation and a hands-on workshop

- **Capacity Auction Training**

- Half day workshop will cover participating in the IESO Capacity Auction.

- **Interjurisdictional Energy Trading**

- half-day workshop will cover trading in the IESO markets. Specific topics include: IESO market overview, NISL, intertie pricing, transaction timelines and Transmission Rights

Course Offerings

The following course delivery offerings are available

- Public Courses
 - **Courses Offered:** Introduction to Ontario's Physical Markets, Settlements/Commercial Reconciliation, *Capacity Auction , *Interjurisdictional Energy Trading
 - **Date:** Spring & Fall
- Private Training
 - **Courses Offered:** Full day or half day customized for to market participants needs
 - **Date:** Upon request and subject to availability

Online Training

IESO Online Training Material

- Online material include Workbooks, Training Guides and Quick Takes
- Application guides and manuals are designed specifically for individuals using IESO interfaces and tools.
- Allow market participants to learn at their own pace

Collaboration

- [Guide to IESO Workspaces](#)
- [IESO Gateway User Guide](#)
 - [IESO Gateway FAQ](#)
- IESO Gateway Recorded Webinar's
 - [July 21, 2021 - 11:00 am session](#)
 - [July 21, 2021 - 2:00 pm session](#)
- IESO Gateway EIM Test Plan Reference Guide
 - [EIM Market Participant Test Plan Reference Guide](#)
 - [Market Participants Test Cases](#)
 - [Issue Log Template](#)

Market Participation Tools

- [Submitting, Revising and Cancelling Energy Bids](#)
- [Submitting, Revising and Cancelling Energy Offers](#)
- [Submitting, Revising and Cancelling Schedules and Forecasts](#)
- [Submitting, Revising and Cancelling Import Offers and Export Bids](#)
- [Submitting, Revising and Cancelling Operating Reserve Offers](#)
- Meter Data Distribution User Manual
- [Outage Coordination and Scheduling System \(OCSS\) CROW Web Client User Guide](#)
- [Outage Coordination and Scheduling System \(OCSS\) CROW Web Client User Guide - Videos](#)
- [Web Based Dispatch Service, Market Participant's Guide](#)

Expanding Training Capability

- Establish new vehicles for training: E learning (online training course)
To meet the growing need for training in various areas
- Continually evolve and expand our training portfolio to meet customer needs

Thank You

ieso.ca

1.888.448.7777

customer.relations@ieso.ca

engagement@ieso.ca



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