JULY 2025

Need for Additional Regulation Service

Stakeholder Engagement Session

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Territory Acknowledgement

The IESO acknowledges the land we are delivering today's webinar from is the traditional territory of many nations including the Mississaugas of the Credit, the Anishnabeg, the Chippewa, the Haudenosaunee and the Wendat peoples and is now home to many diverse First Nations, Inuit and Métis peoples. We also acknowledge that Toronto is covered by Treaty 13 with the Mississaugas of the Credit First Nation.

As we have attendees from across Ontario, the IESO would also like to acknowledge all of the traditional territories across the province, which includes those of the Algonquin, Anishnawbe, Cree, Oji-Cree, Huron-Wendat, Haudenosaunee and Métis peoples.

Need for Additional Regulation Service

Purpose and Agenda

Purpose

- The purpose of this session is to present the need for additional Regulation Service capacity over the next 10 years as a result of an expected increase in industrial loads, such as electric arc furnaces
- The IESO will outline the technical specifications required for eligible facilities to provide Regulation Service and IESO's plan to acquire this additional Regulation capacity
- Following this presentation, we are requesting feedback from stakeholders to inform the IESO's next steps

Agenda

- What is Regulation Service?
- High Level Requirements
- Summary of 2025 APO’s Regulation Needs Assessment
- Detailed Technical Specifications
- Options for Acquiring Additional Regulation Service
- Summary
- Next steps

What is Regulation Service?

What are Ancillary Services?

Regulation Service is one of four Ancillary Services that the IESO utilizes.

Ancillary Services are services used to help ensure the reliable operation of the power system. Ancillary Services make up a relatively small component of all power system costs but are a critical part of the overall power system.

- Regulation Service
- Reactive Support and Voltage Control (RSVC)
- Black Start
- Operating Reserve*

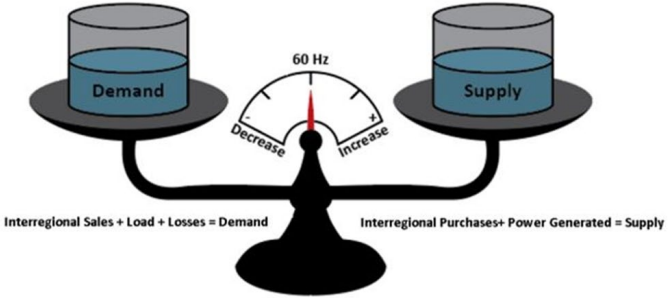
**OR is obtained from the market in Ontario*

What is Regulation?

- The IESO is required by NERC Reliability Standards to continuously match supply and demand
- During normal operations, it is typical for small mismatches between total demand and total supply to occur
- Typically, the system is designed to automatically respond to these small mismatches by making continuous adjustments that maintain the delicate balance
- Mismatches between supply and demand for different lengths of time require different services to respond

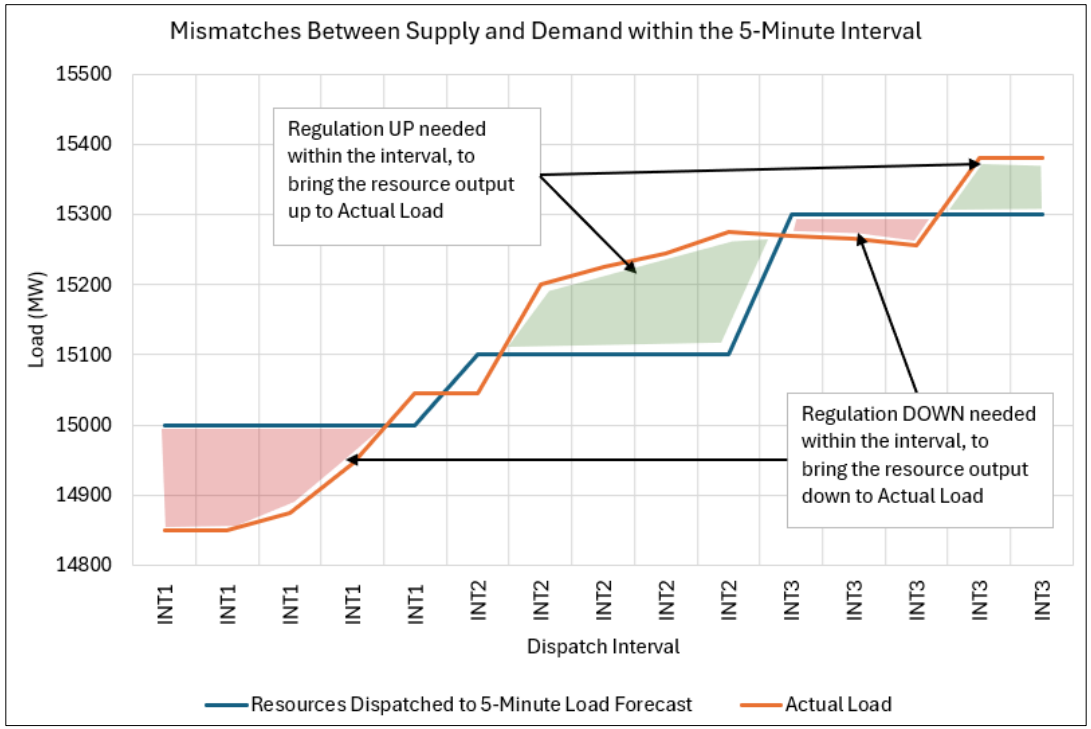
What is Regulation? Continued..

Mechanism	Inertial Response	Primary Frequency Response	Regulation	Operating Reserve	Ramping Capability
What is the response time?	Immediately following a system event	Within the first few seconds following a system event	Within less than 5-minutes of a mismatch between supply and demand	Within 10 minutes or 30 minutes of a system event	Five minutes to hours
How is balancing currently achieved?	Drawn from the stored kinetic energy of rotating equipment	Automatic adjustment of energy output by generators	Signal from IESO tools to a resource to adjust energy output	Activated by the IESO	Scheduled by the IESO's dispatch scheduling engine



- For Regulation service, instructions to begin ramping (up or down) are sent out every few seconds.
- Ramp rates are considered, and responses occur within the dispatch interval.

What is Regulation? Continued..



What is Regulation? Continued..

Regulation provides minute-to-minute balancing to ensure electricity supply matches demand and is currently provided by generation facilities with Automatic Generation Control (AGC) capability, which permits them to vary their output in response to signals sent by the IESO.

The IESO schedules a minimum of ±100 MW of Regulation at all times, as required by the Market Rules. This helps to maintain the balance between Ontario's supply and demand and the IESO's compliance with the relevant reliability standard, as established by the North American Electric Reliability Corporation (NERC).

What is Automatic Generation Control (AGC)?

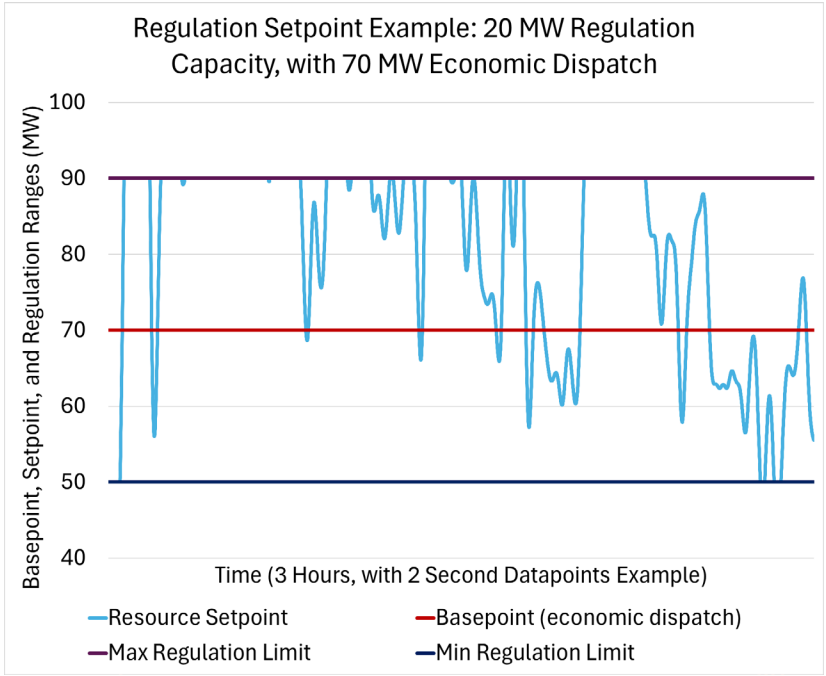
"Regulation" and "AGC" are often used interchangeably. But they do not mean the same thing:

Regulation means the service required to control power system frequency and maintain the balance between load and generation

Automatic Generation Control (AGC) refers to the process that automatically adjusts the output from a generation resource that is providing regulation

Other Important Terms

- Basepoint means the economic dispatch of the resource
- Setpoint means the expected output of the resource as sent by the AGC tool
- Min Regulation Limit means the minimum MW setpoint of the resource, based on the Regulation Capacity
- Max Regulation Limit means the maximum MW setpoint of the resource, based on the Regulation Capacity



High Level Requirements

High Level Requirements

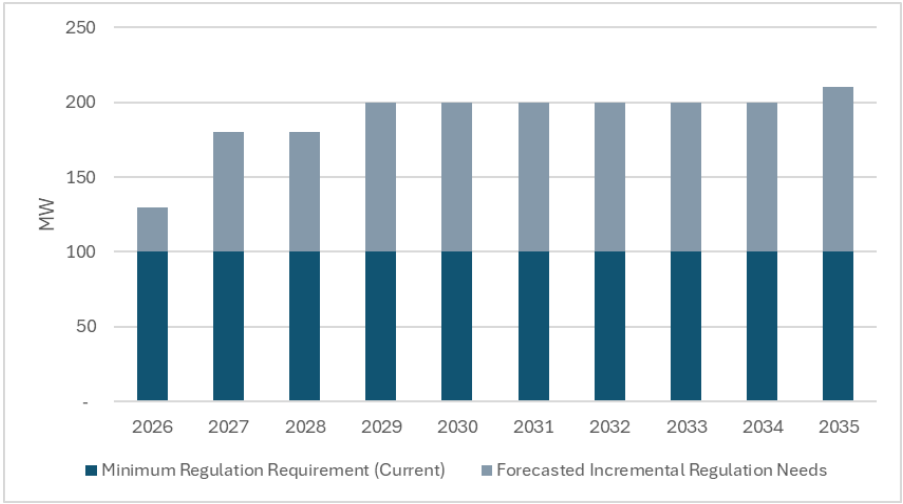
To provide Regulation, a generation resource must:

- Be dispatchable
- Have an energy ramp rate of at least 50% of the offered Regulation capacity per minute
- Be capable of receiving and following AGC signals every 2 seconds or less
- Currently, storage resources are not enabled to provide Regulation. Subsequent phases of the IESO's Enabling Resources Program will enable storage resources to be integrated into the IESO's Regulation service tools and systems. This will support the provision of Regulation service from storage resources if contracted and scheduled by the IESO.

2025 APO's Regulation Needs Assessment

Summary of 2025 APO's Regulation Needs Assessment

- The 2025 APO has determined there is an incremental Regulation need over the next 10 years. The needs arise as a result of an expected increase in industrial loads, such as electric arc furnaces.
- To maintain system balance over the next decade, incremental Regulation of 30 MW is required beginning as early as 2026, growing to 100 MW by 2029.



Detailed Technical Specifications

Ramping Requirements

As per Market Rules Chapter 0.5, Section 4.4.2, the energy ramp rates should be at least 50% of the offered Regulation capacity per minute. This means that the minimum ramp rate must be the full Regulation capacity per two minutes. This will ensure that the IESO's minimum ramp rate requirement of 50MW/min is always met, when delivering the minimum of 100 MW of Regulation capacity.

For example, a resource offering 20 MW of Regulation must be able to move at least 10MW/minute to reach its setpoint.

Telemetry and IT Requirements

A facility or resource providing Regulation must be capable of receiving and following control signals sent from the IESO at the rate of at least one signal every two seconds.

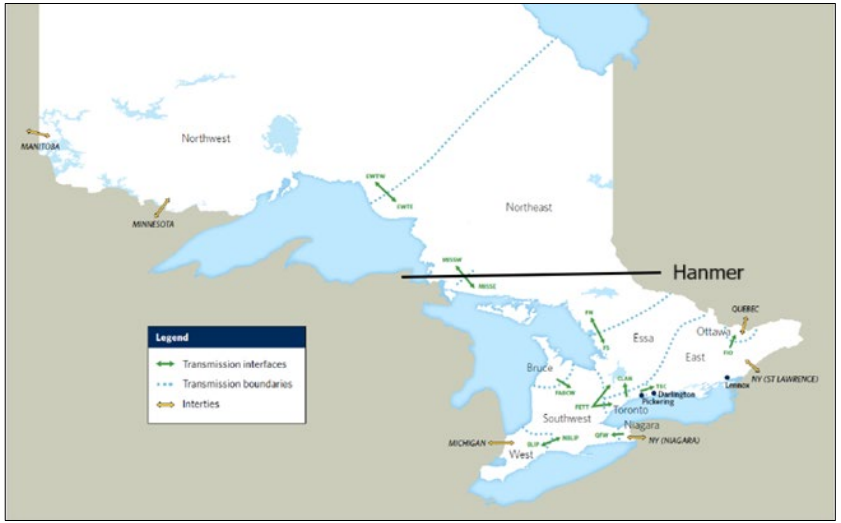
The resource or facility's programmable logic controller (PLC) system (or alternative control system, as applicable) must be able to receive the setpoints sent by the AGC system, and the associated control system must be able to adjust the hydraulic gate (for hydroelectric resources) or a turbine governor valve (for gas-fired/steam resources) accordingly, to change the output of the resource/facility according to the setpoint.

Locational Considerations

A number of factors influence the suitability of Regulation based on location:

- Congested zones
- Weather zones
- Zones with existing or expected transmission security or voltage concerns

For these reasons, the IESO is only seeking Regulation from facilities located south of Hanmer.



Operating Reserve Considerations

The IESO's dispatch scheduling tool is currently not able to simultaneously schedule Operating Reserve from a resource providing Regulation.

Resources providing Regulation will receive the real-time OR lost-opportunity cost make-whole payment to compensate them for the revenue they would have received if their Regulation schedule had not precluded them from providing Operating Reserve.

Regulation Capacity Considerations

The IESO is proposing that for additional Regulation, the minimum Regulation capacity that a resource can offer should be ±10 MW.

For example, for a 25 MW resource with a minimum loading point (MLP) of 5 MW, the Regulation capacity that can be provided is ±10 MW.

Options for Acquiring Additional Regulation Service

Acquisition Options

Bilateral Negotiations:

- The IESO could chose to enter bilateral negotiations with facilities that have been confirmed to meet technical requirements for providing Regulation

Competitive Procurement:

- A competitive procurement would consist of an RFP where qualified facilities can then submit bids to provide Regulation
- Bids would be evaluated based on mandatory technical requirements and pricing

Summary

- The IESO is seeking to acquire additional Regulation capacity to address the identified need for the next decade
- Technical requirements include size, location, IT and telemetry requirements
- The IESO is asking for feedback and questions from market participants interested in providing Regulation
- Based on feedback received, the IESO will consider how best to acquire the additional Regulation capacity

Indicative Timeline

Next steps

- The IESO invites written feedback on the materials presented by **August 8, 2025**. All written feedback should be submitted to **engagement@ieso.ca** utilizing the IESO Feedback Forms posted on the engagement webpage.
- Information about future engagement sessions and stakeholder feedback will be posted on the above webpage. Subscribe to the IESO Bulletin for updates.

Thank You

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Appendix – Relevant Market Rules and Manuals Sections

Telemetry and IT Requirements for Regulation Service Providers

- Market Rules Chapter 0.5, Appendix 5.1, Sections 1.1.1 and 1.1.2
- Market Rules Chapter 0.4, Section 7.3
- Market Rules, Chapter 0.4 Appendices 4.15 and 4.19
- Market Manual 0.6.0: Participant Technical Reference Manual, Sections 3 and 4

Control System Performance Requirements for Regulation Service Providers

- Market Rules Chapter 0.5, Appendix 5.1, Sections 1.1.6 and 1.1.7
- Market Manual 0.6.0: Participant Technical Reference Manual, Sections 3 and 4
- Market Rules Chapter 0.4, Appendix 4.2, Categories 1, 2 and 3, and associated requirements:
  - NERC standards MOD-027 and PRC-024
  - Ontario Resource and Transmission Assessment Criteria (ORTAC)
- Market Manual 0.1.6: Performance Validation
- IESO Form 58, Form 69 and Form 70

Ramping Requirements for Regulation Service Providers

- Market Rules Chapter 0.5, Appendix 5.1, Sections 1.1.3, 1.1.4, and
- Market Rules Chapter 0.5, Section 4.4.2

Testing Requirements for Regulation Service Providers

- Market Rules Chapter 0.5, Section 4.9.2.6

Regulation Capacity Requirements

- Market Rules, Chapter 0.5, Appendix 5.1, Section 1.1.5.