

# Requirements for the Provision of Regulation Service

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## Introduction

Market Participants (MPs) providing regulation service are contracted by the IESO to provide such services and are required to comply with the Market Rules applicable to the registration and provision of regulation service. This Quick Take summarizes Market Rules applicable to the registration process solely for general information purposes, and it should not be relied upon. MPs should consult the Market Rules to understand their rights and obligations thereunder.

## Need for a System Impact Assessment (SIA)

### **Existing Generation Facilities or Energy Storage Facilities directly connected to the IESO-controlled grid**

For an existing generation facility or energy storage facility that is directly connected to the IESO-controlled grid, an SIA has been completed at the time of its connection. The SIA confirmed the facility's compliance with the performance requirements at the time of its connection. A new SIA is generally not required, unless the facility is being modified for the provision of regulation service. If a facility is being modified for the provision of regulation service, the IESO may require a suite of new performance and model validation activities tests, and/or submissions of engineering information to demonstrate the applicable requirements of Market Rules are met. The MP needs to confirm with the IESO whether an SIA may be required.

### **New Generation Facilities or Energy Storage Facilities directly connected to the IESO-controlled grid**

All new generation and energy storage facilities that are intended to provide regulation require an SIA. Some of these facilities may have entered into a procurement contract with the IESO for the provision of regulation service, in which case the SIA may include the applicable technical requirements stipulated in the contract in addition to the standard requirements for regulation.

The IESO will determine the type of assessment (SIA or Expedited SIA (ESIA)) that is needed upon receiving the SIA application.

Typically, existing generation facilities and electricity storage facilities directly connected to the IESO-controlled grid or larger than 10 MW may only require simple studies that qualify for the Expedited SIA process. An ESIA requires three (3) to six (6) months to complete.

New generation facilities and electricity storage facilities directly connected to the IESO-controlled grid are likely to require an SIA, that typically takes six (6) to nine (9) months to complete.

Information on the Connection Assessment Application process can be found at this link: [Connecting to Ontario’s Power System](#).

## Implementing Regulation Service

Following the completion of the SIA or ESIA, a facility will have to undergo a regulation service registration and performance and model validation process, which involves the implementation of software and equipment to enable the applicable resources to receive and respond to regulation signals (through telemetry), integration into IESO tools and systems, as well as performance and model validation tests.

This section describes the tasks that MPs and the IESO need to perform for facilities for the provision of regulation service.

In general, all these tasks will be applicable when registering new regulation service providers, or if existing regulation service providers need to do any updates to parameters or capabilities.

### **Task 1: Register Resources with Regulation Service Capability**

The MP must register the resources to provide regulation service through Online IESO, to provide registration parameters and other associated information to the IESO.

The following parameters are required from the MP on a resource level/facility level, which will be used in various IESO tools.

**Table 2-1: Parameters to be Used in IESO Tools**

Parameter	Description
MIN LIMIT	This is the minimum MW capability of the resource in MW (the minimum output at which regulation service can be provided)
MAX LIMIT	This is the maximum MW capability of the resource in MW (the maximum output at which regulation service can be provided)
MIN RANGE	This is the minimum regulation service value that can be entered as an offered regulation service amount. The minimum would be

Parameter	Description
	the value that is the lowest regulation service for which a resource would provide a regulation schedule (in this example, 1 MW).
MAX RANGE	This is the maximum regulation service value that can be entered as an offered regulation service amount. The maximum would be the value that is the highest regulation service for which a resource would provide a regulation schedule.
Max Rise Ramp Rate (MW/min)	This is the maximum ramp rate up when providing regulation service (i.e. the regulation service up ramp rate).
Max Down Ramp Rate (MW/min)	This is the maximum ramp rate down when providing regulation service (i.e. the regulation service down ramp rate).
Speed Droop (%)	<p>Droop is the percentage amount of speed (frequency) decline that would be necessary to cause the governor controller to increase the <i>active power output</i> of the unit from 0% to 100%.</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• Droop may also refer to the speed decline necessary to cause the governor to increase the prime mover's control mechanism (e.g., gate or valve) position from fully closed (0%) to fully open (100%).</li> <li>• IESO droop requirements refer to the expected active power response to frequency changes, and power percentage values are based on the maximum active power capability.</li> </ul>

**Task 2: Confirm and Establish Telemetry associated with Regulation Service**

The IESO will provide a list of telemetry requirements for regulation resources. The IESO will provide the list to the MP via an Excel document. Further details can be found in Tables 2-2, 2-3 and 2-4.

**Table 2-2: Telemetry Status Point Description**

Point ID	Sequence Number	RTU DNP index	Equipment Name	Equipment Type	RTU Representation	Other Information or Comments
RESOURCE-NAME:AGC_STAT				AGC STATUS	1 = Enable AGC; 0= Disable AGC	AGC Controller Status for the aggregate
RESOURCE-NAME:ESTAT				BREAKER	1 = Close; 0 = Open	Breaker status

**Table 2-3: Telemetry Analog Point Description**

Point ID	Sequence Number	RTU DNP Index	Equivalent Engineering Value Range		Engineering Resources	Other Information or Comments
			MIN	MAX		
RESOURCE-NAME_BUS:KV					kV	Bus Voltage
RESOURCE-NAME_BUS:FREQ					Hz	Frequency
RESOURCE-NAME:MW					MW	Generator Active Power
RESOURCE-NAME:MX					MVAr	Generator Reactive Power

**Table 2-4: Telemetry Setpoints**

Point ID	Sequence Number	RTU DNP index	Transducer Output Range (ma)		Equivalent AI Input Range (volt)		Equivalent Engineering Value Range		Engineering Resources	Other Information or Comments
			MIN	MAX	MIN	MAX	MIN	MAX		
RESOURCE-NAME:AGC_SP									MW	This is an Analog Output for the IESO

**Task 3: Establish Telemetry and Communication Requirements**

The IESO needs to ensure that communication meets regulation performance requirements. All relevant parameters are listed in Tables 2-1 through 2-4.

Further details can be found in the Requirements for the Provision of Regulation Service section of this Quick Take.

**Task 4: Communication Path for RTU Testing for Telemetry**

The IESO will need a technical contact with the MP to schedule and conduct testing for connectivity.

Telemetry Test: All the points used by AGC should be tested with the MP. An update to the model may be needed after this test. Repeat the testing after the update.

Further details can be found in the Requirements for the Provision of Regulation Service section and high level steps are described in Task 8 of this Quick Take.

## Task 5: Update/Establish Regulation Parameters for Resources within the IESO Tools

For testing, the IESO will need to configure relevant IESO tools/platforms in a test environment (e.g. QA).

For DSO tool testing, MPs must ensure the energy offers entered into the IESO system for the resources offering regulation service amounts are correct, so that IESO tools can calculate their economic basepoint correctly.

## Task 6: Regulation Service Resource Tuning/Calibration

The IESO will need a technical contact with the MP to schedule and conduct testing for connectivity for calibration and tuning. This can only be done after Tasks 1–5 have been completed.

The MP can either bring the resource online to test track the signal, or just do signal testing at first to make sure the signal is being received.

The high-level steps during coordinated signal testing between the IESO and the MP are listed below in Table 2-5. It is recommended, but not strictly necessary, to perform regulation service testing during a period where the MP has already scheduled the resource to generate and has an energy dispatch schedule.

**Table 2-5: High Level Steps during Coordinated Testing between the IESO and MP**

Step	Completed by	Action
1	MP	<b>Confirm</b> staff to coordinate with the IESO.
2	IESO	<b>Inform</b> the MP that they need to submit an outage slip in the planning time frame for the required testing in production.

For resource AGC tracking, the following actions will be taken:

**Table 2-6: Resource AGC Tracking**

Step	IESO Action
1	<b>Place</b> the resource's Control Mode into <b>Test</b> .
2	Enter <b>Middle</b> value into "Test Cmd MW" with a Test Time of 15 AGC Cycles (1 minute).
3	Enter <b>High</b> value into "Test Cmd MW" with a Test Time of 15 AGC Cycles (1 minute).
4	Enter <b>Low</b> value into "Test Cmd MW" with a Test Time of 15 AGC Cycles (1 minute).
5	Enter <b>High</b> value into "Test Cmd MW" with a Test Time of 15 AGC Cycles (1 minute).
6	Enter <b>Middle</b> value into "Test Cmd MW" with a Test Time of 15 AGC Cycles (1 minute).

Step	IESO Action
7	Enter <b>any values</b> for testing that the MP would like for their own purposes (such as what happens if a signal outside the normal range is received).
8	<b>Place</b> the resource’s Control Mode back into <b>Manual</b> .

The IESO can perform signal testing as described above without the resource needing a regulation service schedule. The MP will set the AGC Control Mode to TEST for the testing. The IESO will only get alarms if the resource’s AGC Control Mode is set to SReg while it has an active regulation schedule.

The IESO does not get alarms when the MP switches the AGC Control Status from Remote to Local and vice versa. In practice, if the MP switches their Control Status from Remote to Local while they have a regulation service schedule, the AGC tool will automatically switch their Control Mode from SReg to Manual and the IESO will receive an alarm. During testing without a schedule, it is expected that the IESO would not get any alarms. For this reason, it is preferable to do the signal testing when there is no regulation service schedule in the IESO tools.

**Task 7: Final Performance Validation and Testing**

The IESO will need a technical contact with the MP to schedule and conduct final performance and model validation, if required.

The facility must demonstrate that it achieves the applicable requirements of Market Rules Appendix 4.2, i.e. Categories 1, 2, and 3. These requirements include that the facility’s controls provide primary frequency response, and that the implemented protections respect ride through requirements.

It should also be confirmed that the facility’s maximum active power capability and ramping rates are consistent with the intended amount of regulation service to be provided and this can be checked by the IESO.

MPs may have already demonstrated that their facility meets these requirements. If the IESO can confirm this to be the case, and the implementation of the new AGC functionality has not entailed any changes that could cast doubt on the continued validity of a previous validation, then new testing and information submissions may not be required.

Where performance and model validation are required, the information must be submitted to the IESO using one or more of the following IESO forms:

<b>Form number</b>	<b>Form Name</b>
<a href="#">Form 56</a>	Active and Reactive Capability Verification
<a href="#">Form 58</a>	Verification of Models and Data for Generator Turbine/Governor and Load Control
<a href="#">Form 69</a>	Verification of Coordination of Generator Capabilities, Limiters and Protections
<a href="#">Form 70</a>	Verification of Generator Frequency and Voltage Protective Relay Settings
<a href="#">Form 90</a>	Generator Relay Loadability – Synchronous Type Generation

Other forms may be required, and additional guidance may be available for MPs as they plan to execute testing, or to complete the necessary information submissions.

**Task 8: Ensure All Contractual Requirements Have Been Met**

The IESO is responsible to ensure that all requirements from the Regulation Service Agreement have been met.

**Task 9: Registration Approval Notification**

The IESO will issue a new Registration Approval Notification (RAN) when all tasks are complete, and the MP is approved to start providing regulation service.

# Requirements for the Provision of Regulation Service

## Telemetry Requirements for MPs

The Market Rules requirements relating to telemetry may be found in the following documents:

- Market Rules Chapter 5, Appendix 5.1, sections 1.1.1 and 1.1.2
- Market Rules Chapter 4, section 7.3
- Market Rules, Chapter 4 Appendices 4.15 and 4.19
- Market Manual 6.0: Participant Technical Reference Manual, sections 3 and 4

Summary:

- The telemetry requirements for a 'major generation facility' listed in Appendix 4.15 apply.
  - Particular attention should be paid to ensure the telemetry meets the requirements of Appendix 5.1, Section 1.1.2, which may be incremental to (or at least more specific than) App. 4.15 requirements.
- The 'high performance' criteria of App. 4.19 are required (e.g.,  $\leq 2$  seconds between telemetry samples, etc.).

## Control System Performance Requirements for MPs

The requirements relating to performance of the control systems involved in providing regulation service may be found in the following documents:

- Market Rules Chapter 5, Appendix 5.1, sections 1.1.6 and 1.1.7
- Market Manual 6.0: Participant Technical Reference Manual, sections 3 and 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 1.6: Performance Validation
  - ESO Forms 58, 69 and 70

Summary:

- The control system must be capable of receiving control signals sent every two seconds or less, and must distribute the commands to resources within two seconds (if relaying from a central control center to other facilities).
- The control system requirements of the Participant Technical Reference Manual (sections 3 and 4 in particular) apply.
- Resources providing regulation service need to demonstrate that they meet the IESO's deadband, droop, and speed & magnitude of response requirements (i.e., provide the required primary frequency response, even while providing Regulation Service).
  - This is as would typically be done to satisfy MOD-027 and IESO Form 58 requirements – but **while operating with the AGC controller in service.**

- **Note:** Existing AGC controllers may not have this implemented.
- Resources providing regulation service need to demonstrate that they meet Voltage and Frequency Ride Through requirements.
- This is as would typically be done to satisfy PRC-024 and IESO Forms 69 and 70 requirements.

### **Ramping Requirements for Regulation Service**

The Market Rules requirements relating to regulation service ramping rates may be found in the following documents:

- Market Rules Chapter 5, Appendix 5.1, sections 1.1.3, 1.1.4, and Market Rules Chapter 5, section 4.4.2.

Summary:

- Market Rules Chapter 5, Appendix 5.1, sections 1.1.3 and 1.1.4 indicate that the contracted regulation capacity must be provided, with movements within the capacity (up or down) achieved at the registered ramp rate.
- Market Rules Chapter 5, section 4.4.2 requires the IESO to ensure that sufficient regulation capacity is scheduled every hour with a ramp rate that is at least 50% of the required regulation capacity. The IESO ensures this by only contracting with regulation service providers able to provide regulation service with at least a 50% ramp rate (MW/min) of the regulation capacity to be scheduled, so that these reliability requirements can be satisfied by any combination of regulation service providers.
- Otherwise, the ramping rate is subject to agreement.
  - Higher ramping rates are preferable to lower ramping rates, all else being equal.

### **Testing Requirements for Regulation Service**

IESO Requirements pertaining to testing of the regulation service may be found in:

- Market Rules Chapter 5, section 4.9.2.6

Summary:

- Testing of regulation service providers shall be conducted annually according to procedures specified in the Ancillary Service Provider Agreement.
  - Testing of requirements associated with Control System performance (e.g., telemetry and control signal propagation delays; confirmation that the Appendix 4.2 requirements are met – such as AGC controller not inhibiting primary frequency response) are not specifically addressed in the sample ASP agreement.
    - Behavior of AGC controllers, in regard to possible inhibition of Primary Frequency Response, can be reviewed when MOD-027 (IESO form 58) control testing/performance validation is done – this is NOT routinely done at present.

- Verification of ride through requirements should be the same as for all generation facilities and electricity storage facilities (i.e., IESO Form-58); confirmation that ride through capabilities have been verified is required.

## Additional Resources

Training Materials are available on the IESO [Marketplace Training](#) web page:

- Work Book: Introduction to Ontario's Physical Markets
- Guide: Communicating with the IESO: Dispatchable Loads
- Quick Take: Regulation Service through Automatic Generation Control

## Contact Us

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