PUBLIC

Market Manual

Market Manual 1: Connecting to Ontario's Power System

Part 0.1.5: Market Registration Procedures

Issue 2.0

April 25, 2025

This *market manual* provides details regarding the registration requirements for participation in the *day-ahead market* and the *real-time market*.

Document Change History

Issue	Reason for Issue	Date
Refer to Issue 9.0 (PRO-408) for changes prior to Market Transition.		
1.0	Market Transition	November 11, 2024
2.0	Updated in advance of MRP Go Live – May 1,2025	April 25, 2025

Related Documents

Document ID	Document Title
MAN-129	Market Manual 1.4: Connection Assessment and Approval
MAN-130	Market Manual 1.6: Performance Validation

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Reference	Description of Change

Market Transition

A.1.1 This *market manual* is part of the *renewed market rules,* which pertain to:

A.1.1.1 the period prior to a *market transition* insofar as the provisions are relevant and applicable to the rights and obligations of the *IESO* and *market participants* relating to preparation for participation in the *IESO administered markets* following commencement of *market transition;* and

A.1.1.2 the period following commencement of *market transition* in respect of all the rights and obligations of the *IESO* and *market participants.*

A.1.2 All references herein to chapters or provisions of the *market rules* or *market manuals* will be interpreted as, and deemed to be references to chapters and provisions of the *renewed market rules.*

A.1.3 Upon commencement of the *market transition*, the *legacy market rules* will be immediately revoked and only the *renewed market rules* will remain in force.

A.1.4 For certainty, the revocation of the *legacy market rules* upon commencement of *market transition* does not:

A.1.4.1 affect the previous operation of any *market rule* or *market manual* in effect prior to the *market transition*;

A.1.4.2 affect any right, privilege, obligation or liability that came into existence under the *market rules* or *market manuals* in effect prior to the *market transition*;

A.1.4.3 affect any breach, non-compliance, offense or violation committed under or relating to the *market rules* or *market manuals* in effect prior to the *market transition*, or any sanction or penalty incurred in connection with such breach, non-compliance, offense or violation; or

A.1.4.4 affect an investigation, proceeding or remedy in respect of:

(a) a right, privilege, obligation or liability described in subsection A.1.4.2; or

(b) a sanction or penalty described in subsection A.1.4.3.

A.1.5 An investigation, proceeding or remedy pertaining to any matter described in subsection A.1.4.3 may be commenced, continued or enforced, and any sanction or penalty may be imposed, as if the *legacy market rules* had not been revoked.

Market Manual Conventions

The standard conventions followed for market manuals are as follows:

- The word 'shall' denotes a mandatory requirement;
- References to *market rule* sections and sub-sections may be abbreviated in accordance with the following representative format: '**MR Ch.1 ss.1.1-1.2'** (i.e. *market rules,* Chapter 1, sections 1.1 to 1.2).
- References to *market manual* sections and sub-sections may be abbreviated in accordance with the following representative format: '**MM 1.5 ss.1.1-1.2'** (i.e. *market manual* 1.5, sections 1.1 to 1.2).
- Internal references to sections and sub-sections within this manual take the representative format: 'sections 1.1 – 1.2'
- Terms and acronyms used in this *market manual* and its appended documents that are italicized have the meanings ascribed thereto in **MR Ch.11**;
- All user interface labels and options that appear on the IESO gateway and tools are formatted with the bold font style; and
- Data fields are identified in all capitals.

– End of Section –

1. Introduction

1.1 Purpose

This *market manual* provides administrative and procedural details to the *market rules* governing the procedures related to Market Registration, including supplementary information relevant to understanding the rights and obligations of the *IESO* and *market participants*.

Market manuals must be read in conjunction with the applicable *market rules*. Where there is a conflict between a *market manual* and the *market rules*, the *market rules* shall prevail.

MM 1.5 is the second of three *market manuals* that cover the Connecting to Ontario's Power System process. The Connecting to Ontario's Power System process consists of six stages, which are described in the *market manuals* listed in Table 1-1.

Table 1-1: Market Manuals Related to the Connecting to Ontario's Power System Process

Stage	Market Manual
1-Prepare application	**MM 1.4**
2-Obtain conditional approval to connect	
3-Design and build	N/A[1]
4-Authorize market and program participation (also called Participant Authorization)	**MM 1.5**
5-Register equipment	
6-Commission equipment and validate performance	**MM 1.5**, and **MM 1.6**

[1] The "Stage 3: Design and build" activities are determined between the *connection applicant* and its associated *transmitter* or *distributor* after the completion of Stages 1 and 2.

This *market manual* contains the Market Registration procedures, which encompass all of Stages 4 and 5 of the process, in addition to Commission Equipment procedures for Stage 6.

These procedures are comprised of:

- authorize market and program participation (described in section 2);
- register and commission equipment (described in section 3);
- maintain *market participant,* program participant, *facility*, *resource,* and equipment data registered with the *IESO* (described in section 4);
- deregister and disconnect an existing *facility* and its associated *resources* (described in section 5); and
- withdraw a *market participant* from the *IESO-administered markets* (described in section 5).

In some cases, an *IESO* contract will require an organization to register as a program participant regardless as to whether it has a *facility* that is connected to the *IESO-controlled grid*.

Meter registration must be completed for any *facility* connecting to the *IESO-controlled grid* or where any financial transaction associated with such a *facility* is to be settled by the *IESO*. For information on procedures relating to the registration of *meter points* and submission of *meter* totalization tables, refer to **MM 3.0**.

The content of this *market manual* serves as a roadmap for *market participants*, program participants and service providers and reflects the requirements set out in the *market rules* and in certain standards and policies established by the *IESO*.

The procedures in this *market manual* are applicable to:

- any person wishing to apply for participation in the *IESO-administered markets* or programs, or wishing to apply as a service provider (Stage 4);
- any *market participant* or program participant wishing to register equipment (Stage 5);
- any *market participant* or program participant wishing to commission equipment (Stage 6);
- any *market participant* or program participant wishing to update their equipment data;
- any *market participant,* program participant, or service provider wishing to update their registration data;
- any *market participant* or program participant wishing to deregister equipment; and
- any *market participant,* program participant, or service provider wishing to withdraw their participation from one or more of the *IESO-administered markets* or programs.

Owners of new *facilities* connecting to the *IESO-controlled grid,* providing an *ancillary service* for the *IESO*, or modifying an existing *facility* registered with the *IESO* are required to complete Stages 1 through 3 of the Connecting to Ontario's Power System process before starting the Market Registration procedures described in this *market manual*. Stages 1 and 2 are described in **MM 1.4**.

1.2 Scope

This *market manual* supplements the following *market rules*:

- MR Ch.1 s.11: Information Disclosure
- MR Ch.2 and Appendix: Participation
- MR Ch.3 s.2: Dispute Resolution
- MR Ch.3 s.6: Enforcement
- MR Ch.4 s.7: Provision of Connection-Related Information
- MR App.4.15: IESO Monitoring Requirements: Generators
- MR App.4.19: IESO Monitoring Requirements: Generator Performance Standards
- MR App.4.24: IESO Monitoring Requirements: Electricity Storage Participants
- MR Ch.5 s.4.8: Reliability Must-Run Resources
- MR Ch.5 s.4.9: Auditing and Testing of Ancillary Services
- MR Ch.5 s.11: Emergency Preparedness and System Restoration
- MR Ch.5 App.5.1 s.1.2: Operating Reserve
- MR Ch.6 s.5.1.3
- MR Ch.7 s.2: Registration for Physical Operations in the Day-Ahead Market and Real-Time Market
- MR Ch.7 s.3.5.10
- MR Ch.7 s.3.5.11
- MR Ch.7 s.9.4: The Effect of Grid Connection Requirements
- MR Ch.7 s.9.5: Payment for Ancillary Services and Recovery of Costs
- MR Ch.7 s.18: Capacity Auctions
- MR Ch.7 s.21: Electricity Storage in the IESO-Administered Markets
- MR Ch.7 s.22: Market Power Mitigation
- MR Ch.8 s.3.8: Participation in TR Markets and Rules Applicable to TR Participants
- MR Ch.9 s.2.1.2
- MR Ch.9 s.4.4: Day-Ahead Market Generator Offer Guarantee
- MR Ch.9 s.4.5: Real-Time Generator Offer Guarantee
- MR Ch.9 s.6.20: Settlement Accounts

- MR Ch.11: Definitions

1.3 Training and Reference Documents

The Marketplace Training page of the *IESO* website contains workbooks, training guides, and quick takes that applicants can use, specific to each participation type. Instructor-led courses are also available for applicants.

The Connection Process page of the *IESO* website contains guidance on the overall connection process and the standard timelines for stages and activities.

1.4 Contact Information

Changes to this *market manual* are managed via the *IESO* Change Management process. Stakeholders are encouraged to participate in the evolution of this *market manual* via this process.

To contact the *IESO*, *market participants* can email *IESO* Customer Relations at customer.relations@ieso.ca or use telephone or mail. Telephone numbers and the mailing address can be found on the *IESO* website . *IESO* Customer Relations staff will respond as soon as possible.

– End of Section –

2. Authorize Market and Program Participation

2.1 Register an Organization

(MR Ch.2 s.3.1.1 and 3.1.3)

Prospective *market participants*, program participants, and service providers must register their organization through the Online Application Form on the *IESO* website. An entity may be registered as any or all of a *market participant*, program participant, and/or service provider.

The Online Application Form is divided into four sections, whose requirements are described further in Table 2-1.

Table 2-1: Online Application Form Descriptions

Section		Contents and Description
1	**Organization Information**	This section contains the following fields: **Organization Name**, **Organization Short Name** (maximum of eight characters), **Address**, **Main Phone Number**, **Web Address** and **HST Registration Number** (if applicable).
2	**Active Organization Evidence**	This section contains the following fields: • **Business Entity Type:** The applicant identifies the type of business (e.g., corporation, LLP, proprietorship, etc.), business identification number (if applicable) and jurisdiction of registration.[2] • **Intent of Registration:** The applicant identifies whether they intend to register as a *market participant,* program participant, or a service provider.
3	**Mandatory Organization Contacts**	This section requires applicants to identify at least one person (preferably more) in their organization for each of the following contact types: • Authorized Representative • Primary Contact • Rights Administrator • Applicant Representative

[2] The *IESO* will conduct a business registry search to confirm evidence of an active organization, including the registered officers and current status. The jurisdiction of registration must be within Canada or the U.S.A.

Section		Contents and Description
		These contact types and all organization contact roles are described in the Online IESO Guide for all Contact Roles. For information on changing a mandatory contact, refer to section 4.1.4.
4	**Submitter's Contact Information**	The section collects the name and contact information of the person who will be the *IESO*'s point of contact during the registration process.

The data submitted using the online application form will be validated by the *IESO*. In some cases, the *IESO* may request clarification pursuant to **MR Ch.2 s.3.1.3** and the data may need to be revised by the prospective *market participant*, program participant, or service provider before it is approved. Once approved, the *IESO* will create organization and contact records in Online IESO using the submitted data.

2.1.1 Participation Agreement

(MR Ch.2 s.1.2.2 and MR Ch.6 s.5.1.3)

Once the organization and contact records in Online IESO are established, a *participation agreement* is generated and couriered to the Applicant's Authorized Representative for signature and return to the *IESO.*[3] An executed *participation agreement* is required for a participant to be authorized pursuant to **MR Ch.2 s.1.2.2.3** or **MR Ch.6 s.5.1.3.2**.

Once the *IESO* receives the signed *participation agreement*, the *IESO* reviews and signs the *participation agreement* and sends a hard copy of the executed *participation agreement* to the prospective *market participant,* program participant, or service provider. A copy of the fully executed *participation agreement* will be accessible from Online IESO.

2.1.2 Initial Access to Online IESO

(MR Ch.2 s.3.1.1)

The *IESO* will provide initial access to Online IESO, through an email notification, to all of the prospective *market participant's*, program participant's, or service provider's mandatory organization contacts following the execution of the *participation agreement*. Mandatory contacts can complete their assigned Manage Participation procedures (i.e., Actions) in Online IESO.

[3] Under extraordinary circumstances, the *IESO* may email the *participation agreement* to the prospective *market participant*'s or program participant's authorized representative.

2.2 Register as a Market Participant

2.2.1 Submission Requirements

(MR Ch.2 ss.1.2.2.4, 1.2.2.6 and 3.1.2, MR Ch.7 s.22.9, and MR Ch.9 ss.6.20.12 and 6.20.13)

When registering as a *market participant* pursuant to **MR Ch.2 ss.1.2** and **3.1**, a prospective *market participant* must submit the applicable information described in Table 2-2 through Online IESO. The prospective *market participant* may contact the *IESO* at market.registration@ieso.ca for additional information about requirements that may be applicable for their intended participation type.

Table 2-2: Submission Requirements for Market Participant Authorization

Submission Requirement	Description
IESO Market Entry Application Fee	The *IESO* charges an application fee for authorization of market participation (**MR Ch.2 s.3.1.2.1**).
Ontario Energy Board Licence	Prospective *market participants* must have an *OEB licence* for each class of *market participant* (refer to section 2.2.2) for which they intend to conduct market activities (**MR Ch.2 s.1.2.2.4**). *Transmission rights participants*, *virtual traders, capacity auction participants* or c*apacity market participants* using solely *demand response resources* do not require an *OEB license* for that class of participation.
Canadian Bank Account	Each prospective *market participant* to be paid or *invoiced* by the *IESO* must submit relevant Canadian bank account information (**MR Ch.9 ss.6.20.12-6.20.13**).
Import/Export/ e-Tag Data	Prospective *market participants* seeking authorization as an *energy trader* are required to identify all *interties* between the *IESO control area* and adjacent *control areas* across which they wish to import, export or wheel *energy* and import or export *operating reserve*[4] as stated in **MR Ch.7 s.2.2.7**. These prospective *market participants* must obtain the relevant e-Tag[5] capability and submit relevant data associated with the e-Tag. The e-Tag specifications and schema are maintained by the North American Energy Standards Board ("NAESB") and facilitate the processes

[4] Market participants may import energy and operating reserve but can only export energy.

[5] For information on e-Tags, refer to the North American Energy Standards Board website.

Submission Requirement	Description
	required by the *NERC* and NAESB standards related to *interties*.
Canada Energy Regulator Permit	Prospective *market participants* seeking authorization as *energy traders* to export or wheel electricity over *interties* between the *IESO control area* and adjacent *control areas* must obtain export permits issued by the Canada Energy Regulator ("CER") and must submit the permits to the *IESO* (**MR Ch.7 s.2.2.7.2**).
Harmonized Sales Tax Registration Number	Prospective *market participants* must obtain and submit to the *IESO* a Harmonized Sales Tax (HST) registration number (**MR Ch.2 s.3.1.1.2(a)**).[6] Prospective *market participants* that intend on solely participating as either a *TR participant*, *a virtual trader* or a *capacity auction participant* are not required to submit an HST registration number, but must indicate their intent in the **HST Registration Number** field of the Online Application Form.
Prudential Support	Each prospective *market participant* must obtain and submit their *prudential support obligation* for approval by the *IESO* pursuant to **MR Ch.2 s.5, 5B, 5C,** or **5D**. For more information, refer to **MM 5.4**.
Emergency Preparedness Plan	Most prospective *market participants* are required to prepare and submit an *emergency preparedness plan* for approval by the *IESO*. Prospective *market participants* intending to: • authorize as a *capacity market participant*, *distributor*, *generator*, *wholesale consumer*, *electricity storage participant* or *transmitter* are required to complete and submit an *emergency preparedness plan* that meets all applicable requirements in sections 2 and 3 of the Market Participant Emergency Plan Guidelines & Requirements document; or • authorize as an *energy trader* are required only to submit a single-page *emergency preparedness plan*, as provided in the template in section 2 of the Market Participant Emergency Plan Guidelines & Requirements document.

[6] For information on HST registration, refer to the Canada Revenue Agency website.

Submission Requirement	Description
	Capacity auction participants, *TR participants* and *virtual traders* are not required to submit an *emergency preparedness plan*. **MR Ch.5 s.11** describes the content requirements for an *emergency preparedness plan*. For more information on EPP preparation, refer to: • **MM 7.10**, Appendix C • Market Participant Emergency Plan Guidelines & Requirements
Market Control Entity	The entities required to be disclosed pursuant to **MR Ch.7 s.22.9.2**.
Market Control Entity for Physical Withholding	Most prospective *market participants* are required to designate a *market control entity for physical withholding* for their *dispatchable resources*, pursuant to **MR Ch.7 ss.22.9.3-22.9.7**.

2.2.2 Types of Market Participants

(MR Ch.2 s.1.2.1)

Prospective *market participants* select their applicable *market participant* types in Online IESO. Table 2-3 lists the *market participant* types and the markets in which they may participate.

Table 2-3: Types of Market Participants and Scope of Participation

Type	Scope of Market Participation
Capacity Auction Participant	A person who participates in the *capacity auction* and submits *capacity auction offers*. For more information on *capacity auctions*, refer to **MM 12.0**.
Capacity Market Participant	A *capacity auction participant*, who secures a *capacity obligation* through a *capacity auction* and satisfies the requirements contemplated in **MR Ch.7 s.18**. For more information on *capacity auctions*, refer to **MM 12.0**.
Distributor	*Distributors* may participate in the *energy market* only.
Electricity Storage Participant	*Electricity storage participants* may participate in the *energy* and *operating reserve* markets and may also provide certain ancillary services, all subject to the requirements of **MR Ch.7 s.21**.

Type	Scope of Market Participation
Energy Trader	A person who may participate in the *energy market, procurement market* or *operating reserve market* by importing, exporting, or wheeling electricity.[7] Participation in the *operating reserve market* is restricted to *energy traders* that intend to import *energy*.
Generator	*Generators* may participate in the *energy market, operating reserve market* and *procurement market*..
Load	A load may participate in both the *energy market, operating reserve market*, and *procurement market*.
Retailer	*Retailers* may participate in the financial markets for *settlement* purposes only.
Transmitter	*Transmitters* may participate in the *energy market* only.
TR Participant	*TR participants* may participate in the *TR market*. For information on the participation in the *TR market,* refer to **MM 4.4** and **MR Ch.8 s.3.8**.
Virtual Trader	*Virtual traders* may participate in the *energy market* and submit *dispatch data* in the *day-ahead market* only.

2.2.3 Organization Roles and Responsibilities

(MR Ch.2 s.3.1.1)

Table 2-4 describes the organization roles applicable to *generators*, *electricity storage participants*, *wholesale consumers*, and *capacity market participants*. Other than for *facilities* referred to in **MR Ch.7 ss.3.5.10** and **3.5.11**, one organization may fill one, more, or all of the roles, depending on its qualifications and responsibilities. In all cases, any organization fulfilling a role must be authorized as a *market participant*.

[7] Imports and/or export trades are from or to the Ontario *energy market*. For example, a *market participant* seeking to export *energy* from a *facility* within Ontario will have to submit both an *offer* for that *energy* into the Ontario real-time market and a *bid* to export that *energy* into another *control area*. The first *offer* would be associated with the *resource* that is registered with the *IESO*. The second *offer* would be associated with a *boundary entity resource*. Refer to **MM 4.1** for more information on this process.

Table 2-4: Organization Roles and Responsibilities

Role	Responsibility
Owner	The *market participant* who owns and maintains a *facility* or specific equipment within a *facility*. The owner is responsible for completing the Register Equipment procedure and assigning the *registered market participant*, *metered market participant* and operator role relationships to equipment or *resources* if applicable.
Operator	The *market participant* responsible for operating the equipment within a *facility* in real-time operations.
Registered Market Participant	Refer to the **MR Ch.11** definition of a *registered market participant*.
Metered Market Participant	Refer to the **MR Ch.11** definition of a *metered market participant*.
Metered Market Participant Transmission	The *market participant* responsible for paying for one or more transmission services to a *transmitter* relating to an owned *facility*.

For *electricity storage facilities* and *generation facilities* under the same *connection point* (the *facilities* referred to in **MR Ch.7 ss.3.5.10 and 3.5.11**):

- the *registered market participant*, *metered market participant*, and Operator of each associated *resource* must be the same *market participant*;
- the Owner of the storage *generation resource* and the storage *load resource* must be the same *market participant*; and
- the Owner of the *generation resource* may be a different *market participant* than the Owner for the storage *resources*.

2.2.4 Registration Approval Notification for a Market Participant

(MR Ch.2 s.4.1.1)

The Applicant Representative(s) of prospective *market participants* who have sufficiently completed their assigned submission tasks in Online IESO, will receive an order authorizing, or conditionally authorizing, the Applicant as described in **MR Ch.2 s.4.1.1**. This order will be emailed to the Applicant Representative in the form of a RAN or conditional RAN.

After the *IESO* issues the RAN, the applicant is registered as a *market participant* and can begin the Register Equipment procedure described in section 3, if applicable.

2.3 Register as a Program Participant

2.3.1 Submission Requirements

(MR Ch.2 s.3.1.1)

Prospective program participants registering in one or more *IESO* programs where billing and effecting payment in respect of financial obligations or transactions will be processed by the *IESO*, but who are not applying to become authorized as a *market participant*, must submit the information described in Table 2-5 through Online IESO. Prospective program participants can contact the *IESO* at market.registration@ieso.ca for additional information about requirements that might be applicable for their intended participation type.

Table 2-5: Requirements to Register as a Program Participant

Type	Requirements
Canadian Bank Account	Prospective program participants that need to be paid or invoiced by the *IESO* must have a Canadian bank account and must submit relevant bank account details to the *IESO* (**MR Ch.9 ss.6.20.12-6.20.13**).
HST Registration Number	Prospective program participants that need to be paid or invoiced by the *IESO* must obtain an HST registration number[8] and submit it to the *IESO* (**MR Ch.2 s.3.1.1.2(a)**).

2.3.2 Program Participant Types

Prospective program participants select their applicable program participant type in Online IESO. Table 2-6 lists the program participant types and scope of their participation.

Table 2-6: Program Participant Types

Participation Type	Scope of Program Participation
Centralized Forecasting Provider	A person with *variable generation resources* associated with *generation facilities* that have an installed facility capacity of 5MW or greater, connected to the *IESO-controlled grid* or a *distribution system*. These persons must participate in the centralized forecasting program and be authorized as a Centralized Forecasting Provider.

[8] For information on HST registration, refer to the Canada Revenue Agency website.

Participation Type	Scope of Program Participation
	Refer to section 3.7 for more information.
Embedded Generator	A person with *embedded generation facilities* (i.e., *connected* to a *distribution system*) that are not *variable generation resources*. An *embedded generator* is not required to be an *embedded market participant*.
Embedded Load Consumer	A person that participates with an *embedded load facility* that is not directly *connected* to the *IESO-controlled grid,* but is instead embedded within a *distribution system*. This person is not required to be an *embedded market participant*.
Embedded Electricity Storage Participant	A person with one or more *embedded electricity storage facilities* (i.e., connected to a *distribution system*). This person is not required to be an *embedded market participant*.
Energy Performance Program	A person that participates in the Province-wide Energy Performance Conservation and Demand Management Program for Multi-Site Customers.
Industrial Accelerator	A person that is eligible to participate in the Industrial Accelerator Program.
Program Non-Specific	A person participating in an *IESO* program that is not listed in Online IESO.
Smart Metering Cost Recovery	A person that has a financial *settlement* with respect to the smart metering charge.
Smart Submetering Provider	A person who has a financial *settlement* with respect to Ontario Clean Energy Benefit Program Government electricity support program as a Smart Unit Submetering Provider.

2.3.3 Registration Approval Notification for a Program Participant

The Applicant Representative of a prospective program participant that has applied to participate as:

- a centralized forecasting provider;
- an embedded generator;
- an embedded electricity storage facility; or
- an embedded load consumer.

who has sufficiently completed their assigned submission tasks in Online IESO, will receive a RAN emailed from the *IESO* notifying them of their authorization for participation.

Prospective program participants registering to participate in *IESO* programs other than the ones set out above (refer to section 2.3.2) are notified of their authorization by an email from *IESO* Energy Efficiency.

2.4 Register as a Service Provider

2.4.1 Submission Requirements

Persons registering as a service provider where billing and effecting payment in respect of financial obligations or transactions will be processed by the *IESO*, but who are not applying to become authorized as a *market participant*, must submit the information described in Table 2-7 through Online IESO. Prospective service providers can contact the *IESO* at market.registration@ieso.ca for additional information about requirements that might be applicable for their intended participation type.

Table 2-7: Requirements to Register as a Service Provider

Type	Description
Canadian Bank Account	Prospective service providers that need to be paid or invoiced by the *IESO* must submit relevant Canadian bank account details to the *IESO*.
HST Registration Number	Prospective service providers that need to be paid or invoiced by the *IESO* must obtain an HST registration number[9] and submit it to the *IESO*.

2.4.2 Service Provider Types

Prospective service providers select their applicable service type in Online IESO. Table 2-8 lists the service provider types and their services.

Table 2-8: Service Provider Types

Service Type	Scope of Service
Centralized Forecasting Provider	A *forecasting entity* that provides a centralized forecasting service relating to *variable generation*.
Metering Service Provider	Refer to **MR Ch.11** and to **MM 3.8**.

[9] For information on HST registration, refer to the Canada Revenue Agency website.

Service Type	Scope of Service
Meter Data Associate	A person, other than the *metered market participant,* that has access to *metering data*. The *metered market participant* assigns access to this data to the meter data associate.

2.4.3 Authorization Notification for a Service Provider

The *IESO* notifies Applicant Representatives for prospective service providers who have completed their assigned tasks in Online IESO by an email from IESO Metering.

– End of Section –

3. Register Equipment

(MR Ch.7 ss.2.1.1 and 2.2.1)

Market participants must register their *facilities* and equipment to connect to the *IESO-controlled grid.* In some cases, a *market participant* will also register *resources* to participate in the *IESO-administered markets* or for billing and effecting payment in respect of financial obligations or transactions processed by the *IESO.*

The costs incurred by the *IESO* during the registered equipment phase will be invoiced by the *IESO* to the *market participant* according to the provisions described in section 6 of this *market manual*.

3.1 Roles, Responsibilities and Relationships

The following subsections contain roles and responsibilities information, *market participant* and equipment relationships, *market participant* and *resource* relationships and other background information that organizations having an Owner role (refer to section 2.2.3) should review before starting the Register Equipment procedures.

Depending on the scope of the equipment change (e.g. a new *facility* or a modified *facility* registered with the *IESO*), the *facility* owner will be required to complete an assessment and/or submit the applicable supporting documentation for the change.

3.1.1 Equipment Registration Specialist

The Applicant Representative (refer to section 2.1) must assign an Equipment Registration Specialist contact role. The Equipment Registration Specialist is responsible for initiating and completing tasks, including submitting technical data through Online IESO for their *facility*, its equipment, and any applicable *resources*. Online IESO will guide the Equipment Registration Specialist to submit the data that is required. If any data is determined to be inaccurate, incomplete or missing, the *IESO* will reject it and the Equipment Registration Specialist will need to resubmit updated data.

3.1.2 Facility Contacts

The Applicant Representative must assign specific *facility* contacts, where applicable, including:

- Operator High and Normal Priority, the 24/7 contact section responsible for operating equipment at the *facility* location,
- Dispatch High and Normal Priority, the 24/7 contact section responsible for carrying out *dispatch instructions*, and,

- the Facility Coordinator responsible for communications with the *IESO* about a *facility* during regular business hours.

3.1.3 Relationships

3.1.3.1 Market Participant/Facility Role Relationship

The key role relationships between a *market participant* and a *facility* are owner and operator of the equipment within that *facility*, as described in section 2.2.3.

3.1.3.2 Facility/Resource Relationship

The *IESO* creates *resource* and *facility* data record types in Online IESO for each *facility* it registers. Establishing a relationship between a *facility* and one or more *resources* ensures that a *facility* is properly represented in the *IESO-administered markets* and in the *IESO* systems and tools. This is illustrated in the Single-Line Diagram in Figure 3-1, where a fictitious company GenCo owns a *generation facility* consisting of one combustion turbine (G1) and one steam turbine (G2) connecting to a common *connection point*.

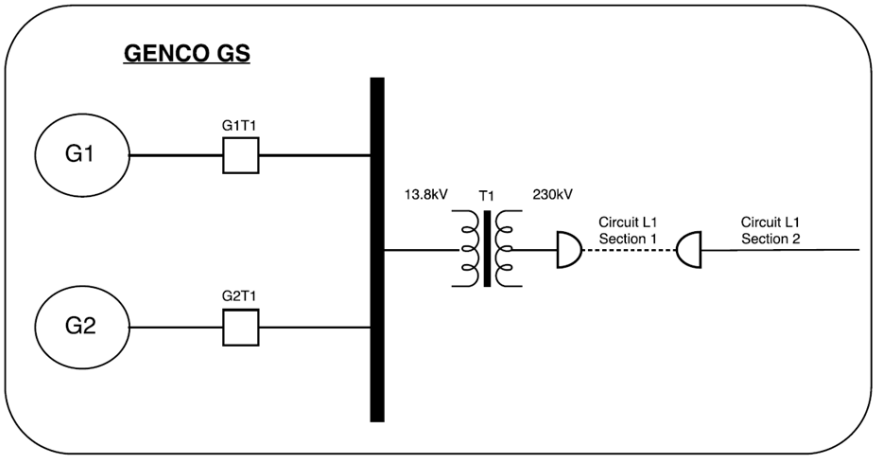

Figure 3-1: Single-Line Diagram Example

The *generation facility* would be registered in Online IESO as GenCo GS and would include all physical equipment that comprise the *facility* (e.g., *generation units*, transformers, circuits, and breakers) and their associated technical data. The *IESO* would create two *resources* for this *facility*. The first *resource* would be identified as Genco-LT.G1 and would include information provided by the *generator* that is the owner of *generation unit* G1. The second *resource* would be identified as Genco-LT.G2. It includes information provided by the *generator* that is the owner of *generation unit* G2.

One *connection point* can have many *resources* associated with it. For example, a *distributor* might own a *load facility connected* to the *IESO-controlled grid* and be registered with a *load resource* at that *connection point*. If a *dispatchable generation*

unit is embedded in the same *distribution system*, that *generation unit* would be registered as a separate *generation resource* associated with the same *connection point*. In other words, the *generation resource* will be distinguished from the *load resource* even though the *generation resource* is embedded in the *distribution system*. Both *resources* have the same *connection point* because they both inject or withdraw *energy* into or from the *IESO-controlled grid* at the same physical *connection point*.

3.1.3.3 Market Participant-Resource Role Relationships

(MR Ch.7 ss.2.2.5 and 2.2.6)

Each *resource* may have role relationships with several different *market participants*. However, each role may only be filled by one *market participant*.

One *market participant* may fill one, more, or all of the role relationships, depending on their qualifications and responsibilities. The *market participant* assigned as a *registered market participant*, *metered market participant* or *metered market participant transmission* must have that corresponding role assigned to its organization.

Table 3-1 lists the role relationships that are assigned by the *market participant* for each *resource.*

Table 3-1: Market Participant/Resource Role Relationships

Role	Responsibility
Owner	The owner is responsible for completing the Register Equipment procedures and assigning the *registered market participant*, *metered market participant* and operator role relationships to equipment or *resources* if applicable. The owner is also responsible for assigning an Equipment Registration Specialist as described in section 3.1.1. Refer to **MR Ch.7 s.2.2.6.1**.
Operator	The *market participant* responsible for operating the equipment within a *facility* in the real-time operations. Refer to **MR Ch.7 s.2.2.6.1**.
Registered Market Participant	The sole *market participant* responsible and authorized to submit *dispatch data* for the *resource* to which it has been assigned The *registered market participant* is also responsible for assigning *registered market participant* user-*resource* relationships that allow individual users to submit *dispatch data* for the assigned *resource*. Refer to **MR Ch.7 s.2.2.4**.

Role	Responsibility
Metered Market Participant	The *market participant* responsible for the financial *settlement* with the *IESO* of all quantities of *physical services* at the relevant *delivery point* for the *resource* as part of the *settlement process.* The *metered market participant* assigns further relationships required for a *delivery point* as detailed in **MM 3.8**. Only one *metered market participant* may be assigned to each *delivery point*. The *metered market participant* assigned to the *day-ahead market* must be the same *metered market participant* assigned to the *real-time market*. *Metered market participants* must contract with a *metering service provider* for their metered *resources*. The *metered market participant* assigns the *metering service provider* relationships to the *delivery point* for the *resource.* Each *delivery point* requires the assignment of a *metered market participant*.
Metered Market Participant Transmission	The *market participant* responsible for paying for one or more transmission services to a *transmitter* relating to an owned *facility*.
Metering Service Provider	Provides, installs, commissions, registers, maintains, repairs, replaces, inspects and tests *metering installations* associated with a *resource*. For more information, refer to **MM 3.8**.
Meter Data Associate	A service provider appointed by an *metered market participant* to access *metering data* pertaining to the *resource*'s *delivery point.* For more information, refer to **MM 3.8**.
Distributor	The *market participant* that owns and operates the *distribution system* to which the *facility* associated with a *resource* is *connected*.
Transmitter	The *market participant* that owns and operates the *transmission system* to which the *facility* associated with a *resource* is *connected*. The *transmitter* may create a transmission network (TN) *resource* or a transmission connection (TC) *resource* for the *facility* for the purpose of collecting the applicable transmission tariff.

3.2 Registration of Facilities and Equipment

(MR Ch.7 ss.2.1.1.2, 2.1.1.7 and 2.2)

The Equipment Registration Specialist must provide the *IESO* with *facility* and equipment data via Online IESO. The *IESO* ensures that all *facility* data provided by owners are referenced appropriately in Online IESO in the *facility* records that contain technical data related to the physical equipment within the *facility.*

Important: It is critical that *market participants* review their registered data in Online IESO to ensure that it is accurate and current. The procedures for changing *market participant*, *facility*, equipment, and *resource* data are contained in section 4.

Through the *facility* and equipment registration activities, the associated *resource(s)* will be established. Sections 3.3 through 3.8 identify the *resource* registration data that the *IESO* may require depending on the *resource* participation type.

3.2.1 Assessment Requirements

Prospective and existing *market participants* and *embedded market participants* must sufficiently complete the Connection Assessment and Approval Process as described in **MM 1.4**. During this process, they will:

- receive a Notification of Conditional Approval to Connect from the *IESO;* and
- confirm with the *IESO* the number of *resources* required at their *facility.*

This information must be provided during the Register Equipment process.

3.2.2 Submission Requirements

(MR Ch.7 ss.2.1.1, 2.2.1, 2.2.3 and 2.2.6)

The *facility* owner must submit the applicable data and documentation described in Table 3-2.

Table 3-2: Submission Requirements for Recording Equipment

Submission Requirement	Description
Notification of Conditional Approval to Connect	Approval received during the Connection Assessment and Approval Process.
Single-Line Diagram	Each *market participant* must provide a station electrical diagram showing the new or modified *facility* and its connection path to the *IESO-controlled grid*. The Single-Line Diagram must: • be accepted by their *transmitter* or *distributor*; • contains the appropriate approved operating nomenclature that is used by the *market participant's transmitter*, and not the engineering nomenclature; • shows the electrical equipment at the *facility* and the *connection points* to the grid;

Submission Requirement	Description
	• shows as-built[10] data approved for construction, and marked with an Ontario Professional Engineer's seal; • clearly references the *market participant's* name, and the *facility* name to be registered in Online IESO; • be annotated with data monitoring information, including the location of the Dynamic Disturbance Recorder and/or equivalent; and • have enough detail to allow the *IESO* to implement modelling changes in *IESO* systems and tools. A Single-Line Diagram is required for all *facilities* being registered for participation in the *IESO-administered markets*, and is submitted via Online IESO.
Protection Description Document	*Market participants* must prepare a document marked with an Ontario Professional Engineer's seal containing written descriptions of all protections and settings (e.g., A, B, primary, or backup), communication schemes, and tele-protections for each protection group at the new or modified *facility*. The Protection Description Document includes local and remote estimated design fault clearing times, a tripping matrix, and (where applicable), describes the separation of redundant protection groups. The *IESO* can provide a template upon request.
Operational Philosophy Document	*Market participants* must prepare a document attesting to their *facilities'* operating conditions and limitations (e.g., common mode failures, high/low temperatures, high/low wind speed) and procedures for *planned* and *forced outages*, returning equipment to service, responding to *IESO* directives within five minutes, and training staff on *IESO* interaction. *Facilities* associated with *variable generation resources* must also provide a description of the power equipment and power curves. Refer to Appendix B: Wind Facility Data Requirements. The *IESO* provides a template of what is required in the operational philosophy document when registering a new *facility*.
Technical Equipment Data	The Register Equipment procedures in Online IESO will require *market participants* to submit technical data for equipment and, where applicable, supporting documentation. This data and supporting information will be reviewed and approved by the *IESO*. Technical data is described in the Register Equipment Help File.

[10] "As-built" data consists of the measurements and specifications of a *facility* prior to any modifications, and is submitted to the *IESO* on a single-line diagram. Confirming as-built equipment in some cases may be as simple as confirming nameplate values are provided during equipment registration. In other cases, data monitoring will be used to confirm model parameters.

Submission Requirement	Description
	These procedures might require some time and several iterations to complete. *Market participants* must start these tasks as early as possible. The specific technical data required is identified in the Register Equipment Help File.
Review Operational and Performance Requirements	The technical requirements and associated performance standards for each type of *facility* are stated in the *market rules* (refer to Appendix A) and in **MM 6**.
Execute Connection Agreement	For a *facility* to participate in the *IESO-administered markets*, the *facility* owner must submit an executed copy of their *connection agreement* with the applicable *transmitter* (if the connection is to the *IESO-controlled grid*) or with the applicable *distributor* (if the connection is to the *distribution system*).
Prepare Restoration Participant Attachment	Based on the criteria contained in section 2.2 of **MM 7.8**, and as identified in the applicable System Impact Assessment, certain *market participants* are designated as *restoration participants*. *Restoration participants* are entities that contribute to the *IESO-controlled grid* restoration process. *Restoration participants* are required to submit a *Restoration Participant Attachment* via Online IESO as outlined in section 13 of **MM 7.8**.
Prepare Facility Description Document	In some situations, as identified in a System Impact Assessment, a new or modified *facility* may need to participate in *remedial action schemes*, or other specialized control schemes. This includes Generation or Load Rejection Schemes, Generation Run-Back Schemes, Capacitor Switching Schemes, or Breaker Backup Protections. These are not typical protection system installations. For such *facilities*, *market participants* must prepare Facility Description Documents, marked with an Ontario Professional Engineer's seal, and submit them for review and approval by the owner of *remedial action schemes*, special protection systems, or other specialized control schemes. Facility Description Documents contain a description of how the *remedial action scheme*, special protection system, or specialized control scheme operates, when and under what conditions, and the estimated design operating times. A block diagram showing the configuration, and functions, and (where applicable) the separation of the redundant functions is also submitted.
Other Supporting Documentation	Other supporting documentation may include items such as nameplate photos, synchronous machine capability curves, manufacturer's wind turbine power curves or solar array power data.

3.2.3 Metering Requirements

(MR Ch.9 s.2.1.2)

After a *market participant* has applied to register a *facility* with the *IESO,* and one or more *resource* records have been created in Online IESO, the *market participant* must identify the *metered market participant* for each *resource* record. The *metered market participant* will assign a *metering service provider* to satisfy the metering requirements for the *resource*.

Information on procedures relating to metering registration can be found in the Meter Registration section of the *IESO* website, as well as in the MM 3: Metering series, available at the IESO Market Rules & Manuals Library.

The metering registration procedures cannot be completed until the *metered market participant-resource* relationship is created (refer to section 3.1.3.3) and the *IESO* has issued a RAN via Online IESO.

3.2.4 Data Monitoring Requirements

(MR Ch.2 s.6 and App.2.2, MR Ch.4 s.5)

All *facilities* must comply with the applicable data monitoring requirements, which are listed in the **MR Ch.4 Appendices**. Data monitor testing is explained in section 3.2.7.3.

3.2.5 Market Rule Exemptions

(MR Ch.1 s.14)

The procedure for applying for an *exemption* from any applicable *market rule* requirement is contained in **MM 2.2**.

3.2.6 Facility Registration Status

- (MR Ch.2 s.3.1.5 and MR Ch.7 s.2.1.1)

Equipment Registration Specialists can track the progress of their Register Equipment procedures by accessing the Manage Facility Requests Report in Online IESO, emailing market.registration@ieso.ca, or by contacting the *IESO* Enrolment Specialist assigned to their equipment change.

The *IESO* issues a RAN to communicate the completion of specific Register Equipment activities. It can be either final or conditional. A Register Equipment change is not considered registered until the *IESO* issues a final RAN.

3.2.6.1 Conditional RANs

(MR Ch.2 s.4.1)

A conditional RAN is issued to allow a *commissioning generation facility* or a *commissioning electricity storage facility* to convey electricity into, through or out of

the *IESO-controlled grid* during the time the *facility* is undergoing commissioning tests. It contains a list of requirements that must be completed prior to the specified expiry date in order for a *facility* to qualify for a final RAN.

The *IESO* may issue one or more conditional RANs during the registration process before issuing a final RAN. For example, a conditional RAN may be issued to allow a new *facility* to:

- *connect* and energize on potential only;
- *connect* and withdraw as a load; or
- *connect* and/or generate for commissioning purposes.

The *IESO* Enrolment Specialist assigned to the Register Equipment change will determine when a conditional RAN is appropriate. A conditional RAN may impose restrictions on a *facility* while the RAN is in effect, such as the *facility's* output being limited to a specified maximum MW value.

3.2.6.2 RAN Extensions

(MR Ch.2 s.4.1)

A RAN may include conditions that must be met by an expiry date. If a condition cannot be met by the expiry date due to circumstances beyond the *market participant's* or program participant's control, the Equipment Registration Specialist may request a RAN extension by emailing either their *IESO* Enrolment Specialist or market.registration@ieso.ca, providing the reason for the extension request and a plan for meeting the RAN conditions. If a RAN extension is granted by the *IESO*, the RAN version number will increment by one.

3.2.6.3 Conditional RAN Expiration and Renewal

(MR Ch.2 s.4.2)

If a conditional RAN is suspended,terminated or lapses, the RAN may be renewed by having the Equipment Registration Specialist submit a request with a new plan for completing all the requirements in the suspended, terminated or lapsed conditional RAN that is acceptable to the *IESO*.

When a conditional RAN is suspended or terminated or lapses, the new or modified equipment must be immediately switched to offline and any associated *dispatch data* must be removed, until such time as the suspension is lifted or a new conditional RAN is issued by the *IESO*.

3.2.6.4 Final RAN

(MR Ch.2 s.4.2)

A Register Equipment change is complete and the equipment registered with the *IESO* when the Equipment Registration Specialist receives a final RAN email from Online IESO.

3.2.7 Participant and Facility Testing

(MR Ch.2 s.6 and App.2.2)

For a new or modified *facility*, the *IESO* may conduct tests during the Register Equipment procedure to confirm that the *operational aspects* of the *facility* can interoperate with *IESO* systems and tools. Tests include, but are not limited to:

- confirming capability of transmitting to the *IESO* interface;
- ensuring the connectivity of the *dispatch workstation*;
- confirming that appropriate voice communications are in place;
- if applicable, verifying that the *facility* responds to the *IESO* control signals;
- assessing whether the *facility* complies with all applicable *market rules* and *NERC* and *NPCC reliability standards*; and
- performing (at various Equipment Registration stages described in sections 3.1 through 3.8) data monitoring tests of the required telemetry points with the *IESO* to ensure that statuses, magnitudes, and sign conventions are correct. All anomalies must be fixed and retested before the first energization of the *facility*.

Tests are scheduled as mutually agreed between the *IESO* and the *market participant*, program participant or service provider. In order to complete the Register Equipment procedures, all tests must be verified and approved by the *IESO*.

Important: *Market participants,* program participants and service providers are responsible for ensuring that their staff receive appropriate training for all of the testing activities conducted by the *IESO* to ensure that they are able to interoperate with all applicable *IESO* systems. Appropriate employee training and procedures must be in place to ensure staff are prepared for participation in the *IESO-administered markets* as soon as the *market participant*, program participant or service provider is authorized.

3.2.7.1 Participant Workstation Testing

Transactions involving data exchanged with *IESO* systems are processed through the *participant workstation* via Online IESO, except for the transfer of real-time data,

which is done through the *dispatch workstation* (refer to section 3.2.7.2). *Market participants* are required to install the necessary hardware and software infrastructure in accordance with the technical requirements contained in section 2 of **MM 6.0**.

Market participants are required to test and confirm that their *participant workstation* is functional, can interoperate and can meet *IESO* technical requirements for non-real time data transfers. *Market participants* receive **Assign Contact Role(s)** and **Confirm System Access Role(s)** tasks from Online IESO, for which they self-confirm. Completion of these tasks, along with the rest of the Equipment Registration procedures through Online IESO is usually sufficient to prove that the *participant workstation* can interact with Online IESO and the *IESO* gateway.

3.2.7.2 Dispatch Workstation Testing

Real-time data transactions are processed through the *market participant's dispatch workstation*. *Market participants* with one or more *resources* that respond to *dispatch instructions* must install, test and maintain *dispatch workstations* that meet the requirements in the *participant technical reference manual* for real-time data transfers. The technical requirements for the *dispatch workstation* are contained in section 3 of **MM 6.0.** Testing of the *dispatch workstation* is conducted in the *IESO* Sandbox. *IESO* Information & Technology Services issues test dispatch instructions for which *market participants* are required to respond. The combined time required to set up the Sandbox test and to complete the actual test is approximately one month.

3.2.7.3 Data Monitor Testing

Real-time data monitoring (i.e., telemetry point data) is required by the *IESO* to monitor and model the power system and operate the *real-time market*. **MR Ch.4 App.4.15** – **4.18** specifies the points required and **MR Ch.4 App.4.19** – **4.23** indicate the required timing performance. The data link is configured and concurrently, the *IESO* Enrolment Specialist prepares a point list with the *market participant*. The link and points will be added to the *IESO* systems. The *market participant* will have to successfully test the link and points with the *IESO* before the *facility* is approved and a final RAN is issued. Incorrect or incomplete telemetry from a *market participant* shall invalidate the *facility's* approval.

3.2.8 Eligibility to Provide Operating Reserve

(MR Ch.5, MR Ch.5 App.5.1 s.1.2 and MR Ch.5 s.4.9)

A *market participant* must meet various eligibility and procedural requirements in order to provide *operating reserve* (OR). Requirements specific to certain *resource* types are detailed in subsequent sections of this *market manual*. The following general eligibility and procedural requirements must be met by all *market participants* planning to provide *operating reserve* (OR):

1. The *market participant* shall initiate the Market Registration process in a timely manner in order to start providing *operating reserve*. For more details about this process, the *market participant* is advised to consult this *market manual* and to contact the *IESO*'s Market Registration at market.registration@ieso.ca.
2. According to **MR Ch.4 s.7**, the *market participant* shall provide to the *IESO* the applicable telemetry data listed in **MR Ch.4 App.4.1 to 4.25** on a continual basis. The telemetry list will be finalized during the Market Registration process and it should include, but not be limited to, active power and reactive power.
3. The *market participant* must complete end-to-end testing of all necessary telemetry points with the *IESO* to ensure that standards are met and that sign conventions are understood.
4. All identified anomalies must be corrected before the *IESO*'s final approval is granted.
5. The *market participant* shall ensure that wholesale revenue *metering installations* comply with **MR Ch.6**. For more details, the *market participant* is encouraged to seek advice from their *metering service provider* or from the *IESO* Metering Group. Some existing *facilities* may require re-registration of the *metering installations*. This will be determined on case by case basis during market registration.
6. After the registration requirements are met, *IESO* will provide a conditional Registration Approval Notification (RAN) approval valid for two months from the date of issuance. During this time, the *market participant* will undergo an *operating reserve* test with the *IESO*. If this first *operating reserve* test fails, a second *operating reserve* test will be conducted within the two-month "grace period", unless the *operating reserve* testing interferes with some abnormal system condition or *outages*. In this latter case, the second *operating reserve* test will be conducted on another date, outside the two-month "grace period".
7. If the second *operating reserve* test fails, the *IESO* may remove the *market participant* from the *operating reserve market* until the *market participant*

submits evidence that they made changes to address the cause of the initial failures and they are fully ready to provide *operating reserve* service.

8. In case the first or the second test (as the case may be) is successful, the *IESO* will provide the final RAN approval to the *market participant*, thereby confirming that the *facility* is approved to provide *operating reserve*.
9. If the *facility* is embedded in a *distributor*'s *distribution system*, the *market participant* must work with the *distributor* to complete and submit the Operating Reserve from Embedded Facilities: Declaration Form to the *IESO*.

3.3 Registration of Resources for Generators

(MR Ch.7 ss.2.1 and 2.2)

To participate in the *IESO-administered markets*, *market participants* authorized as *generators* must register one or more *resources* for each *generation facility*. How these *resources* participate in the *IESO-administered market* varies by the classifications set out in Table 3-3.

Table 3-3: Generation Participation Type by Bid/Offer Type Resource Data Parameter

Bid/Offer Type	Generation Participation Type
Dispatchable	*Dispatchable non-quick start generation resource* (nuclear)
	Dispatchable non-quick start generation resource (non-nuclear)
	Variable generation resource
	Dispatchable hydroelectric *generation resource*
	Dispatchable electricity storage resource
Self-scheduling generator	*Self-scheduling generation resource* *Self-scheduling storage resource*
Intermittent generator	*Intermittent generation resource*

The *bid/offer* type is a mandatory field that indicates whether a registered *generation resource* is either a *dispatchable generation resource*, a *self-scheduling generation resource* or an *intermittent generation resource*. The Energy Market Interface uses the *bid/offer* type to identify the *dispatch data* parameters that a *registered market participant* will be eligible to submit for a *resource*.

As part of the registration procedures for the *day-ahead market* and *real-time market*, the Equipment Registration Specialist must submit *resource* data parameters

required by a Generator Resource, as indicated in the Register Equipment Help File, using Online IESO. The *IESO* requires a minimum of two *business days* to implement changes to these values.

Table 3-4 provides additional detail on some *resource* data requirements for specific generation participation types.

Table 3-4: Resource Data Parameter Requirements by Generation Participation Type

Registration Data Parameter	Section of MM 1.5	Mandatory/Optional/ by IESO	Generation Participation Type								
			Dispatchable								Non-Dispatchable
			Non-quick start (Nuclear)	Non-quick start (non-nuclear)	Combustion Turbine Resource (combined cycle plant)	Steam Turbine Resource (combined cycle plant)	Pseudo-unit (combined cycle plant)	Variable Generation	Hydroelectric	Electricity storage (injections)	Self-scheduling and Intermittent
Bid/Offer Type	3.3.1	M	X	X	X	X		X	X	X	X
Operating Reserve Class	3.3.1.1	M	X	X	X	X	X		X	X	
Market Control Entity for Physical Withholding	3.3.1.2	M	X	X	X	X	X	X	X	X	
Quick Start Flag	3.3.1.3	M	X	X	X	X		X	X	X	X
Number of Forbidden Regions	3.3.2.1	O							X		
Start Indication Value	3.3.2.2	O							X		
Hourly Must Run Flag	3.3.2.3	O							X		

Registration Data Parameter	Section of MM 1.5	Mandatory/Optional/ by IESO	Generation Participation Type								
			Dispatchable								Non-Dispatchable
			Non-quick start (Nuclear)	Non-quick start (non-nuclear)	Combustion Turbine Resource (combined cycle plant)	Steam Turbine Resource (combined cycle plant)	Pseudo-unit (combined cycle plant)	Variable Generation	Hydroelectric	Electricity storage (injections)	Self-scheduling and Intermittent
Cascade Group, Forebay, and Time Lag	3.3.2.4 and 3.3.2.5	O							X		
Elapsed Time to Dispatch	3.3.1.4	M	X	X	X	X		X	X	X	
Period of Steady Operation	3.3.3.1	M		X	X	X					
Minimum Loading Point	3.3.3.2	M		X	X	X					
Minimum Generation Block Run Time	3.3.3.3	M		X	X	X					
Speed-no-Load and Start-up Offer Flag					X	X					

Registration Data Parameter	Section of MM 1.5	Mandatory/Optional/ by IESO	Generation Participation Type								
			Dispatchable								Non-Dispatchable
			Non-quick start (Nuclear)	Non-quick start (non-nuclear)	Combustion Turbine Resource (combined cycle plant)	Steam Turbine Resource (combined cycle plant)	Pseudo-unit (combined cycle plant)	Variable Generation	Hydroelectric	Electricity storage (injections)	Self-scheduling and Intermittent
Pseudo-Unit Modelling Election Flag	3.3.4.1	O			X	X					
Steam Turbine Minimum Loading Point	3.3.4.2	O				X					
Steam Turbine Percentage Share	3.3.4.3	M					X				
Steam Turbine Duct Firing Capacity	3.3.4.4	by IESO				X					
Duct Firing Ten-Minute Operating Reserve Flag	3.3.4.5					X					
Reference Levels for Financial Dispatch Data	3.3.1.5	M	X	X	X	X	X	X	X	X	

Registration Data Parameter	Section of MM 1.5	Mandatory/Optional/ by IESO	Generation Participation Type								
			Dispatchable								Non-Dispatchable
			Non-quick start (Nuclear)	Non-quick start (non-nuclear)	Combustion Turbine Resource (combined cycle plant)	Steam Turbine Resource (combined cycle plant)	Pseudo-unit (combined cycle plant)	Variable Generation	Hydroelectric	Electricity storage (injections)	Self-scheduling and Intermittent
Reference Levels for Non-Financial Dispatch Data	3.3.1.6	M	X	X	X	X	X	X	X	X	
Reference Quantities	3.3.1.7	M	X	X	X	X	X	X	X	X	

3.3.1 General Generation Resource Registration Requirements

3.3.1.1 Operating Reserve Class

(MR Ch.7 s.2.2.8)

The *operating reserve* class indicates which classes, if any, of *operating reserve* the *resource* may provide. The Equipment Registration Specialist submits this mandatory parameter for each *generation resource*.

All *dispatchable generation resources* that meet the requirements of section 3.2.8 are eligible to provide *operating reserve,* with the exception of *resources* registered with a primary or alternate fuel type of wind or solar photovoltaic. The *IESO* uses this parameter to restrict *offers* submitted by the *registered market participant.*

The Equipment Registration Specialist submits a single value for the parameter by selecting one of the following values in Online IESO:

- **10 min non-spin and 30 min** to indicate election to provide in the non-synchronized *ten-minute operating reserve* and *thirty-minute operating reserve*;
- **30 min non-spin** to indicate election to provide *thirty-minute operating reserve*;
- **All type** to indicate election to provide synchronized and non-synchronized *ten-minute operating reserve* as well as *thirty-minute operating reserve*; or
- **No operating reserve** to indicate election not to provide *operating reserve*.

In addition to the eligibility and process requirements outlined in section 3.2.8, *generators* must also meet the following requirements to provide *operating reserve*;

1 -Any *generation unit* and/or *electricity storage unit*(s) utilized, directly or indirectly, by the *market participant* to provide *operating reserve* must meet the performance requirements for Off-Nominal Frequency Operation (category 1), Speed/Frequency *Regulation* (category 2), and Voltage Ride-Through (category 3) specified in **MR Ch.4 App.4.2**.

2- Automatic reconnection capability of any *generation unit* and/or *electricity storage unit*(s) utilized, directly or indirectly, by the *market participant* to provide *operating reserve*, must be set to prevent it from: (i) automatically reconnecting and resuming injection when the system frequency is above 60.5 Hz, and (ii) automatically reconnecting and resuming charging, if applicable, when the system frequency is lower than 59.5 Hz. The frequency supervisory function shall allow for its settings to be changed, but changes shall be made only if approved or requested by the *IESO*.

3.3.1.2 Market Control Entity for Physical Withholding

(MR Ch.7 s.22.9)

Market participants disclose their *market control entities* and then select a *market control entity for physical withholding* from among their *market control entities* for each of their *dispatchable generation resources* via the Update Organization process.

3.3.1.3 Quick Start Flag

The quick start flag indicates if a *resource* is capable of injecting *energy* into the *IESO-controlled grid* within five minutes of receiving an *IESO* request from an offline state. The Equipment Registration Specialist must submit this mandatory parameter for all *generation* participation types in Table 3-4, including for the injection side of a *electricity storage facility.* Some *resources* may be associated with *generation facilities* that have unique operating characteristics. As a result, the *IESO* will provide notification for how these *resources* are to be classified. A value for the quick start flag is only registered after the *IESO* approves the submission.

The *IESO* uses this parameter to determine which *generation resources* and *electricity storage resources* are *quick start resources* and are eligible to provide *ten-minute operating reserve* when their breaker is open and in the determination of *generator offer guarantee (GOG)-eligible resources*.

- The *IESO* will validate the submitted values at the *resource* level with what has been previously submitted at the equipment level. The value of the quick start flag for each *resource* should be the same flag as that of the equipment data for each associated *generation unit*.

If the *resource* is deemed to be a *non-quick start resource* by the *IESO,* the quick start flag is **No**. If the *resource* is deemed to be a *quick start resource* by the *IESO,* the quick start flag is recorded as **Yes**. A *resource* with a registered quick start value of **No** is eligible to provide values for the *resource* data parameters indicated in section 3.3.2. In all cases, the *IESO* also records a start date of the quick start flag value to handle time dependent revisions that affect *settlement processes*.

3.3.1.4 Elapsed Time to Dispatch

(MR Ch.7 s.2.2.6K.1)

The Equipment Registration Specialist submits this data parameter for its *dispatchable generation resources* and its *dispatchable electricity storage resources*.

For *dispatchable non-quick start generation resources,* the *IESO* uses the *elapsed time to dispatch* data parameter in the determination of *GOG-eligible resources*.

The Equipment Registration Specialist submits a single value for this *resource* data parameter by submitting the number of minutes as a numeral. The *IESO* approves this data parameter in accordance with the Elapsed Time to Dispatch supporting

document as described in the Register Equipment Help File. The *IESO* registers *elapsed time to dispatch* after it reviews submitted values and supporting technical documentation.

Reference Levels for Financial Dispatch Data Parameters

(MR Ch.7 ss.22.1.1 and 22.2.1)

Table 3-5 lists the *resource* types that have *reference levels* registered for each *financial dispatch data parameter*. For more information on the process the *IESO* uses to determine *reference levels* for *financial dispatch data parameters*, refer to **MM 14.2**.

Table 3-5: Applicability of Financial Reference Levels by Resource Technology Type

Energy Offer Reference Level	Speed No-Load Reference Level	Start-Up Reference Level	Operating Reserve Offer Reference Level
• *Dispatchable non-quick start generation resource* (non-nuclear) • *Variable generation resource* (i.e., wind and solar) • *Dispatchable hydroelectric generation resource* • *Dispatchable non-quick start generation resource* (nuclear) • *Dispatchable electricity storage resource* (injections)	• *Dispatchable non-quick start generation resource* (non-nuclear)	• *Dispatchable non-quick start generation resource* (non-nuclear)	• *Dispatchable non-quick start generation resource* (non-nuclear) • *Dispatchable hydroelectric generation resource* • *Dispatchable electricity storage resource* (injections)

Reference Levels for Non-Financial Dispatch Data Parameters

(MR Ch.7 ss.22.1.1 and 22.3.1)

Resources have two sets of *reference levels* for *non-financial dispatch data* registered, one each for:

- the summer period, which is from May 1 to October 31; and
- the winter period, which is from November 1 to April 30.

Certain *reference levels* for *non-financial dispatch data parameters* are also registered for each *thermal state* (hot, warm, and cold) of a *resource*.

Table 3-6 sets out the *resource* types that have *reference levels* registered for each *non-financial dispatch data parameter*. For more information on the process the *IESO* uses to determine *reference levels* for *non-financial dispatch data parameters*, refer to **MM 14.2**.

Table 3-6: Reference Levels for Non-Financial Dispatch Data Parameters

Non-Financial Reference Level	Registered for the Following Resource Types
Energy Ramp Rate Reference Level	• *Dispatchable generation resources* • *Dispatchable electricity storage resource* (injections)
Operating Reserve Ramp Rate Reference Level[11]	• *Dispatchable generation resources* • *Dispatchable electricity storage resource* (injections)
Lead Time Reference Level (for each *thermal state*)	• *Dispatchable non-quick start generation resource* (non-nuclear)
Minimum Loading Point Reference Level	• *Dispatchable non-quick start generation resource* (non-nuclear)
Minimum Generation Block Run-Time Reference Level	• *Dispatchable non-quick start generation resource* (non-nuclear)
Minimum Generation Block Down Time Reference Level (for each *thermal state*)	• *Dispatchable non-quick start generation resource* (non-nuclear)
Maximum Number Of Starts per Day Reference Level	• *Dispatchable non-quick start generation resource* (non-nuclear) • *Dispatchable hydroelectric generation resources*
Energy Per Ramp Hour Reference Level (for each *thermal state*)	• *Dispatchable non-quick start generation resource* (non-nuclear)
Ramp Hours To Minimum Loading Point Reference Level (for each *thermal state*)	• *Dispatchable non-quick start generation resource* (non-nuclear)

Reference Quantities

(MR Ch.7 s.22.6.1)

Table 3-7 lists the *resource* types that will have *reference quantities* registered in the *energy* and/or *operating reserve markets*. The *IESO* registers sets of *reference quantities* for each market in which a *resource* participates. For more information on

[11] A single *operating reserve* ramp rate *reference level* is registered that will be used to validate all applicable classes of *operating reserve* ramp rates *dispatch data* submission.

the process the *IESO* uses to determine *reference quantities* and calculate *reference quantity values*, refer to **MM 14.2**.

Table 3-7: Reference Quantities by Technology Type and Market

Energy Market	Operating Reserve Market
• *Dispatchable non-quick start generation resource* (non-nuclear) • *Variable generation resource* (i.e., wind and solar) • *Dispatchable hydroelectric generation resource* • *Dispatchable non-quick start generation resource* (nuclear) • *Dispatchable electricity storage resource* (injections)	• *Dispatchable non-quick start generation resource* (non-nuclear) • *Dispatchable hydroelectric generation resource* • *Dispatchable electricity storage resource* (injections)

3.3.2 Dispatchable Hydroelectric Generation Resource Registration Requirements

(MR Ch.7 s.2.2.6A)

This section applies to *dispatchable generation resource*s with a primary fuel type of **Water**. The registration parameters discussed in this section allow the *IESO* to generate schedules in the *day-ahead market* and *pre-dispatch scheduling* process that respect the technical characteristics of the hydroelectric *generation units* associated with the *resource*. This allows the *dispatch* of these *resources* to respect safety, legislative and environmental considerations.

3.3.2.1 Number of Forbidden Regions

(MR Ch.7 s.2.2.6A.1)

The Equipment Registration Specialist may submit the *forbidden regions* parameter for its *dispatchable* hydroelectric *generation resource*. This parameter is used by the *IESO* to approve submissions of the *forbidden regions dispatch data* parameter in the *day-ahead market, pre-dispatch scheduling* process and *real-time market*.

The Equipment Registration Specialist submits *forbidden regions* into Online IESO by providing the upper and lower limit, as measured in MW, for each *forbidden region*. The Equipment Registration Specialist may register up to five *forbidden regions* for each eligible *resource* in accordance with the following requirements:

- *Forbidden Region* 1 Lower Limit shall be greater than or equal to 0;
- *Forbidden Region* 1 Upper Limit shall be greater than *Forbidden Region* 1 Lower Limit;

- *Forbidden Region* 2 Lower Limit shall be greater than *Forbidden Region* 1 Upper Limit;
- *Forbidden Region* 2 Upper Limit shall be greater than *Forbidden Region* 2 Lower Limit;
- *Forbidden Region* 3 Lower Limit shall be greater than *Forbidden Region* 2 Upper Limit;
- *Forbidden Region* 3 Upper Limit shall be greater than *Forbidden Region* 3 Lower Limit;
- *Forbidden Region* 4 Lower Limit shall be greater than *Forbidden Region* 3 Upper Limit; and
- *Forbidden Region* 4 Upper Limit shall be greater than *Forbidden Region* 4 Lower Limit.
- *Forbidden Region* 5 Lower Limit shall be greater than *Forbidden Region* 4 Upper Limit; and
- *Forbidden Region* 5 Upper Limit shall be greater than *Forbidden Region* 5 Lower Limit.

The *IESO* will review the submitted data and may request additional technical data to support the values submitted. The *IESO* may deny registration of the submitted values if it believes that the technical data does not support the request. Technical data includes equipment limitations (e.g. vibrational issues) or equipment status (e.g. gate position, water levels) justifying the *forbidden region* values identified.

If no values are submitted or approved, then the *IESO* shall assign default values of zero for the number of *forbidden regions* (**MR Ch.7 s.2.2.6E**).

3.3.2.2 Start Indication Value

(MR Ch.7 s.2.2.6A.2)

The Equipment Registration Specialist may submit this optional *start indication value* parameter for each *generation unit* associated with a *dispatchable* hydroelectric *generation resource*. The submitted value(s) will represent the quantity that, when scheduled, indicates that a new *generation unit* was brought on-line.

The *IESO* uses this parameter to determine whether the *generation units* associated with the *resource* have used one or more of their *maximum number of starts per day*. If a *start indication value* is not registered, the *registered market participant* of the associated *resource* will not be permitted to submit the *maximum number of starts per day dispatch data* parameter.

The Equipment Registration Specialist submits a single value, in MW, for each *generation unit* associated with a *dispatchable* hydroelectric *generation resource*. Submitted values must be unique, greater than 0 MW and less than or equal to the

maximum generator *resource* active power capability value registered for the *generation unit*.

3.3.2.3 Hourly Must Run Flag

(MR Ch.7 s.2.2.6A.3)

The Equipment Registration Specialist may submit this optional *hourly must run* flag parameter for each *dispatchable* hydroelectric *generation resource*.

If a registered *hourly must run* flag has a value of **Yes** then the *registered market participant* of the associated *resource* will be permitted to submit the *hourly must run dispatch data* parameter in the *day-ahead market* and *pre-dispatch scheduling* processes. A value of **No** will not permit the *registered market participant* of the associated *resource* to submit the *hourly must run dispatch data* parameter.

When submitted, the flag must be accompanied by technical data or other applicable supporting documentation that demonstrates the existence of *hourly must run* conditions for each *resource*. Operational data may be submitted showcasing a regulatory requirement or equipment limitation related to dam storing and spilling. The *IESO* registers the *hourly must run* flag after its review of submitted values and supporting technical documentation.

3.3.2.4 Cascade Group and Forebay

(MR Ch.7 s.2.2.6A.4)

The *IESO* will record and maintain *cascade group* and *forebay* relationships.

As shown in Figure 3-2, a cascade river system may contain one or more *cascade groups* and each *cascade group* can be comprised of one or more *forebays*. Each *forebay* within a *cascade group* is comprised of one or more *dispatchable* hydroelectric *generation resources* to reflect the *generation units* located on the relevant *forebay*.

This figure is an example of the *forebay* and *resource* relationships within a *cascade group*.

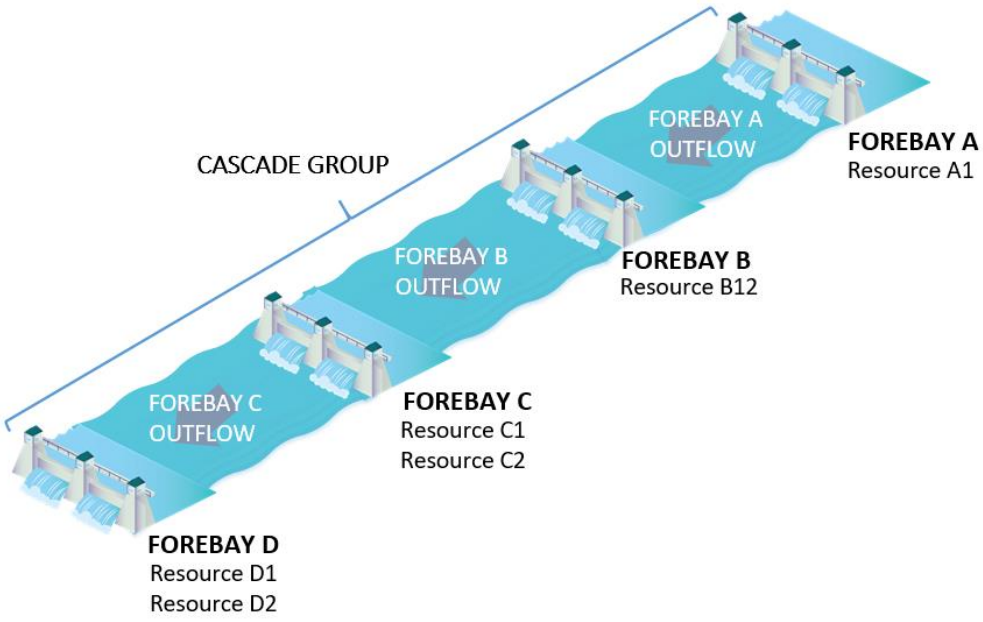

Figure 3-2:- Cascade Group, Forebay, Resource Relationships

By default, the *IESO* registers a *dispatchable* hydroelectric *generation resource* on the applicable *forebay*.

Each *resource* registered on a *forebay* must share its *maximum daily energy limit* and its *minimum daily energy limit* with all other *resources* registered on that *forebay*. In the *day-ahead market* and the *pre-dispatch scheduling* process, all *resources* registered on a *forebay* are evaluated such that the sum of their hourly schedules respect *registered market participant* submissions of the *maximum daily energy limit* and the *minimum daily energy limit dispatch data* parameters. To deregister a *resource* from a *forebay*, the *market participant* must submit a written request to the *IESO*, at market.registration@ieso.ca.

3.3.2.5 Time Lag

(MR Ch.7 s.2.2.6A.4)

The *time lag* registration parameter is an optional parameter that may be registered by the Equipment Registration Specialist who is common to all *resources* that are registered on a *forebay* in a *cascade group*. The *IESO* uses this parameter in the *day-ahead market* and *pre-dispatch scheduling* process to approve submissions of the *time lag dispatch data* parameter by the *registered market participant* for the *forebay*. Additionally, the *IESO* uses the registered *time lag* parameter to determine if the *registered market participant* is permitted to submit a downstream *linked forebay*, *time lag* and MWh ratio as *dispatch data* in the *day-ahead market* and *pre-dispatch scheduling* process. A *registered market participant* is not permitted to

submit these *dispatch data* parameters if a *forebay* does not have a registered *time lag* value.

The Equipment Registration Specialist submits a single *time lag* for each adjacent downstream *linked forebay* by submitting a whole number that is greater than or equal to 0 hours and less than 24 hours. Once the *time lag* for each adjacent downstream *linked forebay* in a *cascade group* is submitted, the *IESO* will calculate the remaining non-adjacent *time lag* values for all other *linked forebays*. Values submitted by the Equipment Registration Specialist and calculated by the *IESO* are shown in Figure 3-3. The Equipment Registration Specialist must submit supporting documentation to support the registration of *time lag*. The *IESO* will ensure operational data and factors affecting and resulting in the submitted time lag values are included in the supporting documents. This operational data includes water flowrates with seasonal and daily variations and/or dam storing requirements. The *IESO* registers the *time lag* after it reviews submitted values and any supporting technical documentation.

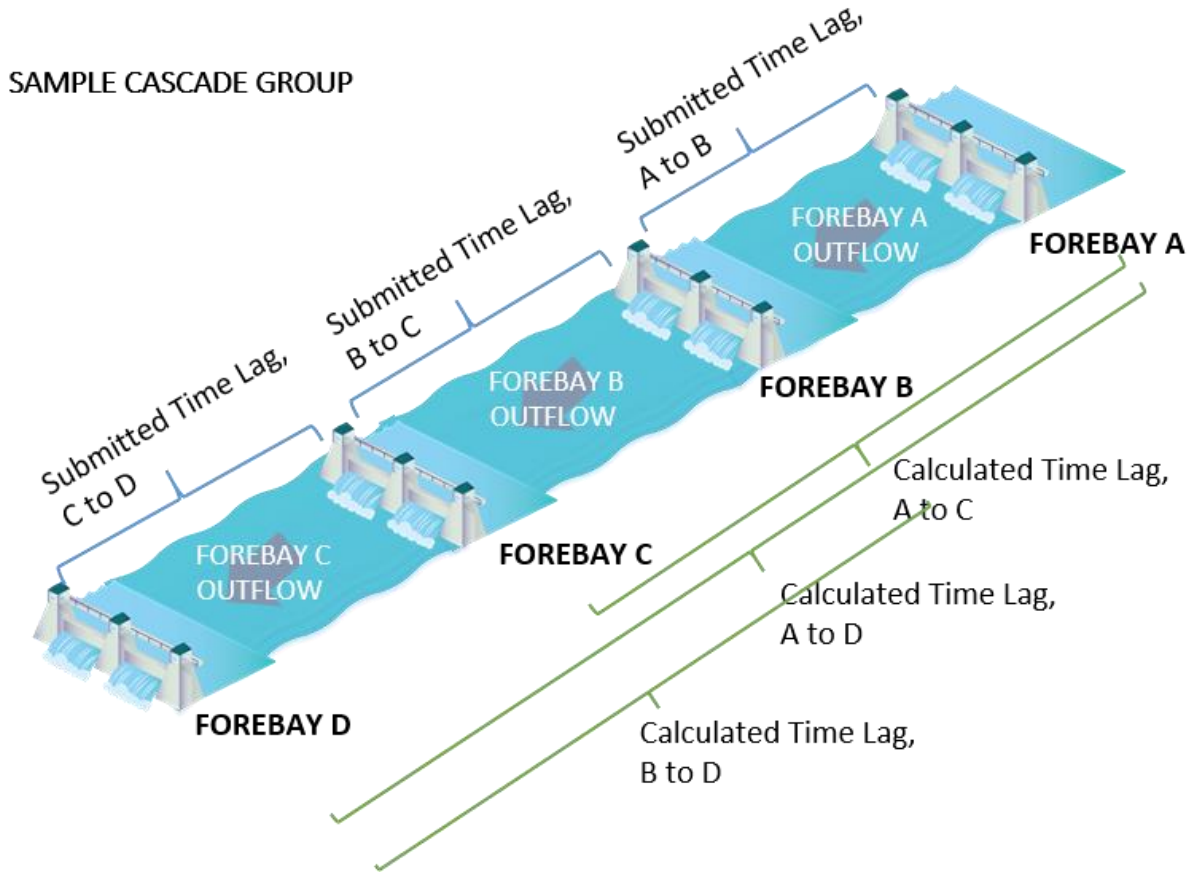

Figure 3-3: Time Lag Example

3.3.3 Dispatchable Non-Quick Start Generation Resources

This section applies to *dispatchable non-quick start generation resource*s with a primary fuel type of **Bio Fuel**, **Gas**, **Oil** or **Steam** that have a value of **No** for their quick start flag *resource* data parameter.

Resource data parameters specific to the modelling of a *dispatchable non-quick start generation resource* are described in the subsections below. A *dispatchable non-quick start generation resource* that has indicated an alternate fuel source as **Steam** and a primary or secondary fuel type that is not **Uranium** is deemed as a *resource* at a *combined cycle plant* and subject to registration of the *resource* data parameters indicated in section 3.3.4.

3.3.3.1 Speed-No-Load and Start-Up Offer Flag

Registered market participants have the ability to submit a *start-up offer* and *speed no-load offer* as hourly *dispatch data* into the *day-ahead market* and *pre-dispatch scheduling* process. *Registered market participants* submitting such *dispatch data* may do so only for:

- a *dispatchable non-quick start generation resource* associated with a *generation unit* that has a primary or alternate fuel type value other than **Uranium**; and
- a *pseudo-unit*.

The Equipment Registration Specialist for a *market participant* that intends to submit *start-up offers* and *speed no-load offers* as *dispatch data* for each *resource* must register the *start-up offer* and *speed no-load offer* eligibility flag in Online IESO as a declaration of intent to submit these *offers*. The Equipment Registration Specialist will be provided with instructions to use the *offer* template file version with the according *start-up offer* and *speed no-load offer* parameters. Changes to the *start-up offer* and *speed no-load offer* eligibility flag must be communicated via Online IESO.

3.3.3.2 Period of Steady Operation

(MR Ch.7 s.2.2.6K.2)

Submission of this data parameter by the Equipment Registration Specialist in Online IESO is mandatory only for a *resource* registered as a *dispatchable non-quick start generation resource*.

Period of steady operation is used in the *real-time market* to maintain the direction of a *resource*'s *dispatch instruction* for a minimum number of *dispatch intervals*. The Equipment Registration Specialist submits the data parameter, by providing a value of 0, 1 or 2 to reflect the number of *dispatch intervals.* The *IESO* will assign a default value of 0 if no value is submitted by the Equipment Registration Specialist.

Depending upon the value submitted, it may be necessary for the *IESO* to adjust the *period of steady operation* value if there is a negative impact on overall system operation. The *market participant* will be notified through Online IESO of any changes to this value.

3.3.3.3 Minimum Loading Point

(MR Ch.7 s.2.2.6B)

The Equipment Registration Specialist submits this parameter for each *dispatchable non-quick start generation resource* that does not have a registered primary or alternate fuel type of **Uranium**. The *IESO* uses the *minimum loading point* registration parameter to approve the *minimum loading point* submitted as *daily dispatch data* by the *registered market participant*. The *IESO* also uses the registered *minimum loading point* to determine whether the *resource* is a *GOG-eligible resource*.

The Equipment Registration Specialist submits a single *minimum loading point* for each eligible *resource* by providing a value in MW. Supporting technical documentation that demonstrates the *minimum loading point* for each *resource* must also be provided. The value submitted must be greater than zero and less than or equal to the value of the maximum active power capability registered as equipment data for the *generation unit* corresponding to the *resource*. The *IESO* shall assign a default value of 0 MW if a value is not submitted by the Equipment Registration Specialist. The *IESO* registers the *minimum loading point* after its review of submitted values and supporting technical documentation.

If a *resource* is part of a *combined cycle plant* and associated with a *generation unit* that has an alternate fuel type of **Steam**, referred to as a steam turbine, the Equipment Registration Specialist may submit multiple values for the *minimum loading point.* Submission of the *minimum loading point* for a *resource* associated with a steam turbine is described in section 3.3.4.2.

3.3.3.4 Minimum Generation Block Run Time

(MR Ch.7 s.2.2.6B)

The Equipment Registration Specialist submits the *minimum generation block run-time resource* data parameter for a *dispatchable non-quick start generation resource* associated with a *generation unit* that does not have a primary or alternate fuel type registered as **Uranium**. The *IESO* uses the *minimum generation block run-time resource* data parameter to determine whether the *resource* is a *GOG-eligible resource*.

The Equipment Registration Specialist submits a single value of the *minimum generation block run-time* for each eligible *dispatchable non-quick start generation resource* by providing a value from 0 to 24 hours. The *IESO* approves submissions by using supporting technical documentation submitted by the Equipment Registration

Specialist in Online IESO. The *IESO* registers *MGBRT* after its review of submitted values and supporting technical documentation.

3.3.3.5 Requirements for Generator Offer Guarantee Status

(MR Ch.7 s.2.2.21, MR Ch.9 s.4.4 and MR Ch.9 s.4.5)

A *resource* will receive a GOG eligibility flag of **Y** if they register the necessary information for their *dispatchable non-quick start generation resource* to meet the requirements of a *GOG-eligible resource.*

Otherwise, the *resource* will receive a GOG eligibility flag of **N**.

3.3.4 Combined Cycle Plant

(MR Ch.7 s.2.2.6G)

This section applies to a *combined cycle plant* whose *generation units* are represented as individual *resources* and it does not have physically aggregated *resources*. Aggregation is explained in section 3.6.

A *combined cycle plant* is a group of *generation resources* associated with a *generation facility* that contains at least one *dispatchable non-quick start generation resource* registered with a generator turbine type value of combustion turbine and at least one *dispatchable non-quick start generation resource* registered with a generator turbine type value of steam turbine. The generator turbine type is a mandatory *resource* data parameter that the *IESO* specifies for a *resource* based on the equipment data parameters submitted by the Equipment Registration Specialist for each *generation unit* associated with the *resource*. The *resource* registered with the combustion turbine value is deemed as a combustion turbine *resource*. The *resource* registered with the steam turbine value is deemed as a steam turbine *resource*.

Modelling of a *combined cycle plant* in the *day-ahead market* and *real-time market* allows *generators* to offer their interdependent units into the market as one *pseudo-unit*, reflecting actual operation dependencies for each combustion turbine with the associated portion of the steam turbine capacity.

In addition to any applicable registration requirements in the Register Equipment Help File, the Equipment Registration Specialist is required by **MR Ch.7 s.2.2.6G** to submit all mandatory *resource* data parameters specific to a *combined cycle plant* as listed in this subsection. Registration of this data allows a *market participant* that intends to utilize a *pseudo-unit* to schedule their *combined cycle plant* in the *day-ahead market* and *real-time market.*

To deregister *pseudo-units*, the *market participant* must submit a written request to the *IESO*, at market.registration@ieso.ca. Deregistration must include all of the *pseudo-units* associated with the *facility* (i.e., all of the *pseudo-units* associated with the

combustion turbines that share the same steam turbine). For *facility* deregistration procedures, refer to section 5.1.

3.3.4.1 Combustion and Steam Turbine Configuration Relationships – Pseudo-Unit Modelling

Potential *dispatch* configuration relationships between combustion turbine *resources* and a steam turbine *resource* at a *combined cycle plant* must be established. These relationships will help ensure that steam turbine *resource* constraints, as a result of a commitment in the *day-ahead market, pre-dispatch scheduling* process or *real-time market*, are applied to the correct *minimum loading point* amount based on the steam turbine *resource's* schedule, and the scheduled configuration of associated combustion turbine *resources*.

For registration purposes, the Equipment Registration Specialist must provide the Resource Name and Resource ID of up to four physical combustion turbine *resources* and one physical steam turbine *resource*, which make up the *combined cycle plant*. The Resource Name and Resource ID are assigned by the *IESO* for each combustion turbine *resource* and steam turbine *resource* and are available in Online IESO. From this submission, the *IESO* derives relationships between the combustion turbine *resources* and the steam turbine *resources* and records their associations.

The registration of a *pseudo-unit* is completed only when the *IESO* approves the request. Approval is determined using the steam turbine utilization supporting document. This document identifies how steam is used at the *combined cycle plant* and must be submitted by the Equipment Registration Specialist at time of *pseudo-unit* registration in Online IESO. The *IESO* will approve *pseudo-unit* requests if it determines that the proposed *pseudo-unit* will be able to comply with *dispatch instructions* and not impact the *security* of the *IESO-controlled grid*. The *IESO* will consider on a case-by-case basis *pseudo-unit* registration requests where not all *resources* designated as part of that *pseudo-unit* are connected to the *IESO-controlled grid* at the same *connection point.*

For participation in *pseudo-unit* modeling, *pseudo-units* are created and their relationship to a combustion turbine *resource* and steam turbine *resource* is recorded. The *pseudo-unit* modelling election flag *resource* data parameter is assigned by the *IESO* to each combustion turbine *resource* and steam turbine to indicate that the *market participant* has elected to enable *pseudo-unit* modelling for scheduling. The number of *pseudo-units* to be registered is equal to the number of combustion turbine *resources* at the *combined cycle plant*.

Combined cycle relationship data for a *combined cycle plant* participating in *pseudo-unit* modeling are used to:

- calculate *pseudo-unit dispatch data* values from physical unit submissions;
- allocate physical unit derating and transmission limitations to the *pseudo-unit* level;

- translate the *pseudo-unit* schedules to physical unit level; and
- enable *settlement* of *pseudo-units* on the physical unit level.

The *IESO* approves the data for all physical combustion turbine *resources* and steam turbine *resources* based on the following rules:

- each *resource* has been registered individually;
- each *resource* is part of the same *facility;*
- each *resource* has a *resource bid* type of **Dispatchable**;
- the *resources* are not part of an aggregated *resource*;
- all *resources* are under the operational control of a single *market participant*; and
- all *resources* are assessed a *settlement* under a single *metered market participant*.

For participation in *pseudo-unit* modeling as part of scheduling of the *combined cycle plant* in the *day-ahead market* and *real-time market*, further validation by the *IESO* includes:

- the number of *pseudo-units* registered is equal to the number of combustion turbine *resource*s registered to the *combined cycle plant*;
- each *pseudo-unit* will have a unique combustion turbine *resource*;
- all combustion turbine *resources* at a *combined cycle plant* that register as a *pseudo-unit* must share the same steam turbine *resource*;
- each *pseudo-unit* will be evaluated to determine if it is a *GOG-eligible resource* based on the physical combustion turbine *resource* unit technical data;
- *pseudo-unit* market type participation (i.e., *energy market*, *operating reserve market*) shall be identical to that of the physical combustion turbine *resource* unit registration data;
- *pseudo-unit* administrative relationships (i.e., *registered market participant*, *metered market participant*, as well as *registered market participant* user eligibility to submit *dispatch data*) shall be identical to that of the physical combustion turbine *resource* unit technical data;
- *pseudo-unit* maximum generator capacity (PSU MGC) will be calculated and recorded based on the MGC of the combustion turbine *resource* (CT) and steam turbine *resource* (ST), and the *steam turbine percentage share* (ST Share%) parameter registered in section 3.3.4.3. Computed parameters need to be rounded to the nearest single decimal value in the following formula:
  PSU MGC = (ST Share% * ST MGC) + CT MGC; and
- *pseudo-unit* maximum ramp rate will be calculated and recorded based on the sum of the Maximum Ramp Rate of the combustion turbine *resource* and steam turbine *resource*.

The *combined cycle plant* relationships and *resource* data parameter requirements are summarized in Figure 3-3.

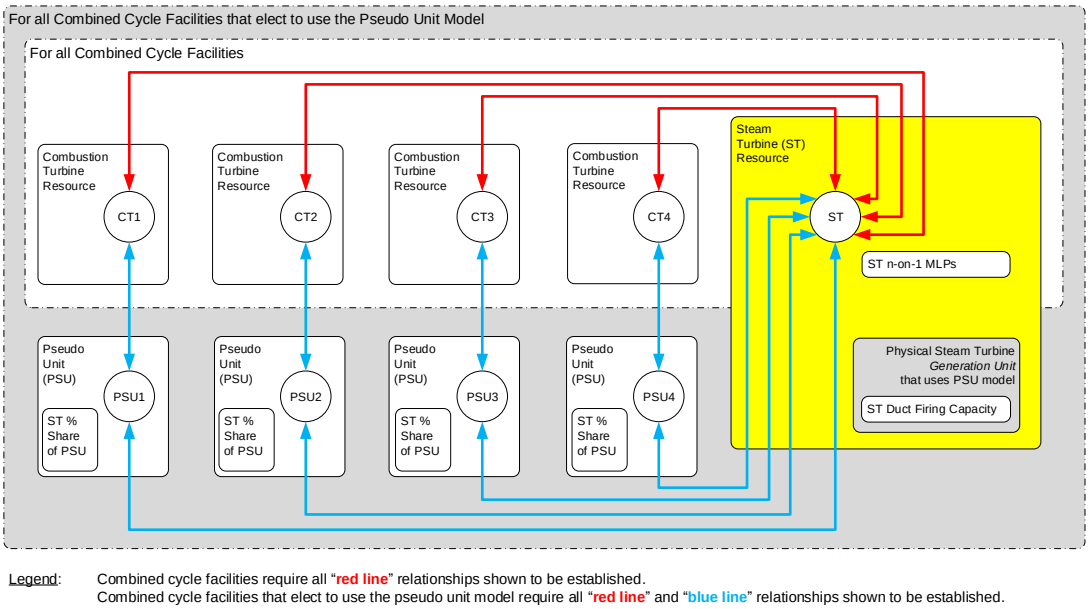

Figure 3-4: Combined Cycle Plant Relationships and Resource Data Parameter Requirements

3.3.4.2 Steam Turbine Minimum Loading Point

The steam turbine *minimum loading point* reflects one or more *resource* data parameters for a steam turbine *resource*. It is the *minimum loading point*, in MW, that is required for a steam turbine *resource*, given its relationship with one or more combustion turbine *resources*. The number of steam turbine *minimum loading points* that must be registered corresponds to the number of combustion turbine *resources* at the same *combined cycle plant* that share a steam turbine *resource* (Figure 3-3). The *IESO* uses the steam turbine *minimum loading point resource* data parameters to accept daily *dispatch data* submissions of steam turbine *resource minimum loading points*. The Equipment Registration Specialist must submit one or more of the following *resource* data parameters:

- steam turbine *minimum loading point* – when one or more combustion turbines are associated with the steam turbine;
- steam turbine *minimum loading point* (2 on 1) – when two or more combustion turbines are associated with the steam turbine;
- steam turbine *minimum loading point* (3 on 1) – when three or more in-service combustion turbines are associated with the steam turbine;
- steam turbine *minimum loading point* (4 on 1) – when four or more in-service combustion turbines are associated with the steam turbine.

The value submitted by the Equipment Registration Specialist for the steam turbine must reflect the actual capability of the associated *generation unit*.

The *IESO* accepts the submission using the following validation rules:

- must be a steam turbine part of a *combined cycle plant;*
- number format xxxx.x – unit is MW; and
- 0 < MLP(i-1)-on-1 < MLP(i)-on-1 =< MGC,

where:

- MLP is the *minimum loading point*.
- MGC is the *pseudo-unit* maximum generator capacity as determined by the *IESO*
- I is an index for the steam turbine *minimum loading point* to indicate its relationship to the *combined cycle plant* configuration. The "i" is defined as a variable 2 =< i =< n, where "n" is the number of combustion turbines at the *combined cycle plant*.

3.3.4.3 Steam Turbine Percentage Share

The *steam turbine percentage share* must be submitted by the Equipment Registration Specialist for each *pseudo-unit*. The *IESO* uses this parameter to determine the steam duct firing capacity of a *pseudo-unit* and the maximum *resource* active power capability equipment data parameter for the *generation unit* associated with the steam turbine.

The Equipment Registration Specialist must submit a percentage, from 0% to 100%, that correlates to the number of combustion turbines registered for the *combined cycle plant*. Additionally, the Equipment Registration Specialist must submit supporting documentation that provides operational data showcasing a linear correlation between the steam turbine and each combustion turbine in the *dispatchable* range. Operational data should be given for different operating conditions with a maintained linear correlation.

The *IESO* accepts the submission using the following validation rules:

- the number of *steam turbine percentage share* values registered must equal the number of registered combustion turbines elected for *pseudo-unit* modeling;
- each *steam turbine percentage share* value must >=0 and in the format xx.x %;
- the sum of all *steam turbine percentage share* values = 100.0%; and
- each *steam turbine percentage share* value * (registered maximum generator *resource* active power capability for the steam turbine *generation unit*

associated with the steam turbine) >= (MLP for a 1 combustion turbine to 1 steam turbine relationship).

3.3.4.4 Steam Turbine Duct Firing Capacity

The steam turbine duct firing capacity represents the capacity, in MW, available from the duct firing range of the *generation unit* associated with a steam turbine *resource*. This data parameter may be submitted by the Equipment Registration Specialist for each *generation unit* associated with a steam turbine *resource* and reflects the actual capability of the *generation unit.* If the *market participant* has elected to model the steam turbine *resource* as part of a *pseudo-unit,* the *IESO* will use this parameter to derive the steam turbine duct firing capacity parameter for the associated *resource*. The *resource's* data parameter is used to calculate the duct firing operating region when scheduling a *pseudo-unit* in the *day-ahead market*, *pre-dispatch scheduling* process and *real-time market*.

The *IESO* accepts the submission using the following validation rules:

- the *generation unit* must be associated with a steam turbine that is part of a *combined cycle plant*;
- number format xxxx.x – unit is MW; and
- 0 =< Duct Firing =< ST MGC – [(Registered Number of Combustion Turbines at a Combined Cycle Plant) * (Registered ST MLP1-on-1)]

3.3.4.5 Duct Firing Ten-Minute Operating Reserve Capability Flag

The *duct firing 10-minute operating reserve capability* flag can be used to prevent steam turbine *resources* associated with a *pseudo-unit* from receiving *ten-minute operating reserve* schedules within the duct firing operating region. The *IESO* uses this parameter to determine which classes of *operating reserve* can be scheduled in the duct firing region of a *pseudo-unit*. The parameter is only used if the steam turbine *resource* is registered to participate in *pseudo-unit* modelling and is scheduled as part of a *pseudo-unit* in the *IESO-administered markets*.

This data parameter must be submitted by the Equipment Registration Specialist for each steam turbine *resource* that has elected to participate in *pseudo-unit* modelling. The value submitted by the Equipment Registration Specialist must reflect the actual capability of all *generation units* associated with steam turbine *resources* in a *pseudo-unit*. A value of **Yes** indicates that the *pseudo-unit* may be scheduled by the *IESO* for any class of *operating reserve* in the duct firing region. This value may only be submitted if the registered steam turbine duct firing capacity is > 0 MW. A value of **No**

indicates the *pseudo-unit* may not be scheduled by the *IESO* for synchronized or non-synchronized *ten-minute operating reserve* in the duct firing region.

3.4 Registration of Resources for Wholesale Consumers

(MR Ch.7 ss.2.1, 2.2.1, 2.2.2, 2.2.3, 2.2.5, 2.2.6 (as applicable) and 2.2.8)

Wholesale consumers may participate in the *IESO-administered markets* using a *load resource* with one of the load participation types specified in Table 3-8. These load participation types are determined by the *bid/offer* type as established by the *bid/offer* type *resource* parameter. This parameter must be submitted by each *load resource* and is described in the subsection below.

Table 3-8: Types of Load Resources

Bid/Offer Type	Load Participation Types
Dispatchable	• *Dispatchable load* (includes *dispatchable electricity storage resources* registered to withdraw) • *Hourly demand response resource*
Non-dispatchable	• *Non-dispatchable load*
Day-ahead price responsive	• *Price responsive load* (includes *self-scheduling electricity storage resources* registered to withdraw)

As part of the registration procedures for the *day-ahead market* and *real-time market*, the Equipment Registration Specialist must submit *resource* data parameters required by a Load Resource, as indicated in the Register Equipment Help File, using Online IESO. The *IESO* requires a minimum of two *business days* to implement changes to these values.

Table 3-9 provides additional detail on some *resource* data requirements for specific load participation types.

Table 3-9: Load Resource Registration Parameters

Registration Parameter	Mandatory/ Optional	Load Participation Types			
		Non-Dispatchable Load	Dispatchable Load Including Dispatchable Electricity Storage Resource Registered to Withdraw	Price Responsive Load Including Self-Scheduling Storage Resource Registered to Withdraw	Hourly Demand Response
Bid/Offer Type	M	X	X	X	X
Operating Reserve Class	M		X		
Market Control Entity for Physical Withholding	M		X		
Maximum Load – Active Power	by *IESO*		X	X	
Reference Levels for Financial Dispatch Data	M		X		
Reference Levels for Non-Financial Dispatch Data	M		X		
Reference Quantities	M		X		

As part of the registration procedures for the *day-ahead market* and *real-time market*, the Equipment Registration Specialist must submit specific technical data and *resource* data through Online IESO, which the *IESO* uses to determine a *resource's*:

- commitments and schedules, while respecting the *facility's* technical data; and
- eligibility for *settlement amounts,* including make-whole payments for the *day-ahead market* and *real-time market*.

The following subsections describe the applicable *resource* data parameters that must be submitted by the Equipment Registration Specialist of a *load resource*.

3.4.1.1 Bid/Offer Type

The *bid/offer* type registration parameter is a mandatory registration parameter for all *load resources*. This parameter identifies a *resource* registered as either a *dispatchable load, price responsive load* or a *non-dispatchable load*. The value selected by the Equipment Registration Specialist will be used by the *IESO's* tools to determine *bid* submission eligibility for a *load resource* or *electricity storage resource* in the *day-ahead market* and *real-time market.* During the registration procedure, the Equipment Registration Specialist must select one of the following *bid|offer* types for each *load resource* or *electricity storage resource* registering to withdrawal during the registration procedure:

- **Dispatchable** to indicate a *market participant*'s intent to participate in the *IESO-administered markets* as a *dispatchable load;*
- **Price Responsive Load** to indicate a *market participant*'s intent to participate in the *IESO-administered markets* as a *price responsive load*; or
- **Non-Dispatchable** to indicate a *market participant*'s intent to participate in the *IESO-administered markets* as a *non-dispatchable load*.

Market participants can change their *bid/offer* type from a *dispatchable load* or a *price responsive load* to a *non-dispatchable load* and vice versa. For more details on the requirements specific to submitting these change requests, refer to section 4.2.2.

3.4.1.1.1 Batch Type Dispatchable Loads

Most of the *dispatchable loads* participating in the *energy market* are of the continuous process type. However, some *load resources* are batch type *load resources*, meaning that there are cyclical periods during the *bidding* hour in which they are operating at 0 MW in order to refuel or unload.

A batch type *load resource* may be considered for participation in the *energy market* as *dispatchable loads* provided:

- the batch type *load resource* has an hourly consumption schedule that is predictable at least two hours in advance of the *dispatch hour* to allow the *market participant* to formulate and submit its *bids* within the timelines specified by the *market rules* for *dispatchable resources;* and
- the batch type *load resources* exhibits a duty ratio of at least 0.75. This means that within an hour, the *load resources* should not be at zero consumption for more than a cumulative of 15 minutes.

3.4.1.2 Operating Reserve

(MR Ch.7 s.2.2.8)

Each *wholesale consumer* associated with a *dispatchable load* must submit a value for the *operating reserve* class registration parameter. This parameter identifies if the *resource* is eligible to provide *operating reserve* and the *operating reserve* classes that the *market participant* has elected to provide.

The Equipment Registration Specialist submits a single value for the parameter by selecting one of the following values in Online IESO:

- **10 min non-spin and 30 min** to indicate election to provide in the non-synchronized *ten-minute operating reserve* and *thirty-minute operating reserve*;
- **30 min non-spin** to indicate election to provide *thirty-minute operating reserve*;
- **All type** to indicate election to provide synchronized and non-synchronized *ten-minute operating reserve* as well as *thirty-minute operating reserve*; or
- **No operating reserve** to indicate election not to provide *operating reserve*.

3.4.1.2.1 Eligibility Criteria for Participation in the Operating Reserve Markets

Dispatchable loads must have a predictable, periodic consumption cycle, and meet the eligibility criteria for participation in the *ten-minute operating reserve* and *thirty-minute operating reserve market* as described in Table 3-10.

Table 3-10: Dispatchable Load Eligibility Criteria

Criteria		Rationale
1	Must demonstrate a load cycle of more than 0.75 (total minutes consuming divided by total minutes of the cycle period)	This criterion allows the *IESO* to make assumptions about the availability and consumption level of the *load resource*. A lower duty ratio means that the *IESO* has to carry more *ten-minute operating reserve or thirty-minute operating reserve* or *regulation* to compensate for a higher uncertainty of the ability of the *load resource* to comply with the *ten-minute operating reserve* or *thirty-minute operating reserve* activation request. This also limits the exposure of that *load resource* in the event it's scheduled for *ten-minute operating reserve or thirty-minute operating reserve* but is not able to activate

Criteria		Rationale
		because it would be down 10 or 30 minutes after receipt of the activation message. For instance, for non-spinning *ten-minute operating reserve*, if a *load resource* was down six minutes then up four minutes, it would meet criterion #2, but have a duty cycle of 40%. However, if it were activated in minute 3, then ten minutes later (i.e., minute 13) it would have been down anyway. Criterion #2 combined with criterion #4 limits this exposure.
2	Must not be at zero consumption for more than 10 minutes at a time (exceptions are allowed for unplanned events)	This criterion is required to help ensure that the *load resource* will be able to respond to a *ten-minute operating reserve* activation and reduce consumption within 10 minutes (i.e., the *resource* would have been loaded at the time the relief is required).
3	Must not be at zero consumption for more than 10 minutes at a time (exceptions are allowed for unplanned events)	This criterion is required to help ensure that the *load resource* will be able to respond to a *thirty-minute operating reserve* activation and reduce consumption within 30 minutes (i.e., the *resource* would have been loaded at the time the relief is required).
4	Must be able to maintain a zero consumption level for at least one hour, when activated for *ten-minute operating reserve* or *thirty-minute operating reserve*	As described in *NPCC* Directory 5 Reserve.
5	Must be able to respond to the *IESO*'s activation request for *ten-minute operating reserve* and reduce load within 10 minutes	As described in: • *IESO market rules*, definitions of *ten-minute operating reserve* and *thirty-minute operating reserve* • *NERC* Glossary of Terms
6	Must be able to respond to the *IESO*'s activation request for *thirty-minute operating reserve* and reduce load within 30 minutes	As described in: • *IESO market rules*, definitions of ten-minute and thirty-minute reserve • *NERC* Glossary of Terms

Market Control Entity for Physical Withholding

(MR Ch.7 s.22.9)

Market participants disclose their *market control entities* and then select a *market control entity for physical withholding* from among their *market control entities* for each of their *dispatchable load resources* via the Update Organization process.

Maximum Load – Active Power

The maximum load – active power registration parameter is a mandatory *resource* data parameter that is determined by the *IESO.* This parameter represents the maximum active power capability for a *resource* registered as either a *dispatchable load* or a *price responsive load.* For a *dispatchable load*, the *IESO* uses this parameter to calculate the maximum *offer* quantity for *energy* or *operating reserve* that can be submitted as *dispatch data*. For a *price responsive load*, the *IESO* uses this parameter to calculate the maximum *offer* quantity for *energy* that can be submitted as *dispatch data* in the *day-ahead market*. The *IESO* determines the value of this parameter by calculating the sum of the Total peak load – Active Power values provided by the Equipment Registration Specialist for all registered *load equipment* associated with the *load resource*.

Reference Levels for Financial Dispatch Data Parameters

(MR Ch.7 ss.22.1.1 and 22.2.1)

Table 3-11 lists the load *resource* types that have *reference levels* registered for each *financial dispatch data parameter*. For more information on the process the *IESO* uses to determine *reference levels* for *financial dispatch data parameters*, refer to **MM 14.2**.

Table 3-11: Applicability of Financial Reference Levels by Types of Loads

Energy Offer Reference Level	Speed No-Load Reference Level	Start-Up Reference Level	Operating Reserve Offer Reference Level
None	None	None	• *Dispatchable load* • *Dispatchable electricity storage resource* (withdrawals)

Reference Levels for Non-Financial Dispatch Data Parameters

(MR Ch.7 ss.22.1.1 and 22.3.1)

Resources have two sets of *reference levels* for *non-financial dispatch data* registered, one each for season:

- the summer period, which is from May 1 to October 31; and
- the winter period, which is from November 1 to April 30.

Table 3-12 sets out the *resource* types that have *reference levels* registered for each *non-financial dispatch data parameter*. For more information on the process the *IESO* uses to determine *reference levels* for *non-financial dispatch data parameters*, refer to **MM 14.2**.

Table 3-12: Reference Levels for Non-Financial Dispatch Data Parameters

Non-Financial Reference Level	Registered for the Following Resource Types
Operating Reserve Ramp Rate Reference Level[12]	• *Dispatchable load* • *Dispatchable electricity storage resource* (withdrawals)

Reference Quantities

(MR Ch.7 s.22.6.1)

Table 3-13 lists the load participation types that have *reference quantities* registered in the *energy* and/or *operating reserve markets*. The *IESO* registers sets of *reference quantities* for each market in which a *resource* participates. For more information on the process the *IESO* uses to determine *reference quantities* and calculate *reference quantity values*, refer to **MM 14.2**.

Table 3-13: Reference Quantities by Load Participation Type and Market

Energy Market	Operating Reserve Market
None	• *Dispatchable load* • *Dispatchable electricity storage resource* (withdrawals)

3.5 Registration of Facilities, Equipment, and Resources for Electricity Storage Participants

(MR Ch.7 ss.2.1, 2.2 and 21.2)

All *electricity storage participants* must submit *facility* data and provide operational monitoring to the *IESO*. This includes:

- *electricity storage participants* intending to participate in the *IESO-administered markets*; and

[12] A single *operating reserve* ramp rate *reference level* is registered that will be used to validate all applicable classes of *operating reserve* ramp rates *dispatch data* submission.

- *embedded electricity storage participants* that are not *market participants* but are program participants.

Electricity storage participants intending to participate in the *IESO-administered markets* are required to register in accordance with this *market manual*.

In accordance with **MR Ch.7 s.21**, the evolution of the participation framework for electricity storage in Ontario to potentially provide for fuller integration of electricity storage into the Ontario wholesale electricity markets and grid is under consideration by the *IESO*.

Some or all of the requirements set out herein may change as a result of such evolution, and the *IESO* may, in connection with such changes, require *electricity storage participants* to modify their registration and operational arrangements in accordance with future *market rule* amendments which may supplant the requirements stated herein.

An *electricity storage participant* can register its *facility* in one of three ways:

- *dispatchable electricity storage facility*;
- *self-scheduling electricity storage facility* providing *regulation*[13] *service* only; or
- *self-scheduling electricity storage facility* not providing *regulation service.*

An *electricity storage participant* participating in the *energy market*, *operating reserve market*, or *capacity auction* must register its *facility* as a *dispatchable electricity storage facility*. For more details on *electricity storage facility* participation in the *capacity auction,* refer to **MM 12.0**.

An *electricity storage participant* participating in the *energy market* only (not the *operating reserve market* or *capacity auction*) may register as a *self-scheduling energy storage facility*, if its *electricity storage facility* size is less than 10 MW.

A *self-scheduling electricity storage facility* registered to provide *regulation* service will not be permitted to participate in the *energy market* or the *operating reserve market*.

Prior to registering with the *IESO*, *electricity storage participants* may be required to complete a *connection assessment* as described in **MM 1.4**.

3.5.1.1 Registering Resources

(MR Ch.7 s.21.2)

Registration solution for electricity storage resources – Until such time that *electricity storage resources* are more fully integrated into the *IESO's* tools, *electricity storage resources* are represented within the *IESO* tools as a combination of separate

[13] *Regulation* is an *ancillary service* that is currently contracted by the *IESO*. A contracted *electricity storage facility* may not exceed an *electricity storage facility size* of 50 MW as per **MR Ch.7 s.21.3.2**.

generation and *load resources* representing their injection and withdrawal capabilities respectively. *Electricity storage participants* registering their *resources* pursuant to **MR Ch.7 s.21.2**, must satisfy the registration requirements applicable to *generation* and *load resources*, as outlined in Table 3-14. As such, *market participants* intending to register *electricity storage resources* should also review section 3.3 and section 3.4 to identify the requirements to register *generation resources* and *load resources*, respectively.

Table 3-14: Electricity Storage Resource Type versus Registration Requirements

Resource Type	Authorization	Applicable Registration Requirements
Dispatchable electricity storage resource	To inject *energy*	*Dispatchable generation resource(s)*
	To withdraw *energy*	*Dispatchable load resource(s)*
Self-scheduling electricity storage resource (providing *regulation* only)	• To inject *energy*	*Self-scheduling generation resource(s)*
	• To withdraw *energy*	No registration required
Self-Scheduling Electricity Storage resource (not-providing *regulation*)	To inject *energy*	*Self-scheduling generation resource(s)*
	To withdraw *energy*	*Price responsive load resource(s)*
Embedded Electricity Storage resource (only program participants[14])	To inject *energy*	*Self-scheduling generation resource(s)*
	To withdraw *energy*	Either *Non-dispatchable load(s)* or *Price responsive load resource(s)*, only if required by the *IESO*

For *facilities* referred to in **MR Ch.7 ss.3.5.10** and **3.5.11** (*electricity storage facilities* and *generation facilities* under the same *connection point*), all *resources* i.e. *generation resource(s)* and *electricity storage resources* (both those authorized to inject and those authorized to withdraw) must be registered as *dispatchable resources*.

[14] *Embedded electricity storage resources* that are associated with *market participants* will register in the other three categories stated above.

Interim participation of *electricity storage resources* – The *market rules* impose explicit requirements applicable to various types of *electricity storage resources*. Considering that the *IESO's* systems do not explicitly include *electricity storage resources*, to satisfy these requirements, *electricity storage participants* participate in the *IESO* markets by adhering to the processes applicable to the other *resource* types as described in Table 3-14.

3.5.1.2 Facility Data

Electricity storage participants submit *facility* data via Online IESO for their equipment and *resources*.

In addition to the equipment data that is required in Online IESO, the *IESO* requires additional data listed in Table 3-15.

Table 3-15: Additional Data Required for Electricity Storage Facilities

Parameter	Description
Certified Duration of Service (injecting)	The certified time an *electricity storage facility* can inject continuously until it reaches its Certified Lower Energy Limit, assuming the *electricity storage facility* operates at its Upper Power Operating Limit (injecting).
Certified Duration of Service (withdrawal)	The certified time an *electricity storage facility* can withdraw continuously until it reaches its Certified Upper Energy Limit, assuming the *electricity storage facility* operates at its Upper Power Operating Limit (withdrawing).
Cycle Efficiency	The percentage of withdrawn *energy* that is re-injected over one full cycle of the *electricity storage facility*. During any certification or recertification test, *energy* withdrawals occur at the Lower Power Operating Limit (withdrawing) and *energy* injections occur at the Upper Power Operating limit (injecting).
Certified Upper Energy Limit	The highest certified *energy* amount to which an *electricity storage unit* can be consistently charged without damage beyond expected degradation from normal use.
Certified Lower Energy Limit	The lowest certified *energy* amount to which an *electricity storage unit* can be consistently discharged without damage beyond expected degradation from normal use.
Upper Power Operating Limit (injecting)	The maximum active power output (MW) for operation when injecting.
Lower Power Operating Limit (injecting)	The minimum active power output (MW) for operation when injecting.

Parameter	Description
Upper Power Operating Limit (withdrawing)	The maximum active power consumed (MW) when withdrawing.
Lower Power Operating Limit (withdrawing)	The minimum active power consumed (MW) when withdrawing.

3.5.1.3 Data Monitoring

(MR Ch.4 s.7.3A and App.4.24)

As *market participants*, *electricity storage participants* are subject to the operational data monitoring requirements on a *facility* basis as outlined in **MR Ch.4 App.4.24**.

Electricity storage participants that provide *regulation* will need to provide a basepoint, which is an economic dispatch value (in MW) as determined by the *IESO* or the *market participant*.

Within the required monitoring data outlined in **MR Ch.4 App.4.24**, there are several additional monitoring data unique to *electricity storage facilities* that *electricity storage participants* are required to provide to support the evolution of the permanent framework. These requirements are summarized in Table 3-16.

Table 3-16: Electricity Storage Data Monitoring – Evolving Framework for Electricity Storage

Telemetry Point	Description
Economic Maximum Power Mode (ECO_$P_{max,g}$)	The dynamic, current maximum active power output for operation as provided by the *market participant*.
Economic Minimum Power Mode (ECO_$P_{min,g}$)	The dynamic, current minimum active power output for operation as provided by the *market participant*.
Economic Minimum Charge Limit (ECO_$SOC_{min,g}$)	The dynamic, current minimum *energy* limit (MWh) that is provided by the *market participant*.
Economic Maximum Charge Limit (ECO_$SOC_{max,g}$)	The dynamic, current maximum *energy* limit (MWh) that is provided by the *market participant*.

All operational monitoring shall be communicated to the *IESO* in accordance with *IESO* approved methodologies and standards as set out in **MM 6.0** s.4.

3.5.1.4 Requirements for Operating Reserve Market Participation

(MR Ch.7 ss.2.2.8 and 21.7)

Electricity storage participants may elect to register to provide *operating reserve* in one of the following ways*:*

- with its injection capability only (i.e., as a *generation resource*);
- with its withdrawal capability only (i.e., as a *load resource*); or
- with both its injection and withdrawal capabilities (i.e., as both a *generation resource* and a *load resource*).

Electricity storage participants wishing to provide *operating reserve* must meet the eligibility criteria for participation in either the *ten-minute operating reserve* or *thirty-minute operating reserve* markets, or both markets, as described in Table 3-17. *Operating reserve* offers and operational requirements for *electricity storage facilities* are described in **MM 4.1**.

Table 3-17: Requirements for Operating Reserve Market Participation

	Requirement	Purpose and/or Applicable Rule, Standard, etc.
1	To offer *operating reserve* from its withdraws: *Electricity storage resources* must be able to withdraw continuously for at least 70 minutes at or above the minimum *operating reserve* capability (withdrawal). The minimum *operating reserve* capability (withdrawal) must be at least 1 MW.	This is to ensure that the *resource* has the capability to withdraw continuously at the minimum *operating reserve* capability for an adequate duration before reducing to zero consumption should an activation be called at the end of a *dispatch hour*. For more details, refer to Appendix A of **MM 4.1**.
2	To offer *operating reserve* from the its injections: *Electricity storage resources* must be able to inject continuously for at least 130 minutes at or above the minimum *operating reserve* capability (injection). The minimum *operating reserve* capability (injection) must be at least 1 MW.	This is to ensure that the *resource* has the capability to inject continuously at the minimum *operating reserve* capability for an adequate duration should an activation be called at the end of a *dispatch hour*. For more details, refer to Appendix A of **MM 4.1**.

Requirement		Purpose and/or Applicable Rule, Standard, etc.
3	To provide *operating reserve* from withdrawals: *Electricity storage resources* must be able to maintain **a zero consumption level for at least one hour** when activated for *ten-minute operating reserve* or *thirty-minute operating reserve.*	Comply with *NPCC* Directory 5 Reserve
4	To provide *operating reserve* from injections *Electricity storage resources* must be able to sustain level of *operating reserve* provided for at least one hour when activated for *ten-minute operating reserve or thirty-minute operating reserve*	Comply with *NPCC* Directory 5 Reserve
5	*Electricity storage resources* must be able to respond to the *IESO*'s activation request for *ten-minute operating reserve* and provide *offering reserve* within **10 minutes**	**MR Ch.11** definitions of *ten-minute operating reserve* and *thirty-minute operating reserve* NERC Glossary of Terms
6	*Electricity storage resources* must be able to respond to the *IESO*'s activation request for *thirty-minute operating reserve* and provide offering reserve within **30 minutes**	**MR Ch.11** definitions of *ten-minute operating reserve* and *thirty-minute operating reserve* NERC Glossary of Terms

3.6 Aggregation of Equipment and Resources

(MR Ch.7 s.2.3)

At or subsequent to their initial registration, *market participants* may apply to aggregate *generation units, electricity storage units* or *load equipment* for the purpose of submitting *bids/offers*. The *IESO* will only grant an aggregation request from a *market participant* if the aggregation will not affect *system operating limits* and will not affect *security* or *resource adequacy* assessments.

3.6.1 Resource Compliance Aggregation

Resources that are not eligible for aggregation may be eligible for compliance aggregation. This is where individual *generation resources* within a defined group may ignore their *dispatch* provided that the total *dispatch* is respected. For example, consider two *generation resources*, G1 and G2, each having a *dispatch* of 5 MW. Under compliance aggregation, G1 may generate 3 MW and G2 may generate 7 MW,

meeting the total *dispatch* of 10 MW. This is typical for *generation resources* that are part of river systems that do not share common *connection points*, but may individually experience challenges in following *dispatch instructions* due to sharing a single fuel supply.

Market participants who wish to participate in compliance aggregation shall submit a request noting the relationships between these *resources* (e.g., river system).

The request for aggregation will be considered based on:

- whether the *resources* to be aggregated are *dispatchable quick start generation resources* or *dispatchable non-quick start generation facilities*. Where a *market participant* wishes to register *dispatchable non-quick start generation facilities*, such *resources* will be subject to ramp rate restrictions when exercising compliance aggregation in real time. These restrictions are outlined in the interpretation bulletin, Compliance with Dispatch Instructions Issued to Dispatchable Facilities, IMO_MKRI_0001 v.7.0, ss.2.2-2.3
- whether the *resources* are related to each other (e.g. river systems); and
- the likelihood that the *resource* will be sent to Unit Specific Dispatch for *security* reasons.

If the request for aggregation is approved, the *market participant* will be notified. The in-service activities of the aggregated *resources* are coordinated by the *IESO* in the same way as for any new or modified *facility*.

3.7 Participation in Centralized Forecasting Service for Generation Facilities that have Variable Generation Resources

(MR Ch.4 s.7.1.6)

Each *generation facility* that has *variable generation resources* is required to:

- be authorized as a program participant for centralized forecasting service (refer to section 2.3.2);
- register via Online IESO to provide operational and meteorological monitoring data for centralized forecasting service, then (after being registered) provide the data via Online IESO (refer to sections 3.7.1 through 3.7.4);
- submit *facility* data for its equipment and supporting documentation for its meteorological equipment via Online IESO. Refer to Appendix B (wind) and Appendix C (solar) for complete listings of the required *facility* data. Submitted data are reviewed and (if the data meet requirements) approved by the *IESO*; and
- coordinate with the *IESO* for scheduling and performing data monitoring (operational and meteorological) tests.

3.7.1 Operational and Meteorological Monitoring

(MR Ch.4 App.4.15 and 4.19)

As a *market participant*, a *generation facility* that has *variable generation resources*[15] must provide operational telemetry to the *IESO* and is subject to the operational monitoring requirements outlined in **MR Ch.4 App.4.15** and to the performance requirements outlined in **MR Ch.4 App.4.19**. These requirements are based on a per *facility* basis. All operational monitoring must be provided to the *IESO* per the specifications set out in **MM 6.0**s.4.

Meteorological monitoring that measures local weather at the *facility* shall be provided to the *IESO* at least once every 30 seconds and shall not be modified in any way (i.e., the provided value is not an averaged value).

3.7.2 Meteorological Monitoring - Wind Generation Facilities

At the time of registration, the *IESO* will provide the Equipment Registration Specialist with a list of applicable operational monitoring based on the requirements listed in Appendix B (wind).

Each wind turbine must be no further than 5 km from the nearest meteorological data collection point. A wind *generation facility* may collect and send meteorological data from as many points at the *facility* as are available.

Data are collected through the use of meteorological towers, sodar or lidar technology, nacelle mounted equipment, or a combination of these methods.[16] However, the minimum number of meteorological towers or sodar/lidar units per *facility* must be met, as per Table 3-18, prior to considering any other technology (i.e., nacelle mounted equipment). Multiple *facilities* can provide data from the same data collection points if they are within the 5 km range.

3.7.3 Meteorological Towers and Sodar/Lidar Technology

Wind *facilities* must provide operational monitoring that measures local weather from standalone meteorological towers, or sodar or lidar units, located in areas representative of the microclimate and winds on the prevailing upstream side of the wind *facility*. Data that must be provided by a wind *facility* is found in Appendix B.

If a wind *facility* provides weather data using sodar or lidar technology, supplementary nacelle mounted wind speed and direction data shall be provided.

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[15] As per **MR Ch.4 App.4.19**, the *IESO* considers medium performance to be acceptable for embedded *variable generators* (i.e., program participants).

[16] As alternative technologies are identified, the *IESO* will review their compatibility with the existing requirements and where appropriate expand the list of acceptable technologies.

Meteorological monitoring using nacelle mounted equipment shall comply with the requirements as stated in Table B-4 of Appendix B.

Table 3-18: Meteorological Tower or Sodar/Lidar Unit Requirements for Wind Facilities

Facility Size	Total Number of Meteorological Towers or Sodar/Lidar Units per Facility
Less than 10 MW	None
10 MW to less than 100 MW	1 minimum
100 MW to less than 200 MW	2 minimum
200 MW to less than 300 MW	3 minimum
300 MW to less than 400 MW	4 minimum

3.7.4 Operational Monitoring - Solar Generation Facilities

At the time of registration, the *IESO* will provide the Equipment Registration Specialist with a list of applicable monitoring based on the requirements in Appendix C (solar).

Each solar *facility* shall have a minimum of two meteorological data collection points irrespective of the physical size of the solar *facility*. No solar panel shall be further than 12 km from the nearest two meteorological data collection points. Multiple *facilities* can provide data from the same data collection points if they are within the 12 km range.

3.8 Next Steps

After the Stage 5: Register Equipment procedure is complete, the next stage in connecting to Ontario's power system is Stage 6: Commission equipment and validate performance. Stage 6 is not always mandatory. This procedure is outlined in the Commission equipment and validate performance process diagram.

3.8.1 Commission Equipment

(MR Ch.7 ss.2.2A and 2.2D)

During the Commission Equipment stage, the *market participant* conducts commissioning tests of the equipment installed at their *facility.* These tests are scheduled according to the procedures in **MM 7.3**.

The purpose of the commissioning tests is to confirm whether the equipment:

- meets the requirements and expectations established during the *connection assessment* process and defined in the Notice of Conditional Approval to Connect;

- is impactive on the *reliability* of the *IESO-controlled grid*; and
- should be included in the *outage* reporting requirement.

All exclusions from the *outage* reporting requirement are subject to periodic review by the *IESO* and may be revoked at any time as a result of such a review and/or changes to *facilities*.

Commission testing consists of the following four steps, which are described in detail on the Stage 6: Commission equipment and validate performance webpage:

- submit commissioning request;
- submit commissioning test plan;
- complete commissioning test; and
- submit commissioning test report.

3.8.2 Performance Validation

(MR Ch.2 s.6)

Performance validation applies to new equipment and to equipment that has been modified such that it causes a change to its performance characteristics.

The Equipment Registration Specialist will receive a notification through Online IESO during the Register Equipment procedure if performance validation is required. For more information, refer to **MM 1.6**.

– End of Section –

4. Maintain IESO Registered Data

The purpose of the Maintain IESO Registered Data procedures is to maintain data such that the *IESO* retains current and accurate information on Participants and service providers. This includes maintaining data related to their applicable *facilities*, equipment, *resources*, and people and their contact information and system accesses registered with the *IESO*.

Changes to registered data should be identified to the *IESO* and made in Online IESO as soon as possible before they take effect. However, some proposed changes must be identified to the *IESO* well before they take effect.

> **Important**: It is the responsibility of the *market participant*, program participant or service provider to review and maintain their *IESO* registered data and submitted supporting documentation on an enduring basis, to ensure that they all are correct.

The costs incurred by the *IESO* during the maintain *IESO* registered data phase will be invoiced by the *IESO* to the *market participant* according to the provisions described in section 6.

4.1 Maintain Organization/Participant Registered Data

(MR Ch.1 s.11.3.1 and MR Ch.2 s.3.1.8)

Each *market participant*, program participant, and service provider, via their Applicant Representatives, is required to maintain *IESO* registered data, including supporting documentation, by reviewing and updating them as necessary in Online IESO. Examples of *IESO* registered data include (but are not limited to):

- organization name, address, contact information, etc.;
- access to *IESO* systems;
- *market participant*, program participant, and service provider authorization type;
- bank account data;
- supporting documentation (e.g., *prudential support*, *OEB licence*, CER permit); and
- applicable market control entities or market control entities for physical withholding.

4.1.1 Change Organization Name

An Authorized Representative of a *market participant*, program participant, or service provider may initiate an organization name change request by emailing market.registration@ieso.ca. The request must include the reason for the name change.

The *market participant*, program participant, or service provider will then be instructed to upload applicable supporting documents through Online IESO (e.g., official statement of merger or buyout).

The *IESO* will advise the Authorized Representative whether any additional supporting documents are needed. If no additional supporting documents are needed, the *market participant,* program participant, or service provider must then re-register the organization using the procedures in section 2. A new *participant agreement* will be generated, printed, and issued for signature as described in section 2.1.1.

Market participants changing their organization name must also update their *prudential support* information. Additionally, they must update and submit their *OEB Licence* and (if applicable) CER permit (refer to section 2.2.1).

4.1.2 Change Participation Type

Upon receiving a request from a *market participant* to change their participation type, the *IESO* assesses any possible impact the requested class change may have on the *market participant's facility* information, and whether the change has any real or potential impact on the *security* and *reliability* of the *IESO-controlled grid*.

4.1.3 Access Additions/Changes to IESO Systems

Rights Administrators may need to update, add or delete users that have access to the *IESO* systems used for exchanging data between themselves and the *IESO* (e.g., Online IESO, IESO gateway). For these situations, refer to **MM 1.3** for information on system access.

4.1.4 Changes to Mandatory Organization Contacts

Market participants, program participants and service providers may request a change to one of their mandatory organization contacts (refer to section 2.1) by submitting a task through Online IESO on the day before the change is to take effect, or as soon as possible after. The change must be requested by another mandatory organization contact as described below:

- a request to change an Applicant Representative may be submitted by any mandatory organization contact who is registered in Online IESO;

- a request to change a Rights Administrator may be submitted by either an Authorized Representative, Primary Contact, or another Rights Administrator who is registered in Online IESO and is still functioning in that role; and
- a request to change a Primary Contact may be submitted either by an Authorized Representative or another Primary Contact who is registered in Online IESO and is still in that role.

Online IESO sends an automatic annual email notification to each participant on the anniversary date of their registration requesting they confirm that their mandatory organization contacts are accurate, or to make any necessary changes.

4.1.4.1 Changing an Authorized Representative

A request to change an Authorized Representative may be submitted through Online IESO by any mandatory organization contact. However, the request must be accompanied by a letter (on company letterhead) from either the new Authorized Representative, or from another Authorized Representative who is registered in Online IESO and is still in that role. The letter must include the following information:

- name (legal and if applicable, known name), email address and phone number of the new Authorized Representative;
- attestation either from self (if the new Authorized Representative is to be the only Authorized Representative) or from the Authorized Representative writing the letter that the person identified is now an Authorized Representative;
- attestation that the new Authorized Representative has the authority to contractually bind the company;
- attestation that any registered Authorized Representatives who are no longer in that role should be removed from that role;
- the effective date of the Authorized Representative change; and
- printed name and signature of the Authorized Representative writing the letter.

4.1.4.2 Changing all Mandatory Organization Contacts

In a situation where all of a *market participant's*, program participant's or service provider's registered mandatory organization contacts have changed (e.g., a complete management turnover), a representative of the organization's new management who has the authority to contractually bind the company must contact *IESO* Customer Relations (customer.relations@ieso.ca) to begin the process of registering their new mandatory organization contacts.

4.2 Facility, Equipment and Resource Data Maintenance

(MR Ch.1 s.11.3.1)

After approving a *facility* for participation in the *IESO-administered markets*, the *IESO* uses the maintenance procedures to ensure that all *facilities* continue to meet the minimum requirements defined by the *market rules*. In addition, the maintenance procedures ensure that any changes or additions to *facilities* and their associated *resources* participating in the *IESO-administered markets,* or their related data stored in Online IESO*,* do not negatively impact the *security* or *reliability* of the *IESO-controlled grid*. For example, *facility* maintenance is required where there are market participation changes, such as:

- *resource* type (*generation resource*, *load resource*, etc.);
- *bid/offer* type data parameter for *generation resources* (dispatchable [regular],[17] non-dispatchable, self-scheduling, intermittent);
- *bid/offer* type data parameter for *electricity storage resources*;
- *bid/offer* type data parameter for *load resources* (*dispatchable* [regular],[18] day-ahead price responsive,[19] *non-dispatchable*);
- *operating reserve* class (ten-minute or thirty-minute);
- *facility* type (*generation facility*, *load facility*, etc.);
- *combined cycle plant* modelling (pseudo-unit model, etc.);
- physical site modifications (e.g., changes in MW output, ramp rates, governor models, data monitoring, and voice communication equipment, etc.);
- changes in operational control, as defined by the *registered market participant*; and
- changes to *market control entities* or *market control entity for physical withholding*, as applicable.

Market participants and program participants manage their *facility*, *resource*, and equipment data, and applicable relationship data using Online IESO. These persons are required to submit a change request through Online IESO to notify the *IESO* about any changes, additions or deletions to data concerning their *facilities.* These

[17] Sandbox testing, facilitated by the *IESO*, is required for new *registered market participants* becoming *dispatchable* for the first time. Sandbox testing provides the ability for a *market participant* to familiarize themselves with the *dispatch workstation*.

[18] Sandbox testing, facilitated by the *IESO*, is required for new *registered market participants* becoming *dispatchable* for the first time.

[19] Sandbox testing, facilitated by the *IESO*, is required for new *registered market participants* becoming *price responsive* for the first time.

changes may impact the data stored in Online IESO or the supporting documentation relating to the *facility*.

Any changes that a *market participant*, program participant, or service provider cannot make through Online IESO must be emailed to market.registration@ieso.ca. The *IESO* will update the relevant data in Online IESO, which the *market participant*, program participant, or service provider can then confirm by accessing their Online IESO registration data.

Depending on the nature of the change request*,* the *IESO* may need to prepare and issue a RAN to the Participant in order to approve the change. As a guideline to *market participants* or program participants with existing *facilities*, the *IESO* will issue a RAN for changes including, but not limited to:

- *resource* data parameter changes:
- *operating reserve* class;
- decease/increase in maximum capacities;
- *bid/offer* type,
- *minimum run-time*, *MGBRT*, *minimum loading point*;
- *reference levels*, *reference quantities*; and
- participation in an *IESO* program (e.g., *generator offer* guarantee status);
- equipment data changes (including operating nomenclature changes):
- breaker, transformer, and switch replacements;
- static VAR compensator (SVC), STATCOM, capacitor and reactor;
- remedial action scheme; and
- modifications to *automatic voltage regulator* (*AVR)*, power system stabilizer (PSS); and
- relationship changes for a *facility* or *boundary entity resource* (i.e., ownership, operation, or *registered market participant* changes).

A RAN is generally not issued for changes to *facility* contact information, user-*resource* relationship, protection changes to an existing *facility*, and *revenue metering* changes.

It is recommended that the *market participant* or program participant email market.registration@ieso.ca early in the change process to determine if a RAN is required.

The following subsections cover specific types of *facility* data changes.

4.2.1 Data Monitoring and Voice Communications Changes

Any change to a *market participant*'s or program participant's data monitoring or voice communications requires re-submission via Online IESO and, if necessary, revised Single-Line Diagrams. Changes to this data may require the *market participant* or program participant to redo certain *facility* tests (refer to section 3.2.7). After assessment of the requested changes, the *IESO* will notify the *market participant* or program participant through Online IESO whether the requested changes have been approved or denied.

4.2.2 Changes to Bid/Offer Type Registration Parameter for Load Resources

(MR Ch.7 ss.2.2.19 and 2.2.20)

As described in section 3.4.1.1, existing *load resources* can indicate their intent to participate in the *IESO-administered markets* as a *dispatchable load*, a *non-dispatchable load* or a *price responsive load* when submitting the *bid|offer* type *resource* parameter. A *load resource* can change its intent by requesting a change of the *bid/offer* type *resource* parameter to be approved from the *IESO*. Depending on the nature of the change, a *load resource* will have to complete additional stages in the Connecting to Ontario's Power System process as described in section 1.1. **MR Ch.7 s.2.2.19** does not permit a *market participant* to change the *bid/offer* type for an *electricity storage resource* or an *hourly demand response resource*. Requirements for each type of change in the *bid|offer* type of a *load resource* are summarized in the headings below.

4.2.2.1 Changing from a Non-Dispatchable Load or a Price Responsive Load to a Dispatchable Load

Market participants that request a change to their *bid/offer* type from either a *non-dispatchable load* or a *price responsive load* to a *dispatchable load* must do so at least 180 calendar days prior to the effective date. *Market participant* contacts registered with the *IESO*, including the Equipment Registration Specialist and Revenue Metering contact, must complete several requirements at least five *business days* prior to the effective date, including but not limited to the requirements set out below:

- the Register Equipment procedure as a *dispatchable load*, including all applicable prerequisite requirements indicated in section 3.1.1;
- assignment of all applicable *market participant|resource* relationships as described in section 3.1.3.3;
- all applicable metering and data monitoring requirements (e.g., *dispatch workstation*) as described in section 3.2; and

- submission of all *facility*, equipment and *resource* data required by a *dispatchable load* as indicated in the Register Equipment Help File.

A *non-dispatchable load* transitioning to a *dispatchable load* must adhere to *resource* naming conventions as advised by the *IESO*.

4.2.2.2 Changing from a Non-Dispatchable Load or a Dispatchable Load to a Price Responsive Load

Market participants that request a change to their *bid/offer* type from either a *non-dispatchable load* or a *dispatchable load* to a *price responsive load* must do so at least 75 calendar days prior to the effective date. *Market participant* contacts registered with the *IESO*, including the Equipment Registration Specialist and Revenue Metering contact, must complete a number of requirements at least five *business days* prior to the effective date, including but not limited to the requirements set out below:

- the register equipment procedures as a *price responsive load*, including all applicable prerequisite requirements indicated in section 3.1.1;
- assignment of all applicable *market participant*/*resource* relationships as described in section 3.1.3.3;
- all applicable metering and data monitoring requirements as described in section 3.2; and
- submission of all *facility*, equipment and *resource* data required by a *dispatchable load* as indicated in the Register Equipment Help File.

A *non-dispatchable load* transitioning to a *price responsive load* must adhere to *resource* naming conventions as advised by the *IESO*.

4.2.2.3 Changing from a Dispatchable Load or a Price Responsive Load to a Non-Dispatchable Load

Market participants that request a change to their *bid/offer* type from either a *dispatchable load or price responsive load* to a *non-dispatchable load* must do so at least 75 *calendar days* prior to the effective date.

Once the change to the *bid/offer* type takes effect, *market participants* will not be permitted to revert their *bid/offer* type back to a *dispatchable load* or *price responsive load* for a minimum period of 180 calendar days.

A *market participant* for a *load resource* at a *dispatchable electricity storage facility* will not be eligible to change the *resource's bid/offer* type from **Dispatchable** to **Day-ahead price responsive** or **Non-dispatchable** if the associated storage *generation resource* has a *bid/offer* type of **Dispatchable**.

A *market participant* for a *price responsive load* storage *resource* will not be eligible to change the *resource's bid/offer* type from **Day-ahead price responsive** to **Dispatchable** or **Non-dispatchable** if the associated storage *generation resource* is a *self-scheduling storage resource*.

4.2.3 Assessments for Operating Reserve Market Participation

The *IESO* will assess requests to change a *resource's* registration data to allow it to be used for participation in the *operating reserve market* to determine whether:

- the *resource* is eligible to provide synchronized *ten-minute operating reserve*. *Boundary entity resources* are not eligible to offer synchronized *ten-minute operating reserve*;
- the *resource's* registration data indicate that there may be difficulty in providing *ten-minute operating reserve* vs. *thirty-minute operating reserve*; and
- whether the *dispatchable load resource* is eligible to provide *ten-minute operating reserve* or *thirty-minute operating reserve*.

4.2.4 Changes to Self-Scheduling Generators

(MR Ch.7 ss.2.2.9 and 2.2.11)

The *IESO* will assess requests for changes to *self-scheduling generation facilities* and any associated *resources* with respect to:

- ensuring that the *resource* associated with the *self-scheduling generation facility* is between 1 MW and 10 MW nameplate rating, and is within the *IESO control area;* and
- whether the changes to the noted *resource* will affect *IESO-controlled grid security*.

4.2.5 Changes to Intermittent Generators

(MR Ch.7 s.2.2.15)

The *IESO* will assess requests for changes to *intermittent generation resources* to ensure that the change to the related *facility* will not affect *security* of the *IESO-controlled grid*. *Market participants* and program participants shall submit sufficient documentation for the intermittent status and this documentation must be approved by the *IESO*. The documentation must demonstrate that the *generation facility* generates on an intermittent basis as a result of factors beyond the control of the *generator*.

4.2.6 Changes to Electricity Storage Facilities

(MR Ch.7 2.2.11)

The *IESO* will assess requests to change to an *electricity storage facility* to ensure that the change will not affect the *security* of the *IESO-controlled grid*. The *market participant* requesting the change shall submit sufficient documentation relating to the requested change and this documentation must be approved by the *IESO*.

4.2.7 Transfer of Facility Registration

(MR Ch.7 s.2.5)

Market participants who wish to transfer the registration of a *facility* to other *market participants* as a result of their intent to sell, lease, assign or transfer control of that *facility* must submit a request to the *IESO* for the transfer of the *facility* at least 10 *business days* in advance of the proposed date of transfer. The request must specify:

- the identity of the transferee and whether or not they are or intend to be a *market participant*; and
- the date on which the proposed transfer is to take place.

The *market participant* to whom the *facility* is to be transferred must provide to the *IESO*:

- confirmation that it is willing and able to assume control of the *facility* to be transferred and to comply with all provisions of the *market rules* related to *facilities* and any *reliability must-run contract* or *contracted ancillary services* contract applicable to the *facility*;
- a new *connection agreement*;
- a new *OEB licence*;
- a new or revised *restoration participant attachment* (if applicable);
- any changes related to the operational control of the *facility* (e.g., new *registered market participant* data);
- any changes to *market control entities* or *market control entity for physical withholding* (if applicable);
- information concerning any planned changes to the *facility*'s physical characteristics or its associated data monitoring or voice communications equipment; and
- information concerning changes to contacts for the *facility*.

In a rare case, where the *facility* or associated *resources* refer to the prior *market participant's* name, the new *market participant* will be required to register the new *facility* and associated *resources* in Online IESO with a different name. This is to ensure they do not negatively impact the *security* or *reliability* of the *IESO-*

controlled grid. The new *facility* owner is also expected to complete this registration change with their applicable *transmitter* or *distributor*.

If the proposed transferee is not a *market participant* at the time the request for transfer is made, the *IESO* will not approve the transfer until such time as the transferee has completed the Participant Authorization procedures (refer to section 2). All obligations will remain with the current *market participant*.

4.3 Document Changes

(MR Ch.1 s.11.1 and MR Ch.2 s.3.1.8)

Market participants must resubmit the following documentation to the *IESO* any time the content of the original document changes:

- *OEB licence*;
- *connection agreement*;
- *restoration participant attachment*;
- Single-Line Diagram;
- Protection Description Document;
- Operational Philosophy Document;
- Facility Description Documents; and
- technical data, such as capability curves, protection document, operational philosophy, etc.

Once an updated document has been stored in Online IESO, the previous version is archived in the *IESO* document management system, where it can be accessed if required.

– End of Section –

5. Facility Deregistration/Market Participant Withdrawal

5.1 Facility Deregistration

(MR Ch.7 s.2.4)

Market participants who wish to deregister one or more *facilities* are required to file a Notice of Request to Deregister with the *IESO* Manager, Operations Integration by email (market.registration@ieso.ca).

The request to deregister should include, at a minimum, the following information:

- *market participant* name;
- *facility* name;
- *facility* ID;
- *resource* name(s);
- reason for deregistration
- the expected deregistration date; and
- confirmation that deregistration of the *facility* will not potentially:
- endanger the safety of any person;
- damage equipment; or
- violate any *applicable law* (e.g., environmental).

The *IESO* will review the request and may ask the *market participant* to provide additional data if required.

As stated in **MR Ch.7 s.2.4.8**, *generators* with *facilities* must provide the *IESO* with at least six months' notice of plans to retire a *facility*, in addition to notification of any plans the *generator* may have to construct replacement *facilities* for those being retired. This notice is necessary so that the *IESO* has sufficient time to assess the impact the deregistration could have on the *reliability* of the *IESO-controlled grid*, and whether a full technical assessment is required.

5.1.1 Determining Whether Technical Assessment Is Required

Within 10 *business days*[20] of receiving a *market participant*'s request to deregister a *facility*, the *IESO* will inform the *market participant* and the *transmitter* to whose *transmission system* the *facility* is *connected* (if applicable) as to whether or not an

[20] The deregistration of a generator, for example, may require a longer time period to determine whether a technical assessment is required.

IESO technical assessment of the impact of the *facility's* disconnection on the *reliability* of the *IESO-controlled grid* is required.

5.1.2 When Technical Assessment Is Not Required

If the *IESO* determines that a technical assessment of a deregistration is not required, the *IESO* will email the *market participant* and inform them of this decision. The *market participant* will then inform the *IESO* of the date they wish to have the deregistration take effect. The deregistration date:

- may not be less than five *business days* after the date on which the *market participant* received the *IESO*'s notification that the deregistration would not require a technical assessment; and
- as applicable, is subject to the date on which the *facility* has been *disconnected* as confirmed to the *IESO* by the relevant *transmitter*.

5.1.3 When Technical Assessment Is Required

If the *IESO* determines that a technical assessment is required, they will notify the *market participants* and the *transmitters* of the anticipated completion date of the assessment, which can be no more than 45 *business days* from the notification date, unless a longer timeframe is mutually agreed upon by the *IESO* and the *market participants*.

Table 5-1: Actions during Deregistration

If the technical assessment indicates that deregistration of the facility:	IESO/ Market Participant Actions
• impacts, or could potentially impact the *reliability* of the *IESO-controlled grid*; or • could potentially endanger the safety of any person, damage equipment, or violate any *applicable law* (e.g., environmental);	• The *IESO* will not grant approval for the deregistration of the *facility*. • *IESO* Contract Management staff and the relevant *market participant* are required by the *market rules* to enter into good faith negotiations to conclude an agreement for a *reliability must-run contract* for the applicable *facility.*[21]

[21] The applicable *facility* may be either generation, transmission, or load. For more information on *reliability must-run contracts*, refer to **MR Ch.7 ss. 9.6** and **9.7** and **MR Ch.5 s.4.8**.

If the technical assessment indicates that deregistration of the facility:	IESO/ Market Participant Actions
• does not impact the *reliability* of the *IESO-controlled grid*; • does not endanger the safety of any person, damage equipment, nor violate any *applicable law* (e.g., environmental); • if the *facility* is not directly connected to the *IESO-controlled grid*	• Upon receiving the *IESO response* to the deregistration request, the *market participant* or program participant shall email *IESO* to advise of the date they want the *facility* deregistered. • The deregistration date shall not be less than five *business days* from the date the *market participant* or program participant receives the notification from the *IESO* that the deregistration request is approved. • The *IESO* will issue a disconnection letter to the *distributor* or host customer, noting that the *facility* will be deregistered and the date of the deregistration. The distributor or host customer will notify the *IESO* when the *facility* is *disconnected*.
• does not impact the reliability of the *IESO-controlled grid*; • does not endanger the safety of any person, damage equipment, nor violate any *applicable law* (e.g., environmental); and • if the *facility* is directly *connected* to the *IESO-controlled grid*	• Upon receiving the *IESO response* to the deregistration request, the *market participant* shall email *IESO* to advise of the date they want the *facility* deregistered. • The deregistration date shall not be less than five (5) *business days* from the date the *market participant* or program participant receives the notification from the *IESO* that the deregistration request is approved. The *IESO* will then: 1. issue a disconnection letter to the relevant *transmitter*, directing it to disconnect the *facility* from the *IESO-controlled grid* on the date specified in the notice filed by the *market participant*; and 2. deregister the *facility* on the date they receive confirmation from the relevant *transmitter* that the *facility* has been *disconnected*.

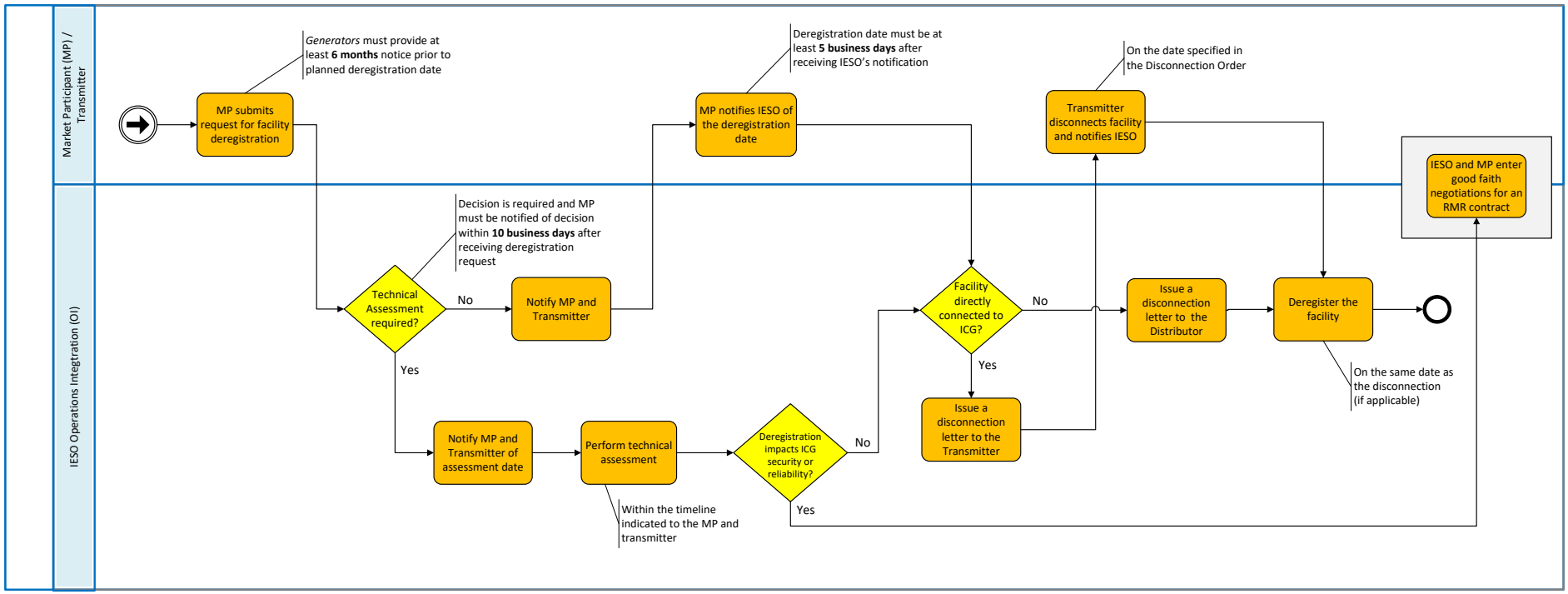

Figure 5-1: Facility Deregistration Process (requested by Market Participant)

5.2 Market Participant, Program Participant or Service Provider Withdrawal

(**MR Ch.2 s.9**)

The following types of *market participants*, program participants, and service providers that no longer wish to participate in the *IESO-administered markets* or programs, or wishes to completely withdraw their organization, must notify the *IESO* by initiating the Withdrawal process through Online IESO.

- *market participants* who no longer wish to participate in any of the *IESO-administered markets;*
- program participants who no longer wish to participate in any of the *IESO's* programs; and
- service providers who no longer wish to provide services to the *IESO.*

The *market participants*, program participants, and service providers will be required to upload a signed copy of the Certification to Withdraw Participation/Organization form (available for download in the online withdrawal process). The Certification to Withdraw Participation/Organization must be signed by the registered Authorized Representative, or a Legal Representative acting on behalf of the *market participant*, program participant, or service provider. The completed Certification to Withdraw Participation/Organization will be filed in *IESO* records as a permanent record on the completion of the withdrawal process.

The *market participant,* program participant, or service provider withdrawal procedures are distinct from the information on Market Participant Deregistration or Termination for Non-compliance. *Market participants* with *facilities* that are registered by the *IESO* shall apply to the *IESO* to transfer or deregister their applicable *facilities* before they submit their application for withdrawal (refer to section 5.1).

The withdrawal date can not be earlier than 10 *business days* from the date of the initiated withdrawal request.

Before requesting a participation withdrawal, the *market participant*, program participant or service provider must ensure that:

- the last of the *market participant's* applicable *facilities* is to be deregistered by the *IESO* and, where applicable, *disconnected* from the *IESO-controlled grid*; or
- the last of the *market participant's* applicable *facilities* is to be transferred by the *IESO* to another eligible *market participant*.

A *market participant's*, program participant's or service provider's application for withdrawal will be reviewed and assessed by the appropriate *IESO* groups. If the *IESO* determines that a *market participant's*, program participant's or service provider's withdrawal can proceed as per their withdrawal request, the *IESO* will

send the Participant a Registration Approval Notification (RAN) confirming that the company is approved to withdraw. The *IESO* will update the *market participant's*, program participant's or service provider's registration record to indicate that the *market participant*, program participant or service provider has withdrawn their participation from the *IESO-administered markets* or from applicable programs.

A *market participant* who has given notice of their intention to withdraw from the *IESO-administered markets* will cease to be a *market participant* on the latest of the following dates:

- the withdrawal date specified when the withdrawal process was initiated; or
- the date that all payments due from the *market participant* have been received by the *IESO*.

5.3 Market Participant Deregistration or Termination for Non-compliance

5.3.1 Termination Order

(MR Ch.3 s.6.4)

Market participants are monitored on an ongoing basis for compliance with their obligations under the *market rules*. A breach of the *market rules* may result in the *IESO* issuing to the *market participant* a financial or non-financial penalty, a *suspension order*, or a *termination order*.

The *IESO* can also issue a *termination order* if a *market participant* has been wound up, dissolved or otherwise has ceased to exist.

A *termination order* results in the forced withdrawal (termination) of the *market participant* from the *IESO-administered markets.*

For complete information on the compliance processes, including the issuance of *termination orders* by the *IESO*, refer to **MM 2.6**.

5.3.2 Deregistration for Non-Compliance

(MR Ch.3 ss.6.2, 6.2A and 6.5)

The *IESO* may seek to deregister a *facility* and/or its associated *resources* as a result of the suspension of a *market participant* for non-compliance with the *market rules* or as a result of persistent breaches of the *market rules* by the *market participant*. This deregistration activity may be in respect of a specific *facility* and its associated *resources* or may be part of the process to terminate the *market participant's* participation in the *IESO-administered markets*. For more information on this process, refer to **MM 2.6**.

– End of Section –

6. Cost Recovery for Reliable Integration Activities

(MR Ch.2 s.10)

The *IESO* is responsible for directing the operation of the *IESO-administered markets* and maintaining the *reliability* of the *IESO-controlled grid*. To fulfill these responsibilities, the *IESO* must perform the reliable integration activities described in this *market manual* before a new or modified *facility* can be placed in service.

The provisions for recovering the cost of these activities apply to reliable integration of *facilities* initiated by their *market participant* on or after December 8, 2022. The content of this section does not apply to any reliable integration activity initiated by a *market participant* before this date.

For the purposes of Cost Recovery, to determine whether work was initiated before or after December 8, 2022, a *market participant* will be deemed by the *IESO* to have initiated reliable integration work based on when they first made contact with *IESO* Market Registration to begin registration activities for either a new participation type or for a new or modified *facility*.

In accordance to and following the provisions of **MR Ch.2 s.10**, the cost of reliable integration activities shall be borne by the *market participant* that causes the *IESO* to incur the cost for reliably integrating the *market participant's* new or modified *facility* into the *IESO-controlled grid* and *IESO-administered markets*. The *market participant* shall pay all the costs and expenses incurred, directly or indirectly, by or on behalf of the *IESO* in processing the *market participant's* request for reliable integration.

6.1 Reliable Integration Activities

To fulfill its responsibilities for directing the operation of the *IESO-administered markets* and maintaining the reliability of the *IESO-controlled grid*, the *IESO* must perform the reliable integration activities described in this *market manual* before a new or modified *facility* can be placed in service. Such activities may include, but are not limited to:

- costs and expenses incurred by the *IESO* to verify, accept and record the information submitted by the *market participant*;
- costs associated with the project planning and with the coordination, approval and issuance of the Registration Approval Notifications (RANs);

- costs and expenses incurred by the *IESO* relating to the *market participant's* proceeding(s) before the *NPCC* or *NERC*, including: studies and analysis performed by or under the supervision of the *IESO* that are necessary for representation, classification or approval of new *facilities* or of modifications to existing *facilities* to *NERC* and/or *NPCC*, regulatory support costs, legal fees, and costs resulting from related activities and travel;
- costs and expenses incurred by the *IESO* for studies and analysis performed by or under the supervision of the *IESO* that are necessary to confirm that the new *facility* or the modifications to an existing *facility* performs according to the applicable requirements in the *market rules*, *reliability* standards and other *IESO* requirements, including specific requirements within the System Impact Assessment (SIA) that was performed under the provisions of MM 1.4;
- costs and expenses incurred by the *IESO* for studies and analysis performed by or under the supervision of the *IESO* that are necessary to update operating security limits, operating procedures and other operational documentation, as they relate to the reliable integration of the *market participant's* new *facility* or the modifications to its existing *facility*;
- costs and expenses incurred by the *IESO* for work performed by or under the supervision of the *IESO* that is necessary to update the systems and tools used by the *IESO* for the operation of the *IESO-controlled grid* and/or the *IESO-administered markets*;
- costs related to any additional reports of the estimated integration costs issued by the *IESO*, at a *market participant's* request; and
- costs and expenses invoiced to the *IESO* from external consultants engaged to assist in completing the integration activities described in section 3 and section 4.

6.2 Cost Allocation

6.2.1 New or Modified Facilities

The cost of reliable integration activities shall be borne by the *market participant* that causes the *IESO* to incur the cost for reliably integrating the *market participant's* new or modified *facility* into the *IESO-controlled grid* and *IESO-administered markets*. The *market participant* shall pay all the costs and expenses incurred, directly or indirectly, by or on behalf of the *IESO* in processing the *market participant's* request for reliable integration.

These costs also apply to new or modified *facilities* that are connected to the *distribution system* with an installed capacity greater than 10 MW, regardless of whether they will participate in the *IESO-administered markets*.

6.2.2 Cost Apportioning for Cluster Studies

The *IESO* conducts power system studies to determine *reliable* operating conditions for the *IESO-controlled grid*. New or modified *facilities* can alter these conditions, and new studies must be conducted. Combining multiple projects into one "cluster study" is known to gain efficiency, reduce the overall processing time, utilize the *resources* better and reduce the overall cost of the study. As such, when possible, the *IESO* will cluster a number of projects into a single study that is necessary for their reliable integration. Clustering is practical for projects that:

- have reached the status of "committed", as described in section 3.3 of MM 1.4.
- are located within the same geographic area (generally within the same *transmission* zone);
- could impact each other or have similar impact on the *reliability* of the power system; and
- are scheduled to come into service within a relatively short period of time from each other (six months to one year).

Clustering is not practical for projects that are: not committed, are located far from each other, in different *transmission* zones, each has some impact on the reliability of a different part of the power system or are scheduled to come in service many years apart. Clustering is also not practical for activities that belong to individual projects, like recording, verifying and correcting the project data, testing their models, etc.

Timely initiation of the market registration process (one of the several options for a project to reach the "committed" status) is important for projects to reduce their integration costs. Projects that become committed while the study is ongoing and are qualified to be part of the study may be included in the cluster only if their inclusion doesn't materially increase the duration or the cost of the ongoing study. Otherwise, they'll be studied on an individual basis or part of a subsequent cluster.

Committed projects may be included, even if they did not initiate their market registration at the start of the cluster study. The *market participants* of those projects will be notified with the date of starting the study or they will be asked to initiate market registration process at an earlier date, such that the information needed for the cluster study is made available to the *IESO* at the start of the study.

At the *IESO*'s discretion, non-committed projects might also be included, but only if their inclusion doesn't materially increase the cost/volume of work for the study. This way, if a non-committed project is withdrawn there is no significant left-over cost associated with that project, after the entire cost of the study has been apportioned amongst the committed projects.

6.2.3 Criteria for Apportioning Cost for Cluster Studies

For each *facility* included in the cluster study, the *market participant's* share of cost will be determined based on the equivalent MVA rating of the *facility*, calculated as described in this section. Note that the equivalent MVA rating in this section is defined exclusively for the purpose of apportioning costs for cluster studies, and has no other, technical or otherwise, meaning and should not be used for any other purposes.

The *IESO* will calculate the total equivalent MVA rating associated with the cluster study by adding together the equivalent MVA rating of each *facility* considered in the study and then calculate the apportioning coefficient for each *market participant*, by dividing the *market participant's facility* equivalent MVA rating to the total equivalent MVA rating of the cluster study. The *IESO* will provide, upon request, the apportioning coefficient to each *market participant* whose *facility* was included in the cluster study. Upon a *transmitter's* request, the *IESO* will provide the apportioning coefficients for all *facilities* included in the cluster study, that are connecting to that *transmitter's transmission system*.

The apportioning coefficients will be used to calculate the share of the total cost of the cluster study that is allocated to each *market participant* whose new or modified *facility* was included in the cluster study, that share of cost will be added on the invoice to the cost of the other reliable integration activities performed for the *market participant's facility*.

The equivalent MVA rating of each *facility* considered in a cluster study will be calculated as follows:

- New or modified *load*, *generation* or *electricity storage facilities* that involve installation of new power transformers will be assigned an equivalent MVA rating that is the highest nameplate continuous summer rating of the transformers. If multiple transformers are installed within the *facility*, the sum of the equivalent MVA rating of those transformers will be used to calculate the total equivalent MVA rating for that *facility*. Only main power transformers or main step up transformers are considered in the calculation of the equivalent MVA rating; other transformers, like station service transformers, spare transformers or instrument transformers, will be ignored.
- Modifications to existing *load*, *generation* or *electricity storage facilities* that don't involve installing new transformers will be assigned an equivalent MVA rating that is calculated using the magnitude of the change (MW) and a 0.9 power factor.
- New *transmission* lines will be allocated an equivalent MVA rating calculated using the line's summer continuous planning rating and its nominal voltage. For uprated or de-rated *transmission* lines, the incremental raise or reduction to the summer continuous planning rating and its nominal voltage will be used to

calculate its equivalent MVA rating. The equivalent MVA rating will only be allocated to *transmission* lines that are not dedicated or constructed for a single *load facility*, *generation facility* or *electricity storage facility.* Those dedicated lines for a single *facility* are considered part of that *facility* and will not have their own equivalent MVA rating assigned for the purpose of this calculation.

- *Transmission* stations and switching stations, other than stations built to serve a single *load*, *generation* or *electricity storage facility* will be allocated 50% of the equivalent MVA rating of each new or modified *transmission* line, excluding transmission line uprating or derating, that is connected within that station. For a modified *transmission* station or switching station, only new or modified lines are considered, those that remain unchanged do not participate in the equivalent MVA rating calculation. New reactive compensation equipment installed in these stations will be allocated an equivalent MVA rating that is equal to the equipment's Mvar rating.

6.2.4 Cost Allocation for RAS Classification

The entire cost related to classification of a new or modified *Remedial Action Scheme* (*RAS*) is charged to the *market participant* that required a change to the *RAS*, or a new *RAS*, in order to connect.

6.3 Invoicing

(MR Ch.3 s.2)

Upon completion of the reliable integration activities described above, the *market participant* will receive an invoice from the *IESO* to cover the total costs and expenses incurred by the *IESO* in conducting these activities. Such invoice shall be considered to create an obligation under the *market rules* to pay the amount specified therein and such amount may, without prejudice to any other manner of recovery available at law, be recovered accordingly.

The *market participant* shall, within 10 *business days*, pay to the *IESO* all amounts owing under an invoice submitted to it by the *IESO* pursuant to this *market manual*.

For further certainty, the *market participant* is responsible for the payment of, and shall pay, any and all invoiced amounts of HST resulting from the *IESO*'s performance of the reliable integration activities described in this *market manual*. "HST" means excise tax, harmonized sales tax, or goods and services tax, imposed under the Excise Tax Act (Canada) or any provincial or territorial legislation imposing sales tax, harmonized sales tax or goods and services tax.

Except as may otherwise be provided in the *market rules*, any disputes arising for invoices issued under section 6 shall be resolved using the dispute resolution process set out in **MR Ch.3 s.2**.

Notwithstanding any other provision of this *market manual*, to the extent consistent with the *market rules*, the *IESO* may set off any amounts owed to the *IESO* by the *market participant* to which the *IESO* became entitled under the *market rules* or under any other agreement between the *IESO* and the *market participant* against any amount remaining after payment in full has been made to the *IESO* for the reliable integration activities described in this *market manual*.

If the reliable integration of a new or modified *facility* takes more than nine months, the *market participant* that seeks to register the new or modified *facility* may request an update of the cost and expenses incurred by the *IESO* to date. At the request of such *market participant*, the *IESO* may issue one report of the estimated integration costs and expenses incurred to date for the *market participant's facility* once in each calendar year for the duration of the reliable integration for that project. The *market participant* that requested the update will pay all the costs and expenses incurred by *IESO* to produce the cost update reports.

– End of Section –

Appendix A: Technical Communication Requirements

(MR Ch.2, MR Ch.2 App.2, MR Ch.4, MR Ch.5 and MR Ch.7)

Table A-1 contains references to technical communications requirements contained in the *market rules*. Given the detailed nature of these references, future rule amendments may alter them. It is the *market participant's* responsibility to confirm whether or not any rule amendments made to the *market rules,* subsequent to the publication of this procedure, change these references. The latest Market Rule Amendments (as posted on the *IESO* website) shall prevail in case of any errors or omissions.

Table A-1: Market Rule Technical Requirements

	Chapter 2 & Appendices				Chapter 4 & Appendices	Chapter 7	
						Communications Reliability	
	General	Voice	Data Monitoring	Workstations	Data Monitoring Requirements & Performance Standards	Data & Workstations	Voice
All	Ch. 2, Sec 6.1, 6.3 App 2.2, Sec 1.5	App 2.2, Sec 1.1, 1.1.7-11	App 2.2, Sec 1.2, 1.2.6	App 2.2, Sec 1.3 (dispatch) 1.4 (participant)	Ch. 4, Sec 7.1, 7.6A, 7.7 (maintenance & repair, MTBF, response times), 7.8 (Reclassification)	Sec 12.1.1, 12.1.2, 12.1.4–6, 12.3	Sec 12.2 12.2.1–12, 12.4
Generators		App 2.2, Sec 1.1.1, 1.1.2	App 2.2, Sec 1.2.1		Ch. 4, Sec 7.3 App 4.2, item 9, 4.15, 4.19	Sec 12.1.1.2 12.1.3.1–2	
Distributors		App 2.2, Sec 1.1.3	App 2.2, Sec 1.2.4		Ch. 4, Sec 7.5 App 4.17, 4.22	Sec 12.1.3.4–5	
Transmitters		App 2.2, Sec 1.1.4	App 2.2, Sec 1.2.3		Ch. 4, Sec 7.2, 7.4 App 4.4, item 9, 4.16, 4.20, 4.21	Sec 12.1.3.3	
Wholesale consumer		App 2.2, Sec 1.1.5	App 2.2, Sec 1.2.2		Ch. 4, Sec 7.5 App 4.17, 4.22	Sec 12.1.3.1–2 12.1.3.4–5	
Embedded Loads		App 2.2, Sec 1.1.6	App 2.2, Sec 1.2.5		Ch. 4, Sec 7.6 App 4.18, 4.23	Sec 12.1.3.1–2	

	Chapter 2 & Appendices				Chapter 4 & Appendices	Chapter 7	
						Communications Reliability	
	General	Voice	Data Monitoring	Workstations	Data Monitoring Requirements & Performance Standards	Data & Workstations	Voice
Electricity Storage		App 2.2, Sec 1.1.12	App 2.2, Sec 1.2.7		Ch. 4 Sec 7.3A App 4.24, 4.25	Sec 12.1.1.2 12.1.3.1-2e	

– End of Appendix –

Appendix B: Wind Resource Data Requirements

Table B-1 identifies *resource* data requirements for the physical layout and details of the turbines. *Market participants* that have wind *resources* must also refer to section 3 for registration requirements.

Table B-1: Wind Resource Data Requirements

#	Static Plant Data	Description
1	Turbine Hub location	Turbine Hub location (latitude and longitude), height, and elevation from sea level.
2	Meteorological (MET) Tower or Sodar or Lidar Unit location	Physical location (latitude and longitude), height of measurements, and elevation from sea level. Met towers require measurement at hub height, sodar/lidar units should measure at hub height as well as 50 and 110 m if possible
3	Type of turbine	Whether the turbine is a horizontal or vertical axis type.
4	Manufacturer's power curve	Power curve maps containing expected output for a turbine at varying wind speeds.
5	Cut in speed	The lowest wind speed (metres per second [m/s]) at which the turbine will generate power.
6	Cut out speed	The wind speed (m/s) at which the wind turbine will be shut down to prevent physical damage.
7	Cut out temperature	The maximum and minimum ambient temperature (in °C) at which the wind turbine will be shut down to prevent physical damage.

Table B-2 identifies operational monitoring requirements for wind *generation resources*.

Table B-2: Wind Resource Operational Monitoring Requirements

Operational Monitoring Requirements			
Measurement Type	**Unit of Measure**	**Height of Measurement**	**Precision (to the nearest…)**
MW output[22] (per *facility*)	Megawatt (MW)	N/A	0.1 MW
Available Megawatts[23]	Megawatt (MW)	N/A	0.1 MW

Table B-3 identifies monitoring requirements for wind *generation resources* from Meteorological towers or sodar or lidar units.

Table B-3: Met Tower and Sodar/Lidar Unit Requirements

Meteorological Tower and Sodar/Lidar Unit Requirements				
#	**Measurement Type**	**Unit of Measure**	**Height of Measurement**	**Precision (to the nearest…)**
1	Wind Speed	Metres per Second (m/s)	Met towers require measurement at hub height, sodar/lidar units should measure at hub height as well as 50 and 110 m if possible	0.1 m/s
2	Wind Direction	Degrees from True North	Met towers require measurement at hub height, sodar/lidar units should measure at hub height as well as 50 and 110 m if possible	1 degree
3	Ambient Air Temperature	Degrees Celsius (°C)	Can be provided from any height	0.1 °C
4	Barometric Pressure	Hectopascals (HPa)	Can be provided from any height	0.1 HPa

[22] Megawatts shall be provided as one measurement per *connection point.*

[23] Available Megawatts shall be reported as the sum total of the capacities of all available turbines per *connection point*. This value should not take into account speed or temperature cut-outs (i.e., available MW = max capacity – *outages*).

Meteorological Tower and Sodar/Lidar Unit Requirements				
#	Measurement Type	Unit of Measure	Height of Measurement	Precision (to the nearest…)
5	Relative Humidity	Percentage (%)	Can be provided from any height	1 %

Table B-4 identifies monitoring requirements for wind *generation facilities* from Nacelle mounted data collection points (temperature, pressure and humidity measurements may be taken at any height at the turbine, not necessarily at the nacelle).

Table B-4: Nacelle-mounted Data Collection Requirements

Nacelle-mounted Data Collection Requirements				
#	Measurement Type	Unit of Measure	Height of Measurement	Precision (to the nearest…)
1	Wind Speed	Metres per Second (m/s)	Hub height	0.1 m/s
2	Wind Direction[24]	Degrees from True North	Hub height	1 degree
3	Ambient Air Temperature	Degrees Celsius (°C)	Can be provided from any height	0.1 °C
4	Barometric Pressure	Hectopascals (HPa)	Can be provided from any height	0.1 HPa
5	Relative Humidity	Percentage (%)	Can be provided from any height	1%

Wind data collected at the nacelle is expected to represent the apparent wind, not the true wind value at a *facility*, it does not need to compensate for changes in conditions due to the motion of the rotor blades.

– End of Appendix –

[24] Wind direction measured at the nacelle may only be used if properly calibrated and if it continues to be provided when the turbine is not generating.

Appendix C: Solar Resource Data Requirements

Table C-1 identifies *resource* data requirements for the physical layout and details of the solar arrays. *Market participants* that have solar *resources* must also refer to section 3 for registration requirements.

Table C-1: Solar Resource Data Requirements

#	Static Plant Data	Description
1	Solar *facility* location (latitude and longitude) [25]	Physical location (GPS coordinates) of each solar array[26].
2	Meteorological data collection device location and elevation (latitude and longitude)	Physical location (GPS coordinates) of each met data collection device, its elevation and height of measurement.
3	Elevation and orientation angles of arrays	Height from ground level and angle of each solar array, Tilt (angle with horizontal plane) and Azimuth (angle in North-East-South West Plane)
4	Power Rating	Rated Power at standard test conditions.
5	*Generation capacity* of the generating *facility* and each *generation unit*	The name plate capacity of the entire *facility* with a breakdown for each array within the system. (DC and AC Power at standard test conditions for arrays and power of inverters.)
6	Temperature Coefficient	Temperature coefficient of the module power at the maximum power point.
7	Type of Mounting	Ground Mount, Rooftop, Rack Mount, Fixed or Solar Tracking (single or dual axis)[27], etc.
8	Module Type	Crystalline, Thin-Film, Concentrated PV (CPV) etc.

[25] The physical location should be representative of the GPS coordinates at the centre of each solar array such that every solar panel within that array is within 5 km of the GPS coordinates. In the event that the array is larger, additional GPS coordinates will be required to outline the geographic footprint of the array.

[26] Solar array is defined as a collection of solar panels that share a *connection point* going into an inverter.

[27] If the tracking feature is disabled the *generator* shall notify the *IESO* using the address renewableforecastinfo@ieso.ca with as much notice as possible.

#	Static Plant Data	Description
9	Wind Protection	Wind speed at which panels are stored to avoid damage. (If applicable)

Table C-2 identifies operational monitoring for solar *generation resources*.

Table C-2: Solar Resource Operational Monitoring Requirements

Operational Monitoring Requirements					
#	**Measurement Type**	**Definition**	**Unit of Measure**	**Data Required for**	**Measurement Precision**
1	MW output[28] (per *facility*)	Current Megawatt (MW) output for the *facility*	Megawatt (MW)	All	0.1 MW
2	Available Megawatts[29]	What the *facility* can produce after deducting *outages*	Megawatt (MW)	All	0.1 MW

Table C-3 identifies meteorological monitoring for solar *generation facilities*.

Table C-3: Solar Resource Meteorological Monitoring Requirements

Meteorological Monitoring Requirements					
#	**Measurement Type**	**Definition**	**Unit of Measure**	**Data Required for**	**Measurement Precision**
1	Plane-of-Array Irradiance (POA)	Measurements perpendicular to the solar receiver	Watts/ Square Metre	Crystalline, Thin-Film, CPV	+/- 1W/m^2
2	Global Horizontal Irradiance (GHI)	The solar irradiance available to a flat-plate collector oriented horizontal to the earth's surface	Watts/ Square Metre	Crystalline, Thin-Film, CPV	+/- 1W/m^2

[28] Megawatts shall be provided as one measurement per *connection point*.

[29] Available Megawatts shall be reported as the sum total of the capacities of all available panels per *connection point* (i.e., available MW = max capacity – *outages*).

Meteorological Monitoring Requirements					
#	**Measurement Type**	**Definition**	**Unit of Measure**	**Data Required for**	**Measurement Precision**
3	Direct Irradiance (DNI)	The amount of solar radiation received per unit area by a surface that is always held perpendicular (or normal) to the rays that come in a straight line from the direction of the sun at its current position in the sky.	Watts/ Square Metre	CPV	+/- 1 W/m^2
4	Ambient temperature at the array average height	Ambient temperature at the array average height	Degrees Celsius (°C)	Crystalline, Thin-Film, CPV	0.1 °C
5	Back of Module Temperature[30]	Average temperature at the back of module	Degrees Celsius (°C)	Crystalline, Thin-Film, CPV	0.1 °C
6	Barometric pressure	Barometric Pressure	Hectopascals (HPa)	Crystalline, Thin-Film, CPV	0.1 HPa
7	Wind speed at the average array height	Anemometer	Metres/Second (m/s)	Crystalline, Thin-Film, CPV	0.1 m/s
8	Wind direction at the average array height	Wind vane or wind mast readings	Degrees from True North	Crystalline, Thin-Film, CPV	1 °

– End of Appendix –

[30] The GPS coordinates of the back of module temperature measurement locations shall be included.

List of Acronyms

Acronym	Meaning
CER	Canada Energy Regulator
GOG	*Generator offer* guarantee
MGBRT	*Minimum generation block run-time*
MLP	*Minimum loading point*
NAESB	North American Energy Standards Board
NERC	North American Electric Reliability Corporation
OEB	*Ontario Energy Board*
RAN	Registration Approval Notification

– End of Section –

References

Document ID	Document Title
RUL-6 to RUL-24	Market Rules
MAN-107	Market Manual 1.3: Identity Management Operations Guide
MAN-132	Market Manual 2.1: Dispute Resolution
MAN-133	Market Manual 2.2: Exemption Application and Assessment
MAN-136	Market Manual 2.6: Treatment of Compliance Issues
MAN-145	Market Manual 3.0: Metering Overview
MAN-146	Market Manual 3.1: Metering Service Provider Registration, Revocation and De-registration
MAN-147	Market Manual 3.2: Meter Point Registration and Maintenance
MAN-151	Market Manual 3.7: Totalization Table Registration
MAN-152	Market Manual 3.8: Creating and Maintaining Delivery Point Relationships
MAN-109	Market Manual 4.1: Submission of Dispatch Data in the Physical Markets
MAN-111	Market Manual 4.3: Operation of the Real-Time Markets
MAN-112	Market Manual 4.4: Transmission Rights Auction
MAN-115	Market Manual 5.4: Prudential Support
MAN-165	Market Manual 6: Participant Technical Reference Manual (PTRM)
MAN-123	Market Manual 7.3: Outage Management
MAN-157	Market Manual 7.8: Ontario Power System Restoration Plan
MAN-158	Market Manual 7.10: Ontario Electricity Emergency Plan
MAN-125	Market Manual 12.0: Capacity Auctions
MAN-168	Market Manual 13.1: Capacity Export Requests
IMO_GDE_0001	Market Participant Emergency Plan Guidelines & Requirements
LST-48	Register Equipment Help File
	Prudential Training Guide

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