

PROCEDURE



**Market Manual 11: Reliability
Compliance**

**Part 11.5 Generator
Verification**

Issue 3.0

This procedure describes the Generator Capability Verification process, intended to provide current and accurate modeling information for reliability assessments of the IESO-controlled grid

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Table of Changes

Reference (Section and Paragraph)	Description of Change
Throughout	Updated to meet accessibility requirements pursuant to the <i>Accessibility for Ontarians with Disabilities Act</i> .

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Market Manuals

The *market manuals* consolidate the market procedures and associated forms, standards, and policies that define certain elements relating to the operation of the *IESO-administered markets*. Market procedures provide more detailed descriptions of the requirements for various activities than is specified in the "*Market Rules*". Where there is a discrepancy between the requirements in a document within a *market manual* and the "*Market Rules*", the "*Market Rules*" shall prevail. Standards and policies appended to, or referenced in, these procedures provide a supporting framework.

Market Procedures

The "Reliability Compliance Manual" is Volume 11 of the *market manuals*, where this document forms Part 11.5: Generator Verification.

A list of the other component part of the Reliability Compliance Manual is provided in Part 11.0: "Reliability Compliance Overview" in Section 2, "About This Manual".

Structure of Market Procedures

Each market procedure is composed of the following sections:

1. '**Introduction**', which contains general information about the procedure, including an overview, a description of the purpose and scope of the procedure, and information about roles and responsibilities of the parties involved in the procedure.
2. '**Work Flow**', which contains a graphical representation of the steps and flow of information within the procedure.
3. '**Procedural Steps**', which contains a table that describes each step and provides other detail related to each step.
4. '**Appendices**', which may include such items as forms, standards, policies, and agreements.

Conventions

The *market manual* standard conventions are defined in the "Market Manual Overview" document

– End of Section –

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1. Introduction

1.1 Purpose

This procedure describes the Generator Capability Verification process, which is intended to provide assurance that current and accurate information on *generator* active and reactive output capability is available to the *IESO* for steady-state models used in assessing the *reliability* of the *IESO-controlled grid*.

1.2 Scope

This procedure applies only to *generators* directly connected to the ICG and describes the steps and interfaces involved in periodically verifying and reporting on the *generation units* active and reactive output capabilities. The procedural workflows and steps described in this document serve as a roadmap for *generators* and reflect the requirements set out in the "*Market Rules*" and applicable *NPCC and NERC reliability* standards.

Additional information on the verification criteria, test parameters and execution is provided in the referenced documents.

The overview information in Section 1.3, below, is provided for context purposes only, highlighting the main actions that comprise the procedure as illustrated in Section 2 and described in Section 3.

1.3 Overview

Market rules (Ch.4 sections 5.1 and 5.2) include compliance obligations for *generators connected* to the *IESO-controlled grid* to test and monitor their equipment to ensure compliance with all applicable *reliability standards*. In addition, *NPCC Directories 9 and 10* require that *generators* and the *IESO* develop a verification program of *generator* output capability to ensure that accurate information is available to the *IESO* for their *reliability* analyses.

1.4 Roles and Responsibilities

This section describes the roles and responsibilities that the *IESO* and *generators* directly connected to ICG have as part of the Generator Capability Verification process, based on *NPCC Directories 9 and 10*.

As the Transmission Operator, the *IESO* is primarily responsible for:

- Establishing and maintaining the Generator Capability Verification program
- Establishing the *generator* verification schedule
- Documenting the declared and verified capability values, as reported by *generators*
- Reporting to *NPCC*, as required

Generators directly connected to ICG are primarily responsible for:

- Complying with the *IESO*'s requests for periodic verification of their active and reactive power capabilities
- Notifying the *IESO* when their *generation units* or *facilities* cannot achieve the declared active and reactive output capabilities because of equipment issues
- Reporting to the *IESO* and resolving all significant discrepancies between the declared and verified values of their units active and reactive output capabilities
- Complying with the self-certification requirements described in this procedure

– End of Section –

2. Procedural Work Flow

The following diagram (Figure 2–1) represents the flow of work and information relating to Generator Capability Verification among the *IESO*, the primary external participant involved in the procedure, and any other parties.

The steps illustrated in the diagram are described in detail in Section 3.

Table 2–1: Legend for Work Flow Diagrams

Legend	Description
Oval	An event that triggers task or that completes task. Trigger events and completion events are numbered sequentially within procedure (01 to 99).
Task Box	Shows reference number, party responsible for performing task (if “other party”), and task name or brief summary of task. Reference number (e.g., 1A.02) indicates procedure number within current <i>market manual</i> (1), sub-procedure identifier (if applicable) (A), and task number (02).
Solid horizontal line	Shows information flow between the <i>IESO</i> and external parties.
Solid vertical line	Shows linkage between tasks.
Broken line	Links trigger events and completion events to preceding or succeeding task.

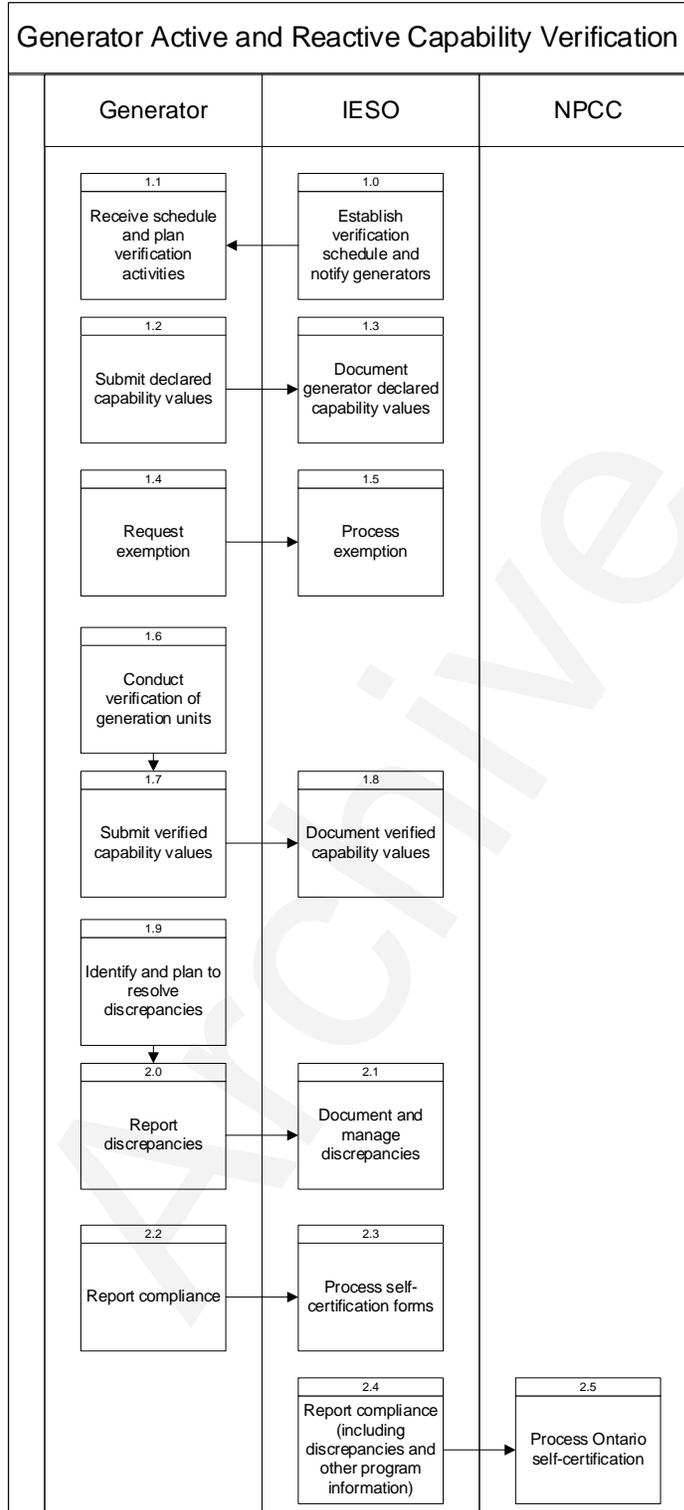


Figure 2–1: Work Flow for Generator Capability Verification

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3. Procedural Steps

3.1 Establish and maintain generator data

The IESO shall establish and maintain the list of *generators* subject to periodic verification (*Directory 9, sections 5.1 and 5.6.2.1, Directory 10 sections 5.1 and 5.6.2.1*). For each *generator*, the list shall also include the following information:

- Market Participant Name
- Generating Station Name
- Generator Unit ID
- Declared *generator* MVA rating [MVA]
- Declared seasonal¹ *Maximum Continuous Rating* (MCR) and Rated Active Power (RAP²) [MW] for each *generator* measured at its terminal
- Declared seasonal Maximum and Minimum Reactive Power Capability [MVar] at RAP for each *generator* measured at its terminal
- Declared *generator* capability curve
- Declared *generator facility* single line diagram
- Declared seasonal auxiliary load requirement [MW and MVar] at RAP for each *generator facility*
- Verified *generator* MVA rating [MVA]
- Verified seasonal MCR and RAP [MW] for each *generator* measured at its terminal
- Verified seasonal Maximum and Minimum Reactive Power Capability [MVar] at RAP for each *generator* measured at its terminal
- Verified *generator* capability curve
- Verified *generator facility* single line diagram
- Verified seasonal auxiliary load requirement [MW and MVar] at RAP for each *generator facility*
- Verification date
- Verification method
- Discrepancy (ABS(Declared – Verified)*100/Declared) [%]
- Reason for discrepancy
- Plan to address discrepancy
- Verification documentation
- Exempt [Y/N]

¹ Seasonal refers to winter (October 1 to March 31) and summer (April 1 to September 30)

² Rated Active Power (RAP) is defined in Market Rules, Appendix 4.2 as the lesser of MW output at rated ambient conditions (e.g. temperature, head, wind speed, solar radiation) and 90% of rated apparent power.(unit name plate MVA)

- Reason for exemption

3.2 Establish verification schedule

The *IESO* shall coordinate with *generators* to establish a verification schedule such that all applicable *generation units* are verified every 5 years (*Directory 9, sections 5.2.1, 5.3 and 5.3.1, Directory 10 sections 5.2.1, 5.3 and 5.3.1*).

3.3 Submit declared capability values

Generators shall provide to the *IESO* and maintain following information (*Directory 9 section 5.6.1.1, Directory 10 section 5.6.1.1*):

- Market Participant Name
- Generating Station Name
- Generator Unit ID
- Declared seasonal RAP and MCR for each *generator* measured at its terminal [MW]
- Declared seasonal Maximum and Minimum Reactive Power Capability at RAP for each *generator* measured at its terminal [MVar]
- Auxiliary seasonal load requirement at RAP for each *generator facility* [MW and MVar]
- Declared *generator* capability curve
- Declared *generator facility* single line diagram
- Declared *generator* MVA rating [MVA]

3.4 Conduct verification of generation units

Generators shall verify the active and reactive capability of their units every 5 years in accordance with the schedule agreed with the *IESO* and the requirements of *Market Rules Chapter 4 section 5, Directory 9 section 5.4* and *Directory 10 section 5.4*.

For each of their units, *generators* must submit to the *IESO* the following information:

- Market Participant Name
- Generating Station Name
- Generator Unit ID
- Verified seasonal RAP and MCR for each *generator* measured at its terminal [MW]
- Verified seasonal Maximum and Minimum Reactive Power Capability at RAP for each *generator* measured at its terminal [MVar] (*Directory 10 section 5.6.1.2*)
- Verified *generator* capability curve
- Verified *generator facility* single line diagram
- Verified *generator* MVA rating [MVA]
- Verification date
- Verification method
- Verification documentation (*Directory 9 section 5.6.1.2, Directory 10 section 5.6.1.5*)

- Auxiliary seasonal load requirement at RAP for each *generator facility* [MW and MVar] (**Directory 9 section 5.6.1.4**)

3.5 Report discrepancies

A discrepancy is a difference of more than the lesser of 10 MW (MVar) or 5% of the declared MW (MVar) capability between the declared and verified active and reactive power capabilities.

Generators shall notify by email the *IESO* IRCP mailbox within 1 (one) *business day* of becoming aware of a discrepancy, and develop and implement a plan (which may include re-verification) to resolve the discrepancy within the timeframe specified by the *IESO*. (**Directory 9 sections 5.2.2 and 5.6.1.3, Directory 10 sections 5.2.2, 5.4.5, 5.6.1.3 and 5.6.2.1**)

The information reported to the *IESO* shall include:

- Market Participant Name
- Generating Station Name
- Generator Unit ID
- Discrepancy $(ABS(Declared - Verified) * 100 / Declared)$ [%]
- Reason for discrepancy [text]
- Plan to address discrepancy [text + hyperlink]

The *IESO* shall specify a time frame for each *generator* to address the discrepancies identified between the declared and verified capability values of their units. (**Directory 9 section 5.6.2.2, Directory 10 section 5.6.2.2**) The information will be submitted to *generators* from the IRCP mailbox.

3.6 Request exemption

Generators connected to the *IESO-controlled grid* must notify the *IESO* and request an exemption if they cannot conduct the scheduled capability verification on one or more of its units for any of these reasons (**Directory 9, section 5.5.1, Directory 10, section 5.5.1**):

- Adverse impact on *transmission system reliability*
- Potential damage to *transmission system* or *generator* equipment
- Environment conditions
- Governmental regulatory or operating license limitations

Within 30 days of receiving notification by a *generator* that it cannot perform the scheduled capability verification, the *IESO* shall notify the *generator* that these units will be exempt from the scheduled verification (**Directory 9, section 5.5.2, Directory 10, section 5.5.2**). The notification will be submitted from the IRCP mailbox.

For the exempted *generation units*, the *generator* will submit to the *IESO* (**Directory 9, section 5.5.1, Directory 9, section 5.5.3**):

- For existing *generators*: *generator* operation records, manufacturer data, or performance tracking for the same previous verification period;
- For new *generators*: commissioning data.

3.7 Compliance reporting

The *IESO* monitors compliance with *NPCC* Directories 9 and 10 through self-certification as part of the *IESO* Reliability Compliance Program. *Generators* are required to report compliance by completing *IESO_FORM_1635* at the end of the 5-year verification cycle and in accordance with the applicable *IRCP* submission timelines.

The *IESO* shall report annually to *NPCC* on the status of the Ontario *generator* verification program, including any changes in process. The *IESO* shall notify *generators* and *NPCC* of any changes to the verification process within 30 days of issue. (***Directory 9, section 5.2.3, Directory 10, section 5.2.3***)

The *IESO* shall report to *NPCC* annually any discrepancies between Declared and Verified values. (***Directory 9, section 5.6.2.3, Directory 10, section 5.6.2.3***)

The *IESO* shall provide the information required by *NPCC* to (***Directory 9 section 7, Directory 10 section 7***):

- annually validate that the *IESO* has implemented a *generator* verification program
- audit the effectiveness of the *IESO's* *generator* verification program and ensure compliance with the *NPCC* Directories 9 and 10

3.8 Procedural steps

This section contains detail on the tasks listed in Figure 2-1.

Table 3–1: Procedural Steps for Generator Capability Verification

Ref.	Task Name	Task Detail	When	Resulting Information	Method	Completion Events
1.0	Establish verification schedule	In cooperation with <i>generators</i> , <i>IESO</i> establishes a 5-year cycle verification schedule.	Annually, if necessary	A verification schedule for each <i>generator</i> by unit and <i>facility</i>	Email from the IRCP mailbox	<i>Generators</i> have a complete and up to date verification schedule for their units
1.1	Receive verification schedule	Each <i>generator</i> receives the verification schedule from the <i>IESO</i>	Annually, if necessary	A verification schedule for each <i>generator</i> by unit and <i>facility</i>	Email from the IRCP mailbox	<i>Generators</i> have a complete and up to date verification schedule for their units
1.2	Submit declared seasonal capability values	<i>Generators</i> submit to the <i>IESO</i> the declared seasonal active and reactive output capabilities for their units	As necessary to maintain the <i>IESO</i> information up to date	A list of all <i>generators</i> and their units active and reactive power capabilities	Email IESO_FORM_1710	The <i>IESO</i> has a complete and up to date list of all <i>generators</i> active and reactive power capabilities
1.3	Document <i>generator</i> declared seasonal capability values	The <i>IESO</i> records the declared seasonal active and reactive output capabilities of the <i>generation units</i>	As necessary to maintain the <i>IESO</i> databases up to date	The <i>generator</i> information database is up to date	Data entry in database	The <i>generator</i> information database is complete and up to date
1.4	Request exemption	<i>Generators</i> request the <i>IESO</i> to exempt their units from the verification requirements for the reasons stated in this procedure	As needed	A written request from <i>generators</i> to the <i>IESO</i>	Email	<i>Generators</i> have documented, explained and submitted their exemption requests

Table 3–1: Procedural Steps for Generator Capability Verification

Ref.	Task Name	Task Detail	When	Resulting Information	Method	Completion Events
1.5	Process exemption	The <i>IESO</i> evaluates the exemption requests received and makes determination whether <i>generators</i> can be exempt	When needed	A written decision from the <i>IESO</i> indicating whether the <i>generator</i> is exempt from the verification obligations	Email	Exemption decision is received by <i>generators</i>
1.6	Conduct verification of <i>generation units</i>	<i>Generators</i> plan and execute the verification process described in this procedure	Every 5 years	Verified seasonal values for the active and reactive output capabilities of all <i>generators</i>	Email	<i>Generators</i> have completed their units verification
1.7	Submit verified seasonal capability values	<i>Generators</i> submit to the <i>IESO</i> the verified seasonal values of their units active and reactive output capabilities	Every 5 years or as necessary to maintain the <i>IESO</i> information up to date	Verified seasonal values for the active and reactive output capabilities of all <i>generators</i>	Email IESO_FORM_1710	<i>Generators</i> have submitted to the <i>IESO</i> the verified seasonal values of their units active and reactive output capabilities
1.8	Document verified seasonal capability values	The <i>IESO</i> records the verified seasonal <i>generation units</i> output capabilities	Every 5 years or as necessary to maintain the <i>IESO</i> information up to date	A list of all <i>generators</i> and their verified seasonal output capabilities	Data entry	<i>IESO</i> databases are complete and up to date
1.9	Identify and plan to resolve discrepancies	<i>Generators</i> identify discrepancies between the declared and verified values of their unit output capabilities. Upon discovery of such discrepancies, <i>generators</i> plan remedial action and report to <i>IESO</i>	Every 5 years or as needed	A list of discrepancies between the declared and verified values of their units output capabilities and a plan to address them.	Discovery	All discrepancies are identified

Table 3–1: Procedural Steps for Generator Capability Verification

Ref.	Task Name	Task Detail	When	Resulting Information	Method	Completion Events
2.0	Report discrepancies	<i>Generators</i> report to the <i>IESO</i> all discrepancies between the declared and verified values of their units output capabilities	Every 5 years or as needed	A list of discrepancies between the declared and verified values of their units output capabilities and a plan to address them.	Email IESO_FORM_1710	The <i>IESO</i> is informed of all discrepancies between the declared and verified values of <i>generation units</i> output capabilities
2.1	Document and manage discrepancies	The <i>IESO</i> records discrepancies identified and decides whether its computer models need to be updated. The <i>IESO</i> also specifies the timeframe in which <i>generators</i> must resolve their identified discrepancies.	Every 5 years or as needed	A list of discrepancies between the declared and verified values of their units output capabilities and a plan to address them.	Data entry	<i>IESO</i> databases are complete and up to date
2.2	Report compliance	<i>Generators</i> self-certify their compliance with the requirements of this procedure	Every 5 years	A completed self certification form	IESO_FORM_1635	Self certification form is completed and submitted to <i>IESO</i>
2.3	Process self certification forms	The <i>IESO</i> reviews and documents the completed self certification forms	Every 5 years	Compliance status of all <i>generators</i>	Data entry	Information is received from all <i>generators</i>
2.4	Report compliance (including discrepancies and other program information)	The <i>IESO</i> reports compliance to <i>NPCC</i> along with other information about the program,	Annually	Compliance submission and report to <i>NPCC</i>	Email	Compliance submission and required information is received by <i>NPCC</i>
2.5	Process Ontario self-certification	<i>NPCC</i> reviews compliance submissions	Annually	Determination of compliance with Directories 9 and 10	Assessment	<i>IESO</i> is assessed for compliance

- End of Section -

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Appendix A: Forms

This appendix contains a list of the forms associated with the *Generator Capability Verification*. These are available on the *IESO* public Web site in the same location as this procedure.

Form Name	Form Number
Verification of Generator Gross and Net Active and Reactive Power Capability	IESO_FORM_1635
Generator Active and Reactive Power Capability	IESO_FORM_1710

– End of Section –

References

Document Name	Document ID
NPCC Directory 9 “Verification of Generator Gross and Net real Power Capability”	N/A
NPCC Directory 10 “Verification of Generator Gross and Net Reactive Power Capability”	N/A
MOD-024-1 “Verification of Generator Gross and Net real Power Capability”	N/A
MOD-025-1 “Verification of Generator Gross and Net Reactive Power Capability”	N/A
TOP-002-2 “Normal Operations Planning”	N/A
FAC-009-1 “Establish and Communicate Facility Ratings”	N/A
Market Manual 1 Part 1.2: Facility Registration, Maintenance and De-registration (section 3.3.1, Appendix C)	MDP_PRO_0016
Generation Facilities	IMO_FORM_1004
Market Manual 2 : Market Administration “Performance Validation”	IESO_REQ_0208

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