

# Market Rules

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## Chapter 4

# Grid Connection Requirements

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### *Authorities*

<b>Prepared by</b>
Market Evolution

<b>Reviewed by</b>
Technical Panel
Legal Affairs
IESO Change Management

<b>Approved by</b>
IESO Board

### *Distribution List*

Name	Organization

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# 1. Introduction

- 1.1.1 This Chapter sets forth rules to assist the *IESO* in maintaining the *reliability* of the *IESO-controlled grid* by:
- 1.1.1.1 requiring all *market participants* to adhere to established standards for all equipment *connected* to the *IESO-controlled grid* and to comply with certain other obligations relating generally to *connection* to the *IESO-controlled grid* and to participation in the *IESO-administered markets*; and
  - 1.1.1.2 setting forth certain *reliability*-related obligations of *embedded generators* that may not be *market participants*.
- 1.1.2 Section 7.5 of Chapter 1 does not apply to this Chapter and any action or event that is required to occur on or by a stipulated time or day under this Chapter or pursuant to a direction, instruction, or order made by the *IESO* under this Chapter shall occur on or by that time, whether or not a business hour, or on or by that day, whether or not a *business day*, unless otherwise specified in this Chapter or in the direction, instruction or order of the *IESO*.
- 1.1.3 For the purposes of this Chapter, “maintaining” *reliability* shall include re-establishing or restoring *reliability* and “maintain” and “maintenance” shall be interpreted accordingly.
- 1.1.4 Nothing in this Chapter is intended to prevent *market participants* from acting to protect their assets from physical damage or to protect the safety of their employees, the public or the environment, provided that the *market participants* coordinate any such actions that may affect the *reliability* of the *IESO-controlled grid* with the *IESO* to the fullest extent practicable.

# 2. Equipment Standards

- 2.1.1 All *market participants* shall ensure that their equipment and *facilities* connected to the *IESO-controlled grid* adhere to all applicable *reliability standards*.

- 2.1.2 All *market participants* shall maintain and operate their equipment and *facilities* in accordance with *applicable law, good utility practice* and all applicable *reliability standards*.
- 2.1.3 The standards described in this Chapter shall be implemented through compliance with the requirements of this Chapter, through *connection agreements* between *transmitters* and *market participants* that are *connected* or seek to *connect* to the *IESO-controlled grid* and through *operating agreements* between the *IESO* and *transmitters*.
- 2.1.4 [Intentionally left blank]
- 2.1.5 No *transmitter* or *market participant* shall place into service a new or modified *connection facility* until the *IESO* has determined that the *connection facility* complies with this Chapter.
- 2.1.6 Nothing in this Chapter shall be deemed to interfere with the right of each *transmitter* and *distributor* to establish standards and criteria for the design, construction, and operation of equipment connected to their systems, provided that such standards and criteria:
- 2.1.6.1 are applied in a non-discriminatory manner to all *market participants* and *connection applicants* *connecting* or seeking to *connect* to the *IESO-controlled grid*;
  - 2.1.6.2 satisfy *reliability standards* and any minimum general performance standards set forth in Appendix 4.1; and
  - 2.1.6.3 shall be subject to review by the *IESO* in the event there is a dispute regarding compliance with this section 2.1.6 and to the right of the *IESO* to override the application of such standards and criteria in the event it determines that they do not so comply.
- 2.1.7 Subject to compliance with the standards set forth in this Chapter and to sections 6.1.6 and 6.1.7, each *market participant* and *connection applicant* shall have the right to *connect* to the *IESO-controlled grid* or to modify its existing *connection facilities* to the *IESO-controlled grid* without undue delay.



## 3. Performance Standards and Obligations of Market Participants

### 3.1 General Requirement

- 3.1.1 The minimum general performance standards for all equipment *connected* to the *IESO-controlled grid* are set forth in Appendix 4.1. Specific performance standards applicable to the equipment of *generators, connected wholesale customers, distributors connected* to the *IESO-controlled grid* and *transmitters* are set forth in Appendices 4.2 to 4.4, respectively.
- 3.1.2 Each *market participant* shall ensure that its equipment *connected* to the *IESO-controlled grid* meets all applicable performance standards in Appendix 4.1 and each *generator, connected wholesale customer, distributor connected* to the *IESO-controlled grid* and *transmitter* shall ensure that its equipment *connected* to or forming part of the *IESO-controlled grid* meets all applicable performance standards in Appendices 4.2 to 4.4, respectively.
- 3.1.3 Each *embedded generator* whose *embedded generation facility* comprises either a *generation unit* rated at greater than 10 MW or *generation units* whose net output is greater than 50 MW shall ensure that its equipment meets all applicable performance requirements in Appendix 4.2.

### 3.2 Development of Rules for Waivers of Standards

- 3.2.1 [Intentionally left blank]
- 3.2.1.1 [Intentionally left blank]
- 3.2.1.2 [Intentionally left blank]
- 3.2.2 [Intentionally left blank]
- 3.2.2.1 [Intentionally left blank]
- 3.2.2.2 [Intentionally left blank]

- 3.2.3 A *generator* may comply with its requirement to provide reactive power either by modifying any of its *generating units* that do not comply with any standard with respect to the provision of reactive power, or by obtaining reactive power from other appropriate *generating units* or *market participants*. The *IESO* shall determine whether these other *generating units* or *market participants* are in sufficiently close electrical proximity to the non-compliant *generating unit* so as to provide the comparable or equivalent reactive power.

### 3.3 Obligations of Transmitters

- 3.3.1 Each *transmitter* shall:
- 3.3.1.1 [Intentionally left blank]
  - 3.3.1.2 coordinate the design of equipment proposed to be *connected* to the *IESO-controlled grid* to achieve compliance with this Chapter;
  - 3.3.1.3 permit and participate in any commissioning, inspection, and testing that the *IESO* requires of equipment that is or is to be *connected* to the *IESO-controlled grid*;
  - 3.3.1.4 [Intentionally left blank]
  - 3.3.1.5 satisfy the data requirements set forth in this Chapter to model the static and dynamic performance of the *IESO-controlled grid*;
  - 3.3.1.6 obtain the prior approval of the *IESO* for all changes in or removals of equipment or *facilities connected* to the *IESO-controlled grid* that could impact on the reliable operation of the *IESO-controlled grid*;
  - 3.3.1.7 operate its portion of the *IESO-controlled grid* such that, during a *normal operating state*, electricity may be transferred continuously at a *connection point*;
  - 3.3.1.8 operate its portion of the *IESO-controlled grid* such that the fault level at any *connection point* does not exceed the limits specified in the relevant *connection agreement*;
  - 3.3.1.9 operate its portion of the *IESO-controlled grid* to minimize the number and duration of interruptions at a *connection point*;
  - 3.3.1.9A follow *good utility practice* to promptly return *transmission facilities* and equipment to service after an interruption;

- 3.3.1.10 [Intentionally left blank]
- 3.3.1.11 [Intentionally left blank]
- 3.3.1.12 complete and return to the *IESO* those portions of the *IESO catalogue of reliability-related information* relevant to its *facilities*; and
- 3.3.1.13 upon the request of the *IESO*, enter into an *operating agreement* with the *IESO*.

### 3.4 Obligations of Generators

- 3.4.1 Each *generator* that participates in the *IESO-administered markets* or that causes or permits electricity to be conveyed into, through or out of the *IESO-controlled grid* shall:
  - 3.4.1.1 [Intentionally left blank]
  - 3.4.1.2 [Intentionally left blank]
  - 3.4.1.3 permit and participate in any commissioning, inspection, and testing that the *IESO* requires of its equipment that is or is to be *connected* to the *IESO-controlled grid*;
  - 3.4.1.4 [Intentionally left blank]
  - 3.4.1.5 [Intentionally left blank]
  - 3.4.1.6 operate its equipment in accordance with its *connection agreement*;
  - 3.4.1.7 [Intentionally left blank]
  - 3.4.1.8 complete and return to the *IESO* those portions of the *IESO catalogue of reliability-related information* relevant to its *facilities*; and
  - 3.4.1.9 notify the *IESO* upon the submission of a *connection request* to a *transmitter*.

### 3.5 Obligations of Connected Wholesale Customers and Distributors Connected to the IESO-Controlled Grid

3.5.1 Each *connected wholesale customer* and each *distributor* connected to the *IESO-controlled grid* shall:

3.5.1.1 [Intentionally left blank]

3.5.1.2 [Intentionally left blank]

3.5.1.3 permit and participate in any commissioning, inspection, and testing that the *IESO* requires of its equipment that is or is to be *connected* to the *IESO-controlled grid*;

3.5.1.4 [Intentionally left blank]

3.5.1.5 [Intentionally left blank]

3.5.1.6 operate its equipment in accordance with its *connection agreement*;

3.5.1.7 [Intentionally left blank]

3.5.1.8 complete and return to the *IESO* those portions of the *IESO* catalogue of *reliability-related information* relevant to its *facilities*; and

3.5.1.9 notify the *IESO* of the submission of a *connection request* to a *transmitter* pursuant to section 3.5.1.1.

## 4. Connection Agreements

4.1.1 Each *connected wholesale customer* and each *distributor* and *generator* connected to the *IESO-controlled grid* shall have a signed *connection agreement*, in such form as may be prescribed by the *OEB*, with the applicable *transmitter* with whom it is *connected*.

4.1.2 Each *embedded facility* that is a *market participant* shall have a signed connection agreement, in such form as may be prescribed by the *OEB*, with the applicable *distributor* with whom it is *connected*.

## 5. Compliance, Inspection, Testing, and Monitoring

### 5.1 General Requirements

- 5.1.1 Each *transmitter, generator, connected wholesale customer or distributor connected* to the *IESO-controlled grid* shall have the obligation to test and monitor its equipment to ensure and maintain compliance with all applicable *reliability standards* required by these *market rules*. The requirement to conduct and pay for such activities shall be specified in each *connection agreement*. If any *transmitter, generator, distributor or connected wholesale customer connected* to the *IESO-controlled grid* in respect of which no relevant waiver has been granted by the *IESO* fails to comply with the provisions of this Chapter, the *IESO* shall notify the *transmitter* and the connecting party of such non-compliance and shall ask that the parties achieve prompt compliance with this Chapter, subject to the imposition of such penalties for failure to comply as may be specified in these *market rules*. Pending such compliance, the *IESO* may direct the *transmitter* and the connecting party to operate their respective equipment and *facilities* so as to maintain the *reliability* of the *IESO-controlled grid*.
- 5.1.2 The results of all compliance monitoring and performance testing required by this Chapter to be performed shall be made available to the *IESO* upon request.
- 5.1.3 Each *transmitter, generator, distributor and connected wholesale customer connected* to the *IESO controlled grid* shall maintain records that set forth the results of all performance testing and monitoring conducted to demonstrate compliance with this Chapter in each case for 7 years from the date of the testing or monitoring activity. Each *transmitter, generator, distributor and connected wholesale customer* shall make such records available to the *IESO* upon request.
- 5.1.4 Parties to a *connection agreement* shall bear the cost of monitoring and testing their equipment and *facilities* for compliance with this Chapter. The *IESO* may request a *transmitter, generator, distributor or connected wholesale customer connected* to the *IESO-controlled grid* to attach to its equipment or *facilities* such test or monitoring equipment as the *IESO* determines appropriate and that is not required by the relevant *connection agreement* to be so attached, provided that such test or monitoring equipment does not adversely affect the performance of the connecting party's equipment or *facilities*. If the test or monitoring equipment required by the *IESO* is intended to provide a general benefit to the *IESO*-

*controlled grid*, and is not otherwise required to ensure compliance of the specific *market participant's* equipment, the *IESO* shall bear the costs of such additional test or monitoring equipment and the costs of operating and attaching such equipment to the *transmitter's, generator's, distributor's* or *connected wholesale customer's* equipment or *facilities*. All such costs shall be subject to verification and audit by the *IESO*.

- 5.1.5 Parties to a *connection agreement* that propose to perform a test on equipment that requires a change to the normal operation of such equipment shall give such prior notice to the *IESO* as the *IESO* shall require if such test could have an adverse impact on the *reliable* operation of the *IESO-controlled grid*. If the *IESO* determines that the proposed test could adversely affect the *reliability* of the *IESO-controlled grid*, the *IESO* may direct that the parties modify the testing procedure or the time scheduled for the test to avoid any threat to *reliability*. If such activities cannot avoid a threat to *reliability* to a degree acceptable to the *IESO*, the *IESO* shall not permit the test.
- 5.1.6 Where the *IESO* believes that the equipment of a *transmitter, generator, distributor* or *connected wholesale customer* connected to the *IESO-controlled grid* does not comply with the requirements of this Chapter, and that such non-compliance poses a threat to the *reliable* operation of the *IESO-controlled grid*, the *IESO* may direct the *transmitter, generator, distributor* or *connected wholesale customer* to modify such equipment to comply with this Chapter.
- 5.1.7 Section 5.1.6 applies regardless of whether a waiver has been granted to the relevant *transmitter, generator, distributor* or *connected wholesale customer* by the *IESO* in respect of the non-complying equipment.

## 5.2 IESO-Required Tests of Generators

- 5.2.1 In addition to any tests required by a *connection agreement*, the *IESO* may require a *generator* to test any *generation facility* connected to the *IESO-controlled grid* in order to determine whether such *facility* meets the requirements of this Chapter. The relevant *generator* shall comply with such request. If possible, the *IESO* shall permit such tests to be performed during the next scheduled *planned outage* of the *facility*. If the *IESO* determines that a test is required for *reliability* reasons prior to the next scheduled *planned outage* of the *facility*, the *IESO* shall cooperate with the *generator* to ensure that the test is conducted in a manner designed to create the minimum impact on the *operation* of that *generation facility*.

- 5.2.2 Tests conducted under this section 5.2 shall be conducted in accordance with procedures that have been agreed upon by the *IESO* and the relevant *generator*. The *IESO* shall provide the relevant *generator* with the parameters of the model derived from such tests.
- 5.2.3 Section 5.1.4 shall apply to determine the allocation to and the recovery by the *IESO* of any costs incurred by a *generator* to assist in the performance of the tests required under this section 5.2.

### 5.3 IESO-Required Tests of Interconnections

- 5.3.1 The *IESO* may perform or require *transmitters* to perform tests to verify the magnitude of the power transfer capability of *interconnections* whenever:
- 5.3.1.1 a new *interconnection* between the *IESO-controlled grid* and a *neighboring electricity system* is placed into operation, augmented or substantially modified; or
  - 5.3.1.2 the *IESO* has reasonable grounds to believe that power transfer capability across that *interconnection* has materially changed.
- 5.3.2 Prior to performing or directing the performance of the tests referred to in section 5.3.1, the *IESO* shall provide as much advance notice as practicable to *market participants* and other *interconnected transmitters* whose systems, equipment or *facilities* could be materially affected by the tests. All *market participants* shall cooperate with the *IESO* and/or the relevant *transmitter* in planning, preparing for and conducting tests to assess the technical performance of *interconnections* on the *IESO-controlled grid*.
- 5.3.3 The *IESO* may temporarily direct the operation of *generation facilities* during the testing of *interconnections* if and to the extent necessary to obtain operational conditions on the *IESO-controlled grid* that are required in order to achieve valid test results. The *IESO* shall plan the timing of tests so that the duration of the tests and the variation in the *dispatch* of the *generation facility* relative to its *dispatch* under non-test conditions are minimized to the extent possible.
- 5.3.4 Any costs that are incurred by a *generator* to assist in the performance of the tests required under section 5.3 that are otherwise unrecoverable shall be recovered from *market participants* in accordance with section 4.8 of Chapter 9. All such costs shall be subject to verification and audit by the *IESO* before being so recovered.

## 6. Establishing or Modifying IESO-Controlled Grid Facilities and Connections

### 6.1 General Requirements

- 6.1.1 Subject to the *reliability standards* required by these *market rules* and to sections 6.1.7, 6.1.22 and 6.1.23, the requirements associated with the design and construction of *connections* to the *IESO-controlled grid* shall be established between the *connecting market participant* or *connection applicant* and the *transmitter* with whom the *market participant* or *connection applicant* seeks to *connect*.
- 6.1.2 [Intentionally left blank]
- 6.1.2.1 [Intentionally left blank]
- 6.1.2.2 [Intentionally left blank]
- 6.1.3 [Intentionally left blank]
- 6.1.4 [Intentionally left blank]
- 6.1.4.1 [Intentionally left blank]
- 6.1.4.2 [Intentionally left blank]
- 6.1.5 The *IESO* shall, upon receipt of a *request for connection assessment* referred to in section 6.1.6, assess the impact of a new or modified *connection* to the *IESO-controlled grid* on the *reliability* of the *integrated power system* by means of a *connection assessment* conducted in accordance with the provisions of sections 6.1.14 to 6.1.18.
- 6.1.6 A *connection applicant* shall:
- 6.1.6.1 file a *request for connection assessment* to obtain the assessment referred to in section 6.1.5 and the approval of the *IESO* in accordance with the provisions of sections 6.1.14 to 6.1.18; and
- 6.1.6.2 where applicable, obtain the approval of the *IESO* pursuant to section 6.1.22.



Without limiting the generality of sections 6.1.14 and 6.1.15, each *request for connection assessment* shall meet the requirements of section 6.1.15 and shall be accompanied by the information referred to in Appendices 4.5A to 4.9, as may be applicable, or such portion of that information as the *IESO* may allow. Such *connection applicant* shall notify the *transmitter* of the filing of such request for *connection assessment*.

- 6.1.7 If the *IESO* determines as part of a *connection assessment* that a new or modified *connection* will have an adverse effect on the *reliability* of the *integrated power system*, the *IESO* shall describe such adverse effects in its report on the *connection assessment* and of the system upgrades required to mitigate such adverse effects. No *market participant*, *connection applicant* or *transmitter* shall establish such new or modified *connection* unless the required system upgrades described in the *connection assessment* are designed and implemented to the satisfaction of the *IESO*.
- 6.1.8 [Intentionally left blank]
- 6.1.9 Each *transmitter* shall, subject to obtaining any required approvals therefor and to the completion by the *IESO* of a *connection assessment* in accordance with section 6.1.5 and sections 6.1.14 to 6.1.18, and, if applicable, such further assessment and resulting approval as contemplated by sections 6.1.22 and 6.1.23, undertake the design and construction of any upgrades to its portion of the *IESO-controlled grid* that are required by the *IESO* to ensure the *reliability* of the *IESO-controlled grid*.
- 6.1.10 Each *transmitter* shall, if required by its *licence*, or an order of the *OEB* or by an agreement between the *transmitter* and the *connection applicant*, use its best efforts to undertake the design and construction of any *connection facilities* that are necessary to bring about any new or modified *connections* to the *IESO-controlled grid* that have been the subject of a *connection assessment* completed in accordance with sections 6.1.14 to 6.1.18 and, if applicable, sections 6.1.22 and 6.1.23 on a timely basis and in accordance with the requirements of this Chapter.
- 6.1.11 [Intentionally left blank]
- 6.1.12 [Intentionally left blank]
- 6.1.13 [Intentionally left blank]
- 6.1.14 The *IESO* shall establish procedures describing the manner and timing for the processing of *requests for connection assessment*.

- 6.1.15 A *connection applicant* shall file with the *IESO*:
- 6.1.15.1 a *request for connection assessment*, the supporting documentation referred to in section 6.1.6 and such other supporting documentation that meets the requirements of the procedures referred to in section 6.1.14;
  - 6.1.15.2 a deposit in such amount as may be specified in the procedures referred to in section 6.1.14; and
  - 6.1.15.3 an executed agreement in the form set forth in the procedures referred to in section 6.1.14 pursuant to which the *connection applicant* agrees, subject to section 6.1.17, to pay to the *IESO* an amount equal to all of the costs and expenses incurred by the *IESO* in completing the *connection assessment* associated with the *request for connection assessment* subject to section 6.1.17.
- 6.1.16 The *IESO* shall process each *request for connection assessment* in accordance with the procedures referred to in section 6.1.14 and as follows:
- 6.1.16.1 the *IESO* shall, unless the *request for connection assessment* is withdrawn or deemed to have been withdrawn pursuant to the procedures referred to in section 6.1.14, conduct a *connection assessment* in respect of the subject-matter of the *request for connection assessment* in accordance with the procedures referred to in section 6.1.14;
  - 6.1.16.2 the *IESO* shall provide to the *connection applicant* and to the applicable *transmitter* a copy of the report of the results of the completed *connection assessment* referred to in section 6.1.16.1;
  - 6.1.16.3 provided that the *connection applicant* has met the requirements of section 6.1.15, within such time as may be specified in the procedures referred to in section 6.1.14,
    - a. [Intentionally left blank]
    - b. [Intentionally left blank]
    - c. [Intentionally left blank]the *IESO* shall conduct a *connection assessment* in respect of the subject-matter of the *request for connection assessment* in accordance with the procedures referred to in section 6.1.14;

- 6.1.16.4 the *IESO* shall provide to the *connection applicant* and the applicable *transmitter* a copy of the report of the results of the completed *connection assessment* referred to in section 6.1.16.3, together with notice of its approval or disapproval of the new or modified *connection* that is the subject-matter of the *connection assessment*;
- 6.1.16.5 the *IESO* shall advise the *Ontario Energy Board* of the results of the *connection assessment* referred to in section 6.1.16.3; and
- 6.1.16.6 provided that the *connection applicant* has, within such time or times following the date of completion of the *connection assessment* that relates to its *request for connection assessment* as may be specified in the procedures referred to in section 6.1.14, filed with the *IESO* such confirmation or evidence, as the case may be and as may be specified in such procedures, of its intention to proceed with the new or modified *connection* that is the subject-matter of its *request for connection assessment*:
- a. the *connection applicant* shall retain the priority allocated to its *request for connection assessment*; and
  - b. the *IESO* shall include the results of such *connection assessment* in such subsequent *connection assessment*, conducted within the times specified in the procedures referred to in section 6.1.14, as may be appropriate.
  - c. [Intentionally left blank – section deleted]
- 6.1.17 Where the *IESO* conducts a *connection assessment* that relates to two or more *requests for connection assessment*, the *IESO* shall apportion the costs relating to the *connection assessment* amongst the applicable *connection applicants* in accordance with the procedures referred to in section 6.1.14 and shall reflect such apportionment in the agreement referred to in section 6.1.15.3.
- 6.1.18 Where:
- 6.1.18.1 the *IESO* conducts a *connection assessment* that relates to two or more *requests for connection assessment*; and
  - 6.1.18.2 one or more of the *connection applicants* withdraws or is deemed to have withdrawn its *request for connection assessment*,
- the *IESO* shall apportion the costs relating to the *connection assessment* amongst applicable *connection applicants* in accordance with the procedures referred to in section 6.1.14.

- 6.1.19 [Intentionally left blank]
- 6.1.20 The *IESO* shall submit an *invoice* to each *connection applicant* upon completion of the *connection assessment* which relates to the *connection applicant's request for connection assessment* in an amount equal to:
- 6.1.20.1 all of the *IESO's* costs and expenses relating to the processing of the *connection applicant's request for connection assessment* and to the conduct of the *connection assessment*; or
  - 6.1.20.2 where section 6.1.17 or 6.1.18 applies, the portion of the costs and expenses referred to in section 6.1.20.1 apportioned to the *connection applicant*;
- minus
- 6.1.20.3 the amount of any deposit paid pursuant to section 6.1.15.2.
- 6.1.21 A *connection applicant* shall, within ten *business days* of receipt of an *invoice* referred to in section 6.1.20, pay to the *IESO* the amount owing thereunder. 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.
- 6.1.22 No *connection applicant* shall establish a new or modify an existing *connection* to the *IESO-controlled grid* in a manner that differs materially from the configuration or technical parameters that were used by the *IESO* as the basis upon which it approved such new or modified *connection* in accordance with section 6.1.14 to 6.1.18 unless the applicable *connection applicant* has obtained the approval of the *IESO* for the change in configuration or technical parameter.
- 6.1.23 The *IESO* shall approve a change in configuration or technical parameter referred to in section 6.1.22 unless the *IESO* determines that such change will have an adverse effect on the *reliability* of the *integrated power system*. Where the *IESO* does not approve such change, no *connection applicant* shall establish the applicable new or modify the applicable existing *connection* to the *IESO-controlled grid* unless the required system upgrades described in the *connection assessment* are designed and implemented to the satisfaction of the *IESO*.

## 6.1A Upgrades to Ensure Reliability

- 6.1A.1 Each *transmitter* shall, subject to obtaining any required approvals therefor, undertake the design and construction of any upgrades to its portion of the *IESO-*

*controlled grid* that are required by the *IESO* to ensure the *reliability* of the *IESO-controlled grid*.

## 6.2 Voluntary Disconnection

- 6.2.1 A *connected market participant* may *disconnect* from the *IESO-controlled grid* any *registered facility* that has been de-registered in accordance with section 2.4 of Chapter 7 following the completion of all applicable operating and decommissioning procedures referred to in the *connection agreement* applicable to the *registered facility*.

## 6.3 Disconnection by Transmitter or Distributor

- 6.3.1 A *transmitter* may *disconnect* from the *IESO-controlled grid* the *facilities* or equipment of a *market participant* in accordance with the *market rules* and *applicable law*.
- 6.3.1.1 [Intentionally left blank]
- 6.3.1.2 [Intentionally left blank]
- 6.3.1.3 [Intentionally left blank]
- 6.3.1A Subject to section 6.4.3, a *transmitter* shall notify the *IESO* prior to *disconnecting* from the *IESO-controlled grid* the *facilities* or equipment of a *market participant* for any reason other than in response to a *disconnection order*.
- 6.3.2 Each *transmitter* and *distributor* to whom a *disconnection order* is issued pursuant to section 6.4 shall, subject only to section 3.4.1.5 or 3.7.1.5 of Chapter 5, as the case may be, on the date and at the time specified in the *disconnection order*, *disconnect* the *facilities* or equipment referred to in the *disconnection order*.
- 6.3.3 Without limiting the generality of section 8.3 of Chapter 1, a *disconnection order* may be issued by the *IESO* to a *transmitter* or a *distributor* pursuant to section 6.4 by voice communication.

## 6.4 Disconnection During an Emergency or For Safety or Reliability Reasons

- 6.4.1 During an *emergency*, the *IESO* may:

- 6.4.1.1 direct a connected *market participant* to reduce the power transferred at the *connection point* to zero in an orderly manner; and
  - 6.4.1.2 issue a *disconnection order* to a *transmitter* or a *distributor* directing the *transmitter* or *distributor* to *disconnect* a person's *facilities* or equipment from the *IESO-controlled grid*, its *transmission system* or its *distribution system*, as the case may be.
- 6.4.2 Where the *IESO* becomes aware of a threat to the safety of persons, property or the environment or to the *reliability* of the *integrated power system* that requires urgent action, the *IESO* may issue a *disconnection order* directing the relevant *transmitter* or *distributor* to *disconnect* a person's *facilities* or equipment from the *IESO-controlled grid*, its *transmission system* or its *distribution system*, as the case may be.
- 6.4.2A Where the *IESO* becomes aware that a person has *connected facilities* or equipment to the *IESO-controlled grid*:
- 6.4.2A.1 without the approval of the *IESO* including, where applicable, but not limited to the approval referred to in section 6.1.22;
  - 6.4.2A.2 in a manner that does not comply with the requirements of the *market rules* or *applicable law*;
  - 6.4.2A.3 in a manner that does not comply with the requirements identified in a *connection assessment* associated with that person's *facilities* or equipment; or
  - 6.4.2A.4 where applicable, in a manner other than that determined satisfactory by the *IESO* pursuant to section 6.1.7 or 6.1.23,
- the *IESO* may issue a *disconnection order* directing the relevant *transmitter* to *disconnect* the person's *facilities* or equipment from the *IESO-controlled grid*.
- 6.4.2B Where the *IESO* becomes aware that a *generator* has synchronized a *generation unit* to the *IESO-controlled grid* other than in accordance with section 11.2 of Chapter 7, the *IESO* may issue a *disconnection order* directing the relevant *transmitter* to *disconnect* the *generation unit* from the *IESO-controlled grid*.
- 6.4.3 A *transmitter* may, in accordance with the provisions of its *licence*, any code issued by the *OEB* with which the *transmitter* is required to comply, or the *market rules*, immediately *disconnect* from the *IESO-controlled grid* the *facilities* or equipment of a person where:

- 6.4.3.1 such action is urgently required as a result of a threat to the safety of persons, property or the environment, or a threat of physical damage to the *transmitter's* assets;
- 6.4.3.2 the urgency is such that there is insufficient time to notify the *IESO* prior to such action being taken; and
- 6.4.3.3 the *transmitter* is the operator of the connection facility.

A *transmitter* that *disconnects* a person's *facilities* or equipment pursuant to this section 6.4.3 shall promptly inform the *IESO* that such action has been taken.

## 6.5 Obligation to Reconnect After Disconnection

- 6.5.1 A *transmitter* or *distributor* to whom a *disconnection order* was issued pursuant to section 6.4 shall, in accordance with the direction referred to in section 6.5.2, reconnect the relevant *facilities* or equipment to the *IESO-controlled grid*, its *transmission system* or its *distribution system*, as the case may be, once:
  - 6.5.1.1 the *transmitter* or *distributor*, as the case may be, and the *IESO* are satisfied that the *emergency* which prompted the *disconnection* no longer exists; or
  - 6.5.1.2 where the *disconnection* occurred for reasons other than an *emergency*, the *transmitter* or *distributor*, as the case may be, and the *IESO* are satisfied that the reason for the *disconnection* no longer exists.
- 6.5.2 A *transmitter* or *distributor* to whom a *disconnection order* was issued pursuant to section 6.4 may reconnect the relevant *facilities* and equipment only under direction from the *IESO* provided that the person whose *facilities* or equipment were *disconnected* has carried out any required demonstration referred to in section 6.5.3 to the reasonable satisfaction of the *transmitter* or the *distributor*, as the case may be, and the *IESO*.
- 6.5.3 Prior to reconnection, the *transmitter* or *distributor*, as the case may be, or the *IESO* may require that the person whose *facilities* or equipment were *disconnected* demonstrate that it has taken all necessary steps to prevent the recurrence of any event that prompted the *disconnection* that was within the control of the person.
- 6.5.3A A *transmitter* that has *disconnected* from the *IESO-controlled grid* the *facilities* or equipment of a person in circumstances other than where it has received from the

- IESO* a *disconnection order* directing it to do so shall inform the *IESO* prior to reconnecting such *facilities* or equipment.
- 6.5.4 Any agreement between a *transmitter* and a *market participant* as to the payment of any costs associated with *disconnection* and reconnection shall be contained in their *connection agreement*.

## 7. Provision of Connection-Related Information

### 7.1 Provision of Information

- 7.1.1 [Intentionally left blank]
- 7.1.2 A *market participant* that becomes aware of any material change to or inconsistency with any information or data previously supplied to another *market participant* or to the *IESO* in accordance with a new or modified *connection* that could affect the *reliability* of the *IESO-controlled grid* shall promptly notify the *IESO* and such other *market participant* in writing of that change or inconsistency.
- 7.1.3 Each *generator* whose *generation facility* is *connected* to the *IESO-controlled grid*, *connected wholesale customer* and *distributor* connected to the *IESO-controlled grid*, and *transmitter* shall provide to the *IESO* the information described in Appendices 4.5A to 4.9, as applicable prior to placing any *connected facility* into service.
- 7.1.4 Each *embedded generator* whose *embedded generation facility* includes a *generation unit* rated at greater than 10 MVA and that is designated by the *IESO* for the purposes of this section 7.1 shall provide to the *IESO* the information described in Part A of Appendix 4.6 as may be requested by the *IESO*.
- 7.1.5 Each *embedded generator* that:
- 7.1.5.1 participates in the *IESO-administered markets* and whose *embedded generation facility* includes a *generation unit* rated at 1 MW or higher;
  - 7.1.5.2 is a non-market participant and whose *embedded generation facility* includes a *generation unit* rated at 10 MVA or higher,



and that is not required to provide data pursuant to section 7.1.4, shall provide the *IESO* with the data listed in Part B of Appendix 4.6.

- 7.1.6 Each *variable generator* shall provide data to the *IESO* in accordance with the applicable *market manual* for the purposes of deriving forecasts of the amount of *energy* that the *variable generator* is capable of producing.

## 7.2 [Intentionally left blank]

## 7.3 Monitoring Information Provided by Generators to the IESO

- 7.3.1 Subject to section 7.3.2, in order to permit the *IESO* to direct the operations of the *IESO-controlled grid*, each:

- 7.3.1.1 *generator* (i) whose *generation facility* is *connected* to the *IESO-controlled grid*, or (ii) that is participating in the *IESO-administered markets*; and
- 7.3.1.2 *embedded generator* (i) that is not a *market participant* or whose *embedded generation facility* is not a *registered facility*; (ii) whose *embedded generation facility* includes a *generation unit* rated at greater than 20 MVA or that comprises *generation units* the ratings of which in the aggregate exceeds 20 MVA; and (iii) that is designated by the *IESO* for the purposes of this section 7.3.1 as being required to provide such data in order to enable the *IESO* to maintain the *reliability* of the *IESO-controlled grid*,

shall provide the *IESO* with the data listed in Appendix 4.15 on a continual basis. Such data shall not be modified by the *generator* and shall be provided:

- 7.3.1.3 with equipment that meets the requirements set forth in Appendix 2.2 of Chapter 2; and
- 7.3.1.4 subject to section 7.6A, in accordance with the performance standards set forth in Appendix 4.19.
- 7.3.2 Section 7.3.1 does not apply to:
- 7.3.2.1 a *small generation facility*;

- 7.3.2.2 a *self-scheduling generation facility* that has a name-plate rating of less than 10 MW; or
- 7.3.2.3 an *intermittent generator* or a *transitional scheduling generator* that is comprised solely of a *generation unit* rated at less than 20 MW or of *generation units* the ratings of which in the aggregate is less than 20 MW unless designated by the *IESO* at the time of registration as affecting the *reliability* of the *IESO-controlled grid*.
- 7.3.2A Each *variable generator* not otherwise subject to any communication requirements specified in this chapter shall at a minimum, meet the medium performance standards set forth in Appendix 4.19 for the purposes of providing data in accordance with section 7.1.6.
- 7.3.3 [Intentionally left blank – section deleted]
- 7.3.4 The *IESO* shall *publish*, as soon as practicable following each *dispatch hour*, the actual *generation capacity* (in MW) and hourly *energy* production (in MWh) for each *generation unit* based on information provided to it by *market participants*. *Generation capacity* and *energy* production for *generation units* with rating less than 20 MVA can be aggregated by station.
- 7.3.5 The *IESO* shall, as soon as practicable prior to each *dispatch hour*, endeavour to provide a confidential forecast produced by the *forecasting entity* to each *registered market participant* for each of their *variable generation facilities* as specified in the applicable *market manual*. The *IESO* shall determine and *publish* the date when the confidential forecasts will first become available.
- 7.3.6 The *IESO* shall, as soon as practicable following each *dispatch hour*, provide the confidential forecast produced by the *forecasting entity* for each *dispatch interval* in the preceding *dispatch hour*, to each *registered market participant* for each of their *variable generation facilities* as specified in the applicable *market manual*.

## 7.4 Monitoring Information Provided by Transmitters to the IESO

- 7.4.1 In order to permit the *IESO* to direct the operations of the *IESO-controlled grid*, each *transmitter* shall provide the *IESO* with the data listed in Appendix 4.16 on a continual basis. Such data shall not be modified by the *transmitter* and shall be provided:
- 7.4.1.1 with equipment that meets the requirements set forth in Appendix 2.2 of Chapter 2; and

7.4.1.2 in accordance with the performance standards set forth in Appendix 4.20 and, subject to section 7.6A, Appendix 4.21.

7.4.2 [Intentionally left blank]

## 7.5 Monitoring Information Provided to the IESO by Connected Wholesale Customers and Distributors Connected to the IESO-Controlled Grid

7.5.1 In order to permit the *IESO* to direct the operations of the *IESO-controlled grid*, each *connected wholesale customer* and each *distributor connected to the IESO-controlled grid* shall provide the *IESO* with the data listed in Appendix 4.17 on a continual basis. Such data shall not be modified by the *connected wholesale customer* or *distributor connected to the IESO-controlled grid*, as the case may be, and shall be provided:

7.5.1.1 with equipment that meets the requirements set forth in Appendix 2.2 of Chapter 2; and

7.5.1.2 subject to section 7.6A, in accordance with the performance standards set forth in Appendix 4.22.

7.5.2 A *distributor* that is not *connected to the IESO-controlled grid* and that is designated by the *IESO* for the purposes of this section 7.5.2 as being required to provide the data listed in Appendix 4.17 in order to enable the *IESO* to maintain the *reliability* of the *IESO-controlled grid* shall comply with the obligations set forth in section 7.5.1.

## 7.6 Monitoring Information Provided by Embedded Load Customers to the IESO

7.6.1 In order to permit the *IESO* to direct the operations of the *IESO-controlled grid*, each *embedded load consumer* that is designated by the *IESO* for the purposes of this section 7.6.1 as being required to provide such data in order to enable the *IESO* to maintain the *reliability* of the *IESO-controlled grid* shall provide the *IESO* with the data listed in Appendix 4.18 on a continual basis. Such data shall not be modified by the *embedded load consumer* and shall be provided:

7.6.1.1 with equipment that meets the requirements set forth in Appendix 2.2 of Chapter 2; and

- 7.6.1.2 subject to section 7.6A, in accordance with the performance standards set forth in Appendix 4.23.

## 7.6A Alternative Arrangements for Submission of Data Measurements

- 7.6A.1 *Market participants* may propose to the *IESO* an alternative arrangement to make data measurements or equipment status changes available to the *IESO* communications interface within times different than those specified in Appendix 4.19, 4.21, 4.22, or 4.23.
- 7.6A.2 Where an alternative arrangement proposed pursuant to section 7.6A.1 relates to the requirement to make data measurements or equipment status changes available at the *IESO* communications interface within less than 2 seconds from the change in field monitored quantity or field status change, as the case may be, the *IESO* shall approve the alternative arrangement if:
- 7.6A.2.1 the proposed alternative arrangement demonstrates to the satisfaction of the *IESO* that the *market participant's* facilities and equipment are capable of providing the data measurements or equipment status changes in such a manner that such data will be displayed on the communications terminals located at the *IESO's* principal and back-up control centers within less than 8 seconds from the change in field monitored quantity or field status change; and
  - 7.6A.2.2 the proposed alternative arrangement demonstrates to the satisfaction of the *IESO* that the *market participant's* facilities and equipment are capable of meeting such other *reliability*-related performance standards and other requirements as may be specified by the *IESO*, including but not limited to time consistency of data, and loss of data from electrically adjacent stations.
- 7.6A.3 Where an alternative arrangement proposed pursuant to section 7.6A.1 relates to the requirement to make data measurements or equipment status changes available at the *IESO* communications interface within less than 10 seconds from the change in field monitored quantity or field status change, as the case may be, the *IESO* shall approve the alternative arrangement if:
- 7.6A.3.1 the proposed alternative arrangement demonstrates to the satisfaction of the *IESO* that the *market participant's* facilities and equipment are capable of providing the data measurements or equipment status changes in such a manner that such data will be displayed on the

communications terminals located at the *IESO*'s principal and back-up control centers within less than 20 seconds from the change in field monitored quantity or field status change; and

7.6A.3.2 the proposed alternative arrangement demonstrates to the satisfaction of the *IESO* that the *market participant's facilities* and equipment are capable of meeting such other *reliability*-related performance standards and other requirements as may be specified by the *IESO*, including but not limited to time consistency of data, and loss of data from electrically adjacent stations.

7.6A.4 Upon approval of an alternative arrangement proposed and reviewed under this section, the *IESO* may incorporate the alternative arrangement as an alternative standard in the *market rules*.

## 7.7 Reliability, Maintenance and Repair of Monitoring and Control Equipment

7.7.1 Each person referred to in section 7.3.1, 7.4.1, 7.5.1, 7.5.2 or 7.6.1, as the case may be, shall maintain the monitoring and control equipment referred to in Appendices 4.15 to 4.18 as applicable, in accordance with *good utility practice* and shall ensure that such equipment:

7.7.1.1 has an overall mean time between failures of:

- a. no less than three years; or
- b. no less than five years, if the equipment is designated by the *IESO* as significant for purposes of enabling the *IESO* to maintain the *reliability* of the *IESO-controlled grid*;

7.7.1.1A each person referred to in section 7.7.1 shall report and schedule with the *IESO* all planned changes to monitoring equipment referred to in section 7.7.1.1 and associated potential and current transformers and other devices affecting the accuracy or the reliability of such equipment;

7.7.1.2 is secure from the effects of interruptions in power supply for a period of at least eight hours.

7.7.2 Each person referred to in section 7.7.1 and 7.3.2A shall respond to an *outage* of or defect in the equipment referred to in section 7.7.1 or the applicable *market manual*:

- 7.7.2.1 immediately, in the case of equipment relating to *facilities* to which the high performance information monitoring standard applies pursuant to Appendices 4.19 to 4.23 other than *significant generation facilities* and *significant dispatchable load facilities*;
- a. [Intentionally left blank]
  - b. [Intentionally left blank]
  - c. [Intentionally left blank]
  - d. [Intentionally left blank]
  - e. [Intentionally left blank]
  - f. [Intentionally left blank]
  - g. [Intentionally left blank]
  - h. [Intentionally left blank]
- 7.7.2.2 no later than the next day following the day on which the *outage* or defect is discovered, in the case of equipment relating to *significant generation facilities*, *significant dispatchable load facilities*, *variable generation*, and *facilities* to which the medium performance information monitoring standard applies pursuant to Appendices 4.19 to 4.23.
- a. [Intentionally left blank]
  - b. [Intentionally left blank]
  - c. [Intentionally left blank]
  - d. [Intentionally left blank]
  - e. [Intentionally left blank]
  - f. [Intentionally left blank]
- 7.7.3 Each person referred to in section 7.7.1 and 7.3.2A shall ensure that the equipment referred to in section 7.7.1 or the applicable *market manual* is restored to a fully operational state following an *outage* of or defect in such equipment as follows:
- 7.7.3.1 in the case of equipment relating to the *facilities* referred to in section 7.7.2.1, within 24 hours of the time at which the *outage* or defect is discovered;

- 7.7.3.2 in the case of equipment relating to the *facilities* referred to in section 7.7.2.2, within 48 hours of the time at which the *outage* or defect is discovered; and
- 7.7.3.3 in all other cases, within 14 days of the time at which the *outage* or defect is discovered.
- 7.7.4 The *IESO* may direct a person referred to in section 7.7.1 and 7.3.2A to respond and restore the equipment referred to in section 7.7.1 or the applicable *market manual* to a fully operational state following an *outage* of or defect in such equipment within such longer or shorter time periods than those referred to in sections 7.7.2 and 7.7.3 based on the immediate or short-term impact of the unavailability of the equipment on the reliable operation of the *IESO-controlled grid*, provided that where a person is directed to respond and restore any such equipment in less than 24 hours, the person shall use commercial best efforts to achieve such direction.
- 7.7.5 Each person referred to in section 7.7.1 shall notify the *IESO* of any *planned outage* of the equipment referred to in section 7.7.1 no less than four days prior to the *planned outage*.

## 7.8 Re-Classification of Facilities

- 7.8.1 The *IESO* may, for the purposes of sections 7.3 to 7.6:
- 7.8.1.1 re-classify a *small generation facility* as a *minor generation facility*, a *significant generation facility* or a *major generation facility*;
- 7.8.1.2 re-classify a *minor generation facility* as a *significant generation facility* or a *major generation facility*;
- 7.8.1.3 re-classify a *significant generation facility* as a *major generation facility*;
- 7.8.1.4 re-classify a *minor dispatchable load facility* as a *significant dispatchable load facility* or a *major dispatchable load facility*; and
- 7.8.1.5 re-classify a *significant dispatchable load facility* as a *major dispatchable load facility*,

where the *IESO* determines that such re-classification is required to enable the *IESO* to maintain the *reliability* of the *IESO-controlled grid*.

- 7.8.2 The *IESO* may, for the purposes of sections 7.3 to 7.6:
- 7.8.2.1 re-classify a *major generation facility* as a *significant generation facility*, a *minor generation facility* or a *small generation facility*;
  - 7.8.2.2 re-classify a *significant generation facility* as a *minor generation facility* or a *small generation facility*;
  - 7.8.2.3 re-classify a *minor generation facility* as a *small generation facility*;
  - 7.8.2.4 re-classify a *major dispatchable load facility* as a *significant dispatchable load facility* or a *minor dispatchable load facility*; and
  - 7.8.2.5 re-classify a *significant dispatchable load facility* as a *minor dispatchable load facility*,
- where the *IESO* determines that such re-classification will not adversely affect the ability of the *IESO* to maintain *reliability* of the *IESO-controlled grid*.
- 7.8.3 A person whose *facility* has been re-classified pursuant to section 7.8.1 or 7.8.2 shall:
- 7.8.3.1 ensure that its *facilities* and equipment meet the requirements set forth in section 7.3, 7.4, 7.5 or 7.6, as the case may be; and
  - 7.8.3.2 comply with the requirements of section 7.7,
- applicable to the class of *facility* in which its *facility* has been re-classified.