

**PUBLIC**



**PROCEDURE**

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## **Market Manual 1: Connecting to Ontario's Power System**

# **Part 1.4: Connection Assessment and Approval**

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**Issue 24.0  
December 4, 2024**

**This market manual provides detailed procedures to be followed by connection applicants who wish to connect to the IESO-controlled grid.**

**MDP\_PRO\_0048**

## Document Change History

Issue	Reason for Issue	Date
<p>For changes prior to 2014, refer to <b>Market Manual 2.10</b>, versions 19.0 and prior.            For changes prior to 2019, refer to versions 23.0 and prior.</p>		
18.0	Issue released in advance of Baseline 42.1.	October 15, 2019
19.0	Issue released in advance of Baseline 43.1. All changes apply to obligations secured in a <i>capacity auction</i> starting June 2020.	May 4, 2020
20.0	Issue released in advance of Baseline 44.0. This market manual has been moved to the new <b>Market Manual 1: Connecting to Ontario's Power System</b> series and the document part number has changed from 2.10 to 1.4.	June 29, 2020
21.0	Updated to meet accessibility requirements pursuant to the <i>Accessibility for Ontarians with Disabilities Act</i> .	October 27, 2020
22.0	Issue released in advance of Baseline 45.0. Updated to include electricity storage participation.	February 26, 2021
23.0	Issue released for Baseline 45.1.	June 2, 2021
24.0	Issue released for Baseline 52.1.	December 4, 2024

## Related Documents

Document ID	Document Title
<a href="#">PRO-408</a>	Market Manual 1.5: Market Registration Procedures
<a href="#">IESO_REQ_0208</a>	Market Manual 1.6: Performance Validation

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## Table of Changes

Reference	Description of Change
Throughout	Reorganized and rewrote the entire document in order to improve content clarity and to comply to new IESO market manual standards and practices.
Section 2.1	Added content to clarify on when the CAA process is needed, and to include details on when inquiries are recommended, treatment of modifications to protection systems, treatment of spare equipment, maintenance work, as well as to clarify when the CAA process is not required.
Section 4 (old)	Moved "Criteria for Connection Assessments" content to section 1.3.
Section 6 (old)	Moved "Submission and Response Methods" content to section 1.4.
Section 7 (old)	Moved "Technical Feasibility Study" content to section 9.
Section 5.3 (formerly 8.3)	Added new section to provide guidance to prospective connection applicants on the party that must file the CAA application with the IESO in most common situations (e.g. connections to a transmitter's system, a distributor's system or to a customer owned facility connected to a transmitter's or to a distributor's system).
Section 11 (old)	Deleted "Withdrawal" section. Information regarding withdrawals can be found in sections 3.2, 5.12, 6.3 and 9.8.
Section 12 (old)	Moved "Information Confidentiality" content to section 1.5.
Appendix B	Added a new appendix for explaining like-for-like replacements.
Appendix C	Added a new appendix for system software updates for generation unit control systems or electricity storage units.

# 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**;
- Terms specific to this *market manual* that are not **MR Ch.11** terms are capitalized and are defined in the [List of Defined Terms](#); and
- All user interface labels and options that appear on the IESO gateway and tools are formatted with the bold font style.

– End of Section –

# 1. Introduction

## 1.1 Purpose

This *market manual* establishes the procedures describing the manner and timing for the processing of requests for *connection assessment*, that are required to be established under section 6.1.14 of Chapter 4 of the *market rules* (**MR Ch.4 s.6.1.14**).

*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 1.4** is the first 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. This *market manual* contains the procedures related to *connection assessment* and approval, which encompasses Stages 1 and 2 of the process.

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

Stage	Market Manual
1- <a href="#">Prepare application</a>	<b>MM 1.4</b>
2- <a href="#">Obtain conditional approval to connect</a>	
3- <a href="#">Design and build</a>	N/A <sup>1</sup>
4- <a href="#">Authorize market and program participation</a> (also called Participant Authorization)	<b>MM 1.5</b>
5- <a href="#">Register equipment</a>	
6- <a href="#">Commission equipment and validate performance</a>	<b>MM 1.5, and MM 1.6</b>

This *market manual* provides a *connection applicant* with the required steps as well as an understanding of the roles played by the *connection applicant*, the *IESO*, and the affected *distributor(s)* and affected *transmitter(s)*. This *market manual* serves as a road map for *connection applicants*, *transmitters* and the *IESO*, and reflects

<sup>1</sup> 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.



the requirements set out in the *market rules*, applicable standards and *IESO* policies and procedures. The overview information in section 2 provided for context purposes only, highlights the main actions that comprise the procedure.

Anyone who wishes to participate in the *IESO-administered markets* or to cause or permit electricity to be conveyed into, through or out of the *IESO-controlled grid* must complete the *IESO* Market Registration process. For information about being authorized as a *market participant*, and for detailed equipment registration procedures, refer to [Market Manual 1.5: Market Registration Procedures](#).

Before submitting the request for *connection assessment*, those intending to establish a new or modified connection to the *IESO-controlled grid* may request a Technical Feasibility Study, as detailed in section 9.

## 1.2 Scope

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

- MR Ch.2 s.3.1.1: Application for Authorization
- MR Ch.3 s.5.3: Exceptions
- MR Ch.4 s.6: Establishing or Modifying IESO-controlled Grid Facilities and Connections
- MR App.4.2: Requirements for Generation and Electricity Storage Facilities Connected to the IESO-controlled Grid
- MR App.4.3: Requirements for Connected Wholesale Customers and Distributors Connected to the IESO-controlled Grid
- MR Ch.5 s.7: Forecasts and Assessments
- MR Ch.6: Wholesale Metering

## 1.3 Criteria for Connection Assessments and Technical Feasibility Studies

The criteria used by the *IESO* for *connection assessments* are contained in the [Ontario Resource and Transmission Assessment Criteria](#) posted on the *IESO* website and any applicable *NPCC* and *NERC* reliability standards.

## 1.4 Submission and Response Methods

(MR Ch.4 s.6.1.14)

**Email preferred** – The CAA process requires the submission of various types of information. The preferred method of correspondence is via email to [connection.assessments@ieso.ca](mailto:connection.assessments@ieso.ca). The *IESO* will correspond with the *connection applicant* via email for requests or general notifications.

**Submission process** – The CAA application form should be submitted by email<sup>2</sup>. Hard copies of the application form and supporting documents are not required. Where the supporting documentation is not suitable for email submission, contact the *IESO* at [connection.assessments@ieso.ca](mailto:connection.assessments@ieso.ca) for mailing instructions. The required deposit for a *connection assessment* can be made by *electronic funds transfer*. Details of the approved methods of payment will be provided in the email that informs of the assigned CAA ID<sup>3</sup>.

## 1.5 Information Confidentiality

(MR Ch.3 s.5.3 and MR Ch.4 s.6.4)

**Disclosure of confidential information** – The *IESO* may disclose *confidential information* received from a *connection applicant* to the *transmitter*, as required in **MR Ch.4 s.6.4**.

**Use of confidential information** – Where the *IESO* discloses *confidential information* to a *connection applicant*, or *transmitter* as described above, such *connection applicant*, or *transmitter* may not, except as permitted by the *market rules*, including **MR Ch.3 s.5.3**<sup>4</sup>, further disclose such *confidential information*, and may only use such *confidential information* for the purpose for which it was disclosed or another purpose contemplated in the *market rules*, including for the purpose of carrying out its responsibilities as described in **MR Ch.4 s.6.4**. *Confidential information*, including information that, if disclosed, could reasonably be expected to pose a potential security threat to the *integrated power system*, the *IESO-administered markets*, or those of neighbouring jurisdictions may also be protected under *reliability standards*.

## 1.6 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 typical timelines for stages and activities.

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<sup>2</sup> To the extent possible, the documents and drawings should be submitted in .pdf format. *Connection applicants* intending to send documents in a different format are encouraged to contact the *IESO* in advance.

<sup>3</sup> CAA ID a unique identifier assigned by the *IESO* to each project, as described in section 2.2.

<sup>4</sup> For this purpose, references in that Section shall be considered references to an affected *transmitter*.

## 1.7 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](mailto: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. Overview of the Connection Assessment and Approval Process

(MR Ch.4 ss.6.1 and 6.1.7)

**Connection assessment and approval (CAA) process** – The CAA process requires the *IESO* to complete either a System Impact Assessment (SIA), or if the *IESO* determines, based on the guidelines outlined in section 6.2, that a detailed study is not required, an Expedited System Impact Assessment (ESIA). Note that following the *IESO*'s SIA or ESIA, as part of the CAA process, the *transmitter* may be required to complete a Customer Impact Assessment (CIA) provided for by *Ontario Energy Board's (OEB's) Transmission System Code (TSC)*.

**Purpose** – The objective of the SIA is to ensure the *reliability* of the *integrated power system* is not compromised. When completed, it provides the *connection applicant* with an SIA/ESIA report and Notification of Conditional Approval (NoCA) or a Notification of Disapproval with Reasons (NoDR) for the Project, that is based on the information submitted to the *IESO* by the *connection applicant*.

**Assessment types** – An overview of each of the above assessment types is provided below. Comprehensive descriptions are provided in sections 5, 6 and 9.

### 2.1 Application of the CAA Process

(MR Ch.4 s.6.1.6)

**CAA process required** – The CAA process must be followed where a *connection applicant* is planning either a new connection, or the modification of an existing connection, to the *IESO-controlled grid* (denotes qualified change as per *NERC Reliability Standard FAC-002*), resulting from the following non-exhaustive list:<sup>5</sup>

- The connection of a new or modified *generation facility* or *electricity storage facility* to the *IESO-controlled grid*;
- The connection of a new or modified *generation facility* or *electricity storage facility* that is or will be rated greater than 10 MW<sup>6</sup> to a *distributor's distribution system*;

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<sup>5</sup> If in doubt, *connection applicants* are encouraged to contact the *IESO* for clarification.

<sup>6</sup> Where the units connected to the distributor's distribution system consists of both generation unit(s) and electricity storage unit(s), a connection assessment will be required if the aggregate of the electricity storage unit size(s) and the maximum output of the generation unit(s) is greater than 10 MW.

- The connection of a new or modified *generation facility* or *electricity storage facility*<sup>7</sup> greater than 1 MW within a *connected wholesale customer's load facility*;
- The connection of a new or modified transmission *facility*;
- The connection of a new or modified *load facility* to the *IESO-controlled grid*; and
- The one-time addition of load greater than 10 MW<sup>8</sup>.

**Inquiries recommended** – Modified connections to the *IESO-controlled grid* resulting from one of the following may require an SIA (contact the *IESO* with Project information for a determination):

- The addition of load greater than 10% of the yearly peak load of a transmission connected transformer station over less than five years<sup>9</sup>;
- The addition of load greater than 1 MW<sup>10</sup> within a *connected wholesale customer's load facility*; or
- The connection of a new or modified *facility that provides contracted ancillary services*, other than *operating reserve*. Participants seeking to offer *operating reserve* from an existing *generation facility*, *electricity storage facility* or *load facility* must contact [market.registration@ieso.ca](mailto:market.registration@ieso.ca).

**Protection systems** – Modified connections to the *IESO-controlled grid* as a result of modified protection systems, such as protection setting changes, protection equipment changes and adding or enabling new functionalities to existing protections requires an SIA, with the exception of the following protection changes, that are not expected to have a significant adverse impact on the reliability of the *integrated power system*:

- Protection equipment replacement with 'like-for-like' upgrades with full retention of functionality and settings;

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<sup>7</sup> This includes *generation unit(s)* and *electricity storage unit(s)* used for load displacement, but excludes *generation unit(s)* intended for emergency backup, that only operate in isolation from the *IESO-controlled grid*, even if bringing them on-line involves "make before break", that synchronizes the unit for a very short time – generally a few minutes – to the grid, before disconnecting the unit(s) and the load it supplies from the grid.

<sup>8</sup> Smaller load increase thresholds requiring an SIA may be identified by the *IESO* in areas of the *integrated power system* where there are known constraints. If in doubt, *connection applicants* are encouraged to contact the *IESO* for clarification, as stipulated in the Inquiries Recommended section.

<sup>9</sup> Five years is to account for the Regional Planning cycles. Subsequent addition of load, that was not considered in the plan, may need to be assessed via the CAA process.

<sup>10</sup> Smaller load increase thresholds requiring an SIA may be identified by the *IESO* in areas of the *integrated power system* where there are known constraints. If in doubt, *connection applicants* are encouraged to contact the *IESO* for clarification.

- Protection settings changes performed by a *transmitter* to existing protections systems installed on their transmission elements must be sent to [protection.settings@ieso.ca](mailto:protection.settings@ieso.ca); and
- Protection settings changes performed by a *generator* or *electricity storage participant* to existing protections systems installed at *generation facilities* or *electricity storage facilities* must be sent to [PAO-PerformanceValidationandModelling@ieso.ca](mailto:PAO-PerformanceValidationandModelling@ieso.ca).

**CAA process not required** – The following changes do not generally result in a modification to an existing connection to the *IESO-controlled grid*, and do not need to undergo the formal CAA process, provided they meet certain requirements:

- *Generation* unit control system or *electricity storage unit* system software (including firmware) updates that result in no change to the functionality, steady state and dynamic response of the *generation unit* or *electricity storage unit* and its dynamic models, are required to follow the procedure described in Appendix C: and provide evidence to the *IESO*;
- Addition of feeder breakers at system voltages less than 50 kV that are not associated with peak load increases at the station. If the addition of feeder breakers and associated load transfers affects the amount of load considered for automatic interruption by existing under-frequency load shedding (UFLS), *remedial action schemes (RAS)* or load rejection (L/R) schemes at the station, the *market participant* must update the UFLS, RAS or L/R scheme such that the amount of load subject to automatic interruption by the affected scheme remains unchanged; and
- Like-for-like equipment replacement that meets the conditions listed in Appendix B:.

**Contact IESO** – If in doubt, *connection applicants* or *market participants* planning changes to their existing installations are encouraged to email the *IESO* ([connection.assessments@ieso.ca](mailto:connection.assessments@ieso.ca)) for clarification. The *IESO* normally responds within two *business days*.

### 2.1.1 Maintenance Work, Like-for-Like Modifications and Spare Equipment

**Like-for-like replacements** – For certain like-for-like modifications that occur frequently or at regular intervals, and do not meet the conditions listed in Appendix B of this *market manual*, the *IESO* can perform upon request, a single “blanket” SIA, as applicable, ahead of time. This SIA can then be used by that *market participant* for all subsequent qualifying changes. This approach eliminates the need for assessing each individual change, reduces assessment costs and time for *market participants*, and provides *market participants* with more certainty for future changes.

**Spare equipment** – To expedite the replacement process, the *IESO* can also provide SIAs to those *market participants* that have acquired spare equipment (transformers, inverters, etc.) in advance of its use, should primary equipment fail. Such provisions could also be extended if *market participants* have contracted the delivery of replacement parts with manufacturers, as long as the *market participant* can provide pre-specified performance requirements for the replacement equipment to the *IESO* for the assessment.

**Maintenance work** – Conditional approval for spare equipment or repetitive maintenance work that involves like-for-like equipment replacement as described above could also be included in the initial SIA for a new *facility*, if the information is made available to the *IESO* at the time of that assessment. Currently, *generators* seeking to connect a new *generation facility* can include the required information in the operating philosophy of their proposed *facility* (i.e. details on maintenance *outages*), while *wholesale consumers* seeking to connect a new *load facility* can provide it via the cover letter (or email) of their application.

**Market registration and commissioning still required** – Note that equipment under a “blanket” SIA and spare equipment are still required to undergo the Market Registration process and successfully complete testing and commissioning before being placed in service.

## 2.2 Overview of System Impact Assessment/Expedited System Impact Assessment

(MR Ch.4 ss.6.1.5, 6.1.6, 6.1.14, 6.1.15, 6.1.16)

**Form required** – A *connection applicant* must file a *request for connection assessment*, according to **MR Ch.4 s.6.1.15.1**, using the CAA application form<sup>11</sup> published by the *IESO*. To initiate a *request for connection assessment*, the *connection applicant* completes the [CAA Application Form](#) which can be found on the *IESO* website (refer to Appendix A: Forms). Instructions on how to file the CAA application form are provided on the form.

**Parties that may be *connection applicants*** – A *connection applicant* does not have to be a *market participant* in order to apply for *connection assessment* and approval, however, the required *IESO* Market Registration process, described in [Market Manual 1.5](#), must be completed prior to participation in the *IESO-administered*

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<sup>11</sup> The *IESO* has developed a common CAA application form with *transmitters*, which indicates what information the *IESO* needs to complete the SIA or ESIA, and what information the *transmitter* needs to complete the CIA. As most of this information is used by both the *IESO* and by the *transmitter*, the *connection applicant* must fill the required information once on the common form and submit the same form to both the *IESO* and to the *transmitter*.

*markets*<sup>12</sup>. *Distributors* or *transmitters* may be *connection applicants* and/or facilitators within the CAA process. Responsibilities for *distributors and transmitters* with respect to the CAA process are outlined in section 4 of this *market manual*.

**Communication with *transmitter* or *distributor*** – Before initiating the CAA process with the IESO, those seeking approval of a new or modified connection to the *IESO-controlled grid* are required to engage the *transmitter* or *distributor* with whom they seek to connect, to establish the design of their connection to the *IESO-controlled grid* or to the *distribution system* and to identify the party that will be the *connection applicant*.

**Preliminary SIA or ESIA determination** – Upon receipt of the CAA application and the documents containing all relevant technical information and Project details, the IESO will determine whether the Project meets the ESIA guidelines described in section 6.2. If the IESO determines that the Project does not meet these guidelines, then an SIA will be required instead.

**Content of IESO response** – In its response, the IESO will identify any additional information necessary to determine whether an SIA or ESIA is required based on the guidelines described in section 6.2. The IESO will send an email to the *connection applicant* acknowledging receipt of the CAA application, normally within five *business days*. The IESO may also notify the *transmitter* of the CAA application, in situations where the CAA application form does not require the *connection applicant* to submit the form to the *transmitter*.

**CAA ID** – If an SIA or ESIA is required, and all necessary information is received, the IESO will issue a CAA ID to the *connection applicant* and *transmitter*. A CAA ID is a unique identifier assigned to the SIA or ESIA that will be used in all subsequent correspondence related to the assessment. The *connection applicant* should reference the CAA ID in all subsequent steps in the CAA process pertaining to the Project, including in the payment of the deposit. After receiving the CAA ID, the *connection applicant* will be provided with instructions on submitting the required deposit to the IESO.

**SIA agreement** – If the Project does not meet the ESIA guidelines, the SIA agreement, provided for in **MR Ch.4 s.6.1.15.3**, shall follow the templates *published* by the IESO. The IESO will initiate the execution of the agreement, upon receiving a *request for connection assessment* in the applicable format and the applicable deposit, by sending a proposed agreement, using the appropriate template, to the *connection applicant*.

**Cost recovery agreements for ESIA**s – Where the Project meets the ESIA guidelines, the cost recovery agreement, provided for in **MR Ch.4 s.6.1.15.3**, shall

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<sup>12</sup> Before applying to the IESO for a *connection assessment*, *connection applicants* are strongly advised to initiate discussions with the affected *transmitter*.



follow the templates *published* by the *IESO*. The *IESO* will initiate the execution of the cost recovery agreement upon receiving a request for connection assessment in the applicable format, by sending a proposed agreement, using the appropriate template, to the connection applicant. Since the cost of an ESIA is expected to be significantly less than the deposit amounts established for the SIAs, a deposit is not required for cost recovery agreements. The *connection applicant* is committing, when executing the cost recovery agreement, to pay all costs and expenses incurred by the *IESO* in performing the assessment and preparing the ESIA report.

**Outcome of SIA or ESIA** – The *IESO* conducts an SIA or ESIA within the timeline agreed upon with the *connection applicant*. Upon completion of an SIA or ESIA, the *IESO* issues a final SIA or ESIA report and either an NoCA or NoDR for the Project to the *connection applicant* and *transmitter*.

**SIA or ESIA report public** – Upon completion, the final SIA or ESIA report, excluding any Confidential Appendix, will be posted on the *IESO* website, as described in section 5.9. Any addendum to the final SIA or ESIA report, excluding any Confidential Appendix, will also be posted on the *IESO* website.

**SIA and ESIA invoice** – For ESIA, the *IESO* sends an *invoice* to the *connection applicant* every quarter, if applicable, detailing the total costs and expenses associated with conducting all ESIA for that *connection applicant* in the previous quarter, or quarters, if necessary. For an SIA, the *IESO* sends an *invoice* to the *connection applicant* detailing the total costs and expenses associated with the SIA, which includes any costs the *transmitter* invoiced to the *IESO*. If the total costs and expenses of the SIA are less than the deposit amount, the *IESO* will issue a refund to the *connection applicant*. Any subsequent costs incurred by the *IESO*, e.g. post-SIA (or in the rare occasion, ESIA) changes that result in addenda to the SIA (or ESIA) report, or *IESO* support and participation in regulatory proceedings, will be separately invoiced to the *connection applicant*.

**Post-SIA or ESIA changes following conditional approval** – The *connection applicant* must inform the *IESO* of any change to their Project's design and equipment specifications, which occurred after the conditional approval to connect was granted. The *IESO* will analyze the new Project specifications and indicate if the changes need to be addressed in an addendum to the final SIA or ESIA report. An addendum may also be initiated based on new information provided by the *transmitter* that was not captured in the final SIA or ESIA report or based on new information obtained by the *IESO* that was not reflected in the study assumptions used for the final SIA or ESIA report.

**- End of Section -**

## 3. Management of Connection Assessments

### 3.1 Application Status List

(MR Ch.4 s.6.1.14)

**Status of SIA and ESIA applications list** – A Project will be placed on the [Application Status list](#) on the *IESO* website after the associated SIA agreement or Cost Recovery agreement has been executed by the *IESO*. This list contains all Projects that have an executed SIA agreement or a Cost Recovery agreement.

**Updated monthly** – The list contains SIA and ESIA status information and hyperlinks to final SIA and ESIA reports, excluding any Confidential Appendix, and is updated monthly<sup>13</sup> to reflect new entries and status changes.

**Scope of work and SIA agreement** – Upon receipt of the required deposit and the associated documents, the *IESO* and the *connection applicant* discuss a [Scope of Work](#) and execute an [SIA agreement](#) based on the template located on the *IESO* website. Upon execution of the SIA agreement, the Project is posted on the Application Status list.

### 3.2 Rules of Project Withdrawal

(MR Ch.4 s.6.1.14)

**Summary** – These rules of withdrawal are applicable to *connection assessment* Projects that have executed SIA or Cost Recovery agreements.

1. A Project will be withdrawn if the *connection applicant* submits a [Notification of Withdrawal](#) based on the template listed on the *IESO* website; or
2. A Project that has not achieved the “committed” status, defined in section 3.3 will be deemed by the *IESO* to have been withdrawn if:
  - the *connection applicant* fails to respond to two consecutive requests made by the *IESO* for submission of a Project status report in accordance with section 7;
  - the *connection applicant* fails to notify the *IESO* when meeting milestones described in section 3.4, unless an extension to those milestones is granted;

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<sup>13</sup> The *IESO* targets the beginning of the month to update this list for the previous month. *Connection applicants* with different targets for report *publishing* should contact the *IESO* in advance to arrange for off schedule updates.

- the *connection applicant* or *transmitter* proposes any of the following changes that would have the potential to result in an unacceptable impact on the *reliability* of the *integrated power system*, or an adverse impact on other Projects:
  - a change in *generation unit* or *electricity storage unit* active or reactive output capacity, or an increase in active or reactive peak load;
  - a change in the transmission *facilities* ratings;
  - a modification to the *connection point*, or *connection facilities*;  
or
  - a change to the normal mode of operation of the *connection facilities*.

**Notification of deemed withdrawal** – In all cases listed at item 2 above the *IESO* will issue a Notification of Deemed Withdrawal (IMO\_FORM\_1049) to the *connection applicant*. Upon receiving notification from the *IESO* that the Project was deemed withdrawn, the *connection applicant* may consider submitting a new *request for connection assessment*.

**Responsibility for costs despite withdrawal** – Where a *connection applicant* withdraws or is deemed to have withdrawn its Project in accordance with the provisions of this document, the *connection applicant* remains responsible for any costs and expenses incurred by the *IESO*, as described in section 5.12 for the applicable assessment type.

### 3.3 Committed Projects

**Designation as committed Project** – A committed Project is a Project that has demonstrated to the *IESO* a high probability of being placed into service. Committed Projects will be included, together with all Projects that are in service, at the time of the SIA, in the *basecase* assumptions for the evaluation of all Projects that are not yet committed, irrespective of the SIA status of those Projects. As a result of this inclusion, Projects that are not committed could receive additional requirements for connection or may be deemed withdrawn by the *IESO*, according to section 3.2.

**Criteria for designation as committed Project** – A Project will be deemed by the *IESO* to be a committed Project if:

1. The *connection applicant* provides notification to the *IESO* specifying a defined and future-dated in-service date for the Project;
2. The *connection applicant* provides notification to the *IESO* indicating that Project is actively being completed (i.e. not declared to be “on hold”); and

3. The *connection applicant* provides notification to the *IESO* of one of the following:
- that the *connection applicant* will be compensated with respect to the Project through a power purchase contract with an entity authorized by the *Ontario Energy Board* to purchase and/or sell electricity or *ancillary services* in the *IESO-administered markets* or directly from/to a customer. The *IESO* reserves the right to request information regarding the power purchase contract, as permitted under the terms of the System Impact Assessment Agreement and the *market rules*;
  - that the *connection applicant* will be compensated with respect to the Project through rates set by the *Ontario Energy Board*;
  - that a leave to construct for the Project has been granted by the *Ontario Energy Board*;
  - that the Project has a connection cost recovery agreement (CCRA) in place with the *transmitter*;
  - joint notification with the *transmitter* to the *IESO* indicating the Project will come into service;
  - through the *IESO* Equipment Registration process that the Project has started construction; or
  - (applicable only to Projects in which the *connection applicant* is a licensed *transmitter*) that identifies the Project in its Plans for New or Modified Facilities Information Submittal Form for the Reliability Outlook (IMO\_FORM\_1484) for the Outlook assessment, or Plans for New, Modified or Retiring Transmission Facilities Information Submittal Form for Reliability Assessments (IMO\_FORM\_1494) for other *reliability* assessments.

**Form of notification** – Unless specified otherwise, notifications must be provided in the form of an official letter, signed by the *connection applicant* authorized representative, submitted in electronic format via email to the *IESO* at [connection.assessments@ieso.ca](mailto:connection.assessments@ieso.ca).

**Project status** – The *IESO* will acknowledge that a Project is committed by placing a “Yes” in the “Committed” column of the Application Status list on the *IESO* website. A Project will lose its committed status when the Project is placed in service, is withdrawn by its *connection applicant*, as described in section 3.2, or no longer meets any of the conditions of being committed, in which case it is expected that the *connection applicant* will notify the *IESO*. The *IESO* reserves the right to remove the committed status for a Project should the *IESO* deem that any previously provided notifications are no longer valid based on publicly available information.

## 3.4 Milestones for Projects

(MR Ch.4 s.6.1.14)

**Required milestones** – Other than where the *connection applicant* is a *transmitter*, a Project needs to meet the following milestones to demonstrate ongoing viability and a *connection applicant's* commitment to complete the Project:

1. The *connection applicant* has entered into a CCRA agreement with the *transmitter* within 24 months from receiving the NoCA; and
2. The Project must be in-service within 36 months of signing the CCRA agreement with the *transmitter*.

**Extensions** – If any of these milestones cannot be met due to circumstances beyond the *connection applicant's* control and the *connection applicant* intends to continue the Project, the *connection applicant* must obtain an extension from the IESO by sending a request via email to [connection.assessments@ieso.ca](mailto:connection.assessments@ieso.ca). If an extension is not granted the Project will be deemed withdrawn.

**Notification of completion** – The *connection applicant* must notify the IESO at [connection.assessments@ieso.ca](mailto:connection.assessments@ieso.ca) of meeting the first milestone. Failure to do so in a timely manner may result in the Project losing its committed status and/or being deemed withdrawn.

- End of Section -

## 4. Responsibilities

(MR Ch.4 s.6.1.14)

The *IESO* is responsible for the administration and coordination of the SIA/ESIA portion of the CAA process. Depending on the assessment type, the *connection applicants*, the *transmitter*, the *distributor* and the *IESO* have specific responsibilities as described below.

### 4.1 Connection Applicants

(MR Ch.4 s.6.1.14)

**Summary** – *Connection applicants* are required to:

1. Engage the *transmitter* to establish a mutually agreeable design for their proposed *connection* before initiating the *request for connection assessment*.
2. Initiate the request for connection assessment by submitting a complete CAA application form to the *IESO* and transmitter, as applicable, as described in this document.
3. Submit the required SIA deposit, according to section Required Deposit of this *market manual*.
4. Notify the *transmitter* of the filing of the *request for connection assessment*.
5. Review and provide comments to the *IESO* on the proposed Scope of Work prepared by the *IESO*.
6. Execute with the *IESO*, based on the type of assessment required (i.e. SIA or ESIA), an SIA agreement or a Cost Recovery agreement.
7. Submit responses to *IESO* requests for missing or supplementary information or clarifications.
8. Review and provide comments to the *IESO* on SIA or ESIA reports.
9. Safeguard *confidential information* in SIA and ESIA reports and addendums.
10. Adhere to the timelines stipulated in this document.
11. Submit requests for time extensions, if required.

12. Submit and complete the Consent for Connection Cost Recovery Agreement Status Request when requested by the *IESO*.
13. Pay, upon receipt of an *invoice*, the costs and expenses incurred by the *IESO* and *transmitter* in conducting the SIA or ESIA, and if applicable, in supporting and participating in regulatory proceedings associated with the *connection applicant's* Project.
14. Notify the *IESO* if the *facility* data changes from what was submitted with the CAA application.
15. Provide Project status reports when requested by the *IESO*.
16. Confirm when section 3.4 milestones are met.
17. Notify the *IESO* when any of the conditions for Project committed status as per section 3.3 have been met or changed.

## 4.2 Distributor

(MR Ch.4 s.6.1.14)

**Summary** – The *distributor* is required to:

1. Initiate the request for *connection assessment* for Projects seeking to connect within its *distribution system* that meet the conditions in section 2.1 of this document by submitting a complete CAA application to the *IESO* on behalf of their *distribution* customer.
2. Submit the required SIA deposit, according section Required Deposit of this *market manual*.
3. Review and provide comments to the *IESO* on the proposed Scope of Work prepared by the *IESO* for the *embedded generation facility*, the *embedded electricity storage facility* or *embedded load facility*.
4. Execute with the *IESO*, based on the type of assessment required (i.e. SIA or ESIA) the SIA agreement or the Cost Recovery agreement.
5. Submit to the *IESO* a copy of the *distribution system* Connection Impact Assessment, provided for in the Distribution System Code as part of the CAA application.
6. Submit responses to *IESO* requests for missing or supplementary information or clarification.
7. Provide load forecasts for their load at each *transmission connected* transformer station that supplies their *distribution system* to the *IESO* on request.
8. Review and provide comments to the *IESO* on SIA and ESIA reports.

9. Ensure that, irrespective of their size, *embedded generation facilities* and *embedded storage facilities* connected to their *distribution system* meet the requirements specified in **MR App.4.3**. Additional details about these requirements are available in [Market Manual 1.6](#).
10. Safeguard *confidential information* in SIA and ESIA reports and addendums.

## 4.3 Transmitter

(MR Ch.4 s.6.1.14)

**Summary** – The *transmitter* is required to:

1. Review and accept the *connection* arrangement proposed by the *connection applicant* before the filing of a new *request for connection assessment*.
2. Provide *transmission system facilities* ratings<sup>14</sup> for their *transmission system* to the *IESO* on request.
3. Provide load forecasts for their *connected wholesale customers* and *distributors load facilities* to the *IESO* on request.
4. Assess the expected impact of Project on the *IESO-controlled grid* short circuit levels and protections when requested by the *IESO*.
5. Assess compliance of the Project with the Transmission System Code<sup>15</sup>, to the extent possible, based on the *connection applicant's* submission.
6. Safeguard *confidential information* in SIA and ESIA reports and addendums.
7. Provide the results of the Customer Impact Assessment (CIA), provided for in section 6.4 of the Transmission System Code, to the *IESO*.
8. Communicate and exchange the necessary information, as it pertains to and to facilitate the completion of the SIA or ESIA, with their neighbouring Ontario *transmitter(s)* that may be affected by the *connection* of the Project, in accordance with section 6.8 of the Transmission System Code.
9. Provide details specified in the Consent for Connection Cost Recovery Agreement Status Request, as per section 5.10 as applicable when requested by the *IESO*.

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<sup>14</sup> Includes: line ratings, transformer ratings, circuit breaker ratings, etc.

<sup>15</sup> In the event of any inconsistency between this *market manual* and the Transmission System Code, the Transmission System Code shall prevail to the extent of the inconsistency.



10. Prepare and issue *invoices* to the *IESO* to cover the costs of studies requested by the *IESO*, as applicable.

## 4.4 IESO

(MR Ch.4 s.6.1.14)

**Summary** – The *IESO* is required to perform some or all of the following depending on the assessment type, as applicable:

1. Acknowledge and process all *requests for connection assessment* and related submissions.
2. Inform the *connection applicant* of the assessment type to be followed (i.e. SIA or ESIA).
3. Provide the *connection applicant* a CAA ID number for the Project.
4. Review Project data and issue requests for missing or supplementary information or clarification.
5. Establish the Scope of Work and execute with each *connection applicant*, based on the type of assessment required, an SIA agreement or a Cost Recovery agreement.
6. Place the Project on the Application Status list as described in section 3.1.
7. Respect the time lines agreed to with the *connection applicant*, or otherwise stipulated within this document.
8. Record all costs and expenses incurred in performing all *connection assessment* activities and in supporting and participating in regulatory proceedings associated with the *connection applicant's* Project.
9. Schedule and perform study activities.
10. In consultation with the *transmitter*, prepare and discuss the Scope of Study for short circuit analysis.
11. In consultation with the *transmitter*, request a protection impact assessment.
12. Inform the *connection applicant* and *transmitter* of the SIA's findings, including *transmission system* reinforcement requirements.
13. Issue SIA or ESIA reports to the *connection applicant* and *transmitter*.
14. Safeguard *confidential information* in final SIA and ESIA reports and addendums.

15. If required by applicable standards or *operating agreements*, issue the SIA or ESIA reports to other affected entities.
16. *Publish* the status of SIA/ESIA applications, as described in section 3, and SIA/ESIA reports, excluding any Confidential Appendix, as described in section 5.9.
17. Request that the Consent for Connection Cost Recovery Agreement Status Request be completed by the *connection applicant* and forward a copy to the *transmitter*.
18. Issue a Notification of Conditional Approval or a Notification of Disapproval with Reasons for the Project that was subject to an SIA/ESIA.
19. Support and participate in regulatory proceedings related to the Project.
20. Issue *invoices* pertaining to performing all *connection assessment* activities and in supporting and participating in regulatory proceedings associated with the *connection applicant's* Project,
21. Include committed Projects in the *basecase* assumptions for future *IESO connection assessments* and other *IESO* forecast and *adequacy* studies.
22. Notify the *connection applicant* if study assumptions in the final SIA or ESIA have changed since its release based on new information obtained.

**- End of Section -**

## 5. System Impact Assessment

### 5.1 Objectives

(MR Ch.4 s.6.1.5)

**Purpose** – An SIA is a mandatory phase of the CAA process. SIAs are conducted to determine the impact of Projects on the *reliability* of the *integrated power system* and to identify system upgrades that would be required to mitigate the identified adverse *reliability* impacts. SIAs are conducted with input from the *transmitter* and in consultation with the *connection applicant*.

### 5.2 Scope

(MR Ch.4 s.6.1.5)

**Analysis conducted** – SIAs and ESIA's focus is to identify potential impacts on the *reliability* of the *integrated power system*. Studies are conducted to assess the extent to which all applicable assessment criteria noted in section 1.3 are met, and where this is not the case, to identify the measures required to mitigate any identified deficiency. In an SIA or ESIA, a single Project is assessed to determine the impact of the Project on the *reliability* of the *integrated power system*, and to identify the *transmission system* and Project upgrades required to mitigate any adverse *reliability* impacts.

### 5.3 The Connection Applicant

(MR Ch.4 s.6.1.6)

**Appropriate party** – The following guidelines apply to determine which party is the *connection applicant*:

- The *generator, electricity storage participant, wholesale consumer or distributor* is the *connection applicant*, where it is proposing a new connection to a *transmitter's transmission system* or to modify an existing connection to a *transmitter's transmission system*.
- A *transmitter* is the *connection applicant*, where it is expanding its existing *transmission system* or seeking to connect a new *transmission system*. When a *transmitter* seeks to connect a new *transmission system* to another *transmitter's* existing *transmission system*, modifications are generally needed to the existing *transmission system*. The two *transmitters* that are involved, can opt to both be *connection applicants*, each for the portion of the Project that falls within their ownership, or file a combined CAA

application in which one of them, upon mutual agreement, assumes the role of the *connection applicant*. *Transmitters* are reminded to consider the provisions of section 6.8 of the TSC throughout the CAA process.

- The *distributor* is the *connection applicant*, where a *market participant* or person intends to connect or has connected to its distribution system an embedded *generation facility*, an *embedded electricity storage facility* or an *embedded load facility* that must undergo the CAA process according to section 2.1 of this document. If the new or modified connection is to an embedded *distributor's distribution system*, the host *distributor*, that is a *transmission customer*, is the *connection applicant*.
- A *generator, electricity storage participant* or person that owns a *load facility* that is connected to a *distributor's distribution system* must contact the *distributor* and follow its connection processes. The *distributor* will determine if the project must undergo the CAA process or not and initiate the process accordingly. The *IESO* cannot accept applications directly from proponents seeking to connect within a *distributor's distribution system*.
- The *generator, electricity storage participant* or person that owns a *facility*, that in each case is connected to a *transmitter's transmission system*, is the *connection applicant*, where a third party proposes a new connection or to modify an existing connection within the owner's *facility*. The *IESO* cannot accept applications directly from third parties connecting to or within *facilities* that are not owned by *transmitters*.

For clarifications and situations that are not covered under these guidelines please contact the *IESO* at [connection.assessments@ieso.ca](mailto:connection.assessments@ieso.ca).

## 5.4 Submitting a CAA Application

(MR Ch.4 s.6.1.6)

**Contents of application** – A *request for connection assessment* is initiated by the submission of a CAA application package to the *IESO*, comprised of the completed CAA application form, and the appropriate supporting documentation including a single-line diagram(s). The [CAA application form](#) (refer to Appendix A: Forms) can be downloaded from the *IESO website*. It should be noted that the CAA application form has selectable options for the Project type: *generation* or *electricity storage facilities, transmission facilities, and load facilities*. Once the Project type is selected, the CAA application form will display the technical questionnaires that show the equipment data required to be provided by the *connection applicant*.

**Signing authorities** – Relevant sections of the CAA application form must be completed, signed by an authorized representative of the *connection applicant*, and submitted to the *IESO*. CAA application form from *connection applicants* that are

*market participants* must be signed by an authorized representative that is registered in Online *IESO*. CAA application form from *connection applicants* that are not *market participants* must be signed by an authorized representative of the *connection applicant* that has the authority to bind the organization.

### 5.4.1 Basecase Assumptions

(MR Ch.4 s.6.1.5)

**Facilities and Projects included** – The *basecase* used to perform SIA or ESIA studies includes, in addition to all existing *facilities*, all Projects designated as committed at the time of the assessment with proposed in-service dates prior to and during the study period. The period of study is typically 10 years from the in-service date of the Project that is subject to the SIA.

**Updates required** – The *IESO* may need to confirm in-service dates of other Projects to establish the study assumptions for the *basecase*. These updates will be obtained through requests to *connection applicants* as described in section 7.

### 5.4.2 Other Studies

(MR Ch.4 ss.6.1.5, 6.1.7 and 6.1.14)

**Other studies considered** – *Connection applicants* should make available to the *IESO* any relevant studies that they have undertaken, or which have been undertaken on their behalf. The *IESO* will utilize the study results to the extent possible in preparation of the SIA or ESIA report. Where the *IESO* determines that the study is incomplete or inadequate, it will identify and conduct such further studies and assessments as may be required and will issue its SIA or ESIA report accordingly.

**Requests for additional studies** – The *IESO* reserves the right to request specific studies that are not regularly done by the *IESO* to be performed by the *connection applicant*, and the results to be provided to the *IESO*. In such cases, depending on the nature of those studies, the *IESO* may request the study to be done:

- to support the SIA or ESIA, and the results of the study will be included in the report, or
- as a requirement for connection, to confirm that certain critical assumptions that were made by the *IESO* or provided by the *connection applicant* during the SIA or ESIA are confirmed.

**Inclusion in final report** – The *IESO* may include the *connection applicant's* study results in the final SIA or ESIA report or in an addendum to the final SIA or ESIA report, that could contain additional requirements for connection if some of the assumptions used in the SIA or ESIA are changing, due to the study results.

## 5.5 IESO Study Activities

(MR Ch.4 s.6.1.5)

**Summary** – It is the responsibility of the *IESO* to:

1. Establish *basecase* assumptions.
2. Verify compliance of Projects with the *market rules*, applicable standards and *IESO* policies and procedures.
3. Assess the dynamic performance of the *integrated power system* and the Project using the criteria noted in section 1.3.
4. Assess the expected impact of the Project, using the criteria noted in section 1.3, on:
  - prevailing operating *security limits* and transfer capabilities of the *integrated power system*;
  - operating voltages of the *IESO-controlled grid*;
  - operating flexibility of the *IESO-controlled grid*; and
  - the ability of existing *connections* to deliver to or withdraw power from the *IESO-controlled grid*.
5. Determine the need for additional *facilities* or for modifications to existing *facilities* that may be required to incorporate the Project and mitigate any material adverse impacts on the *reliability* of the *integrated power system*.
6. Provide the *transmitter(s)* with advance notification of SIA or ESIA study results to facilitate completion of the Customer Impact Assessment (CIA) process; and
7. Take into consideration the results of CIA(s) provided by the *transmitter(s)* in formulating *IESO* requirements for system modifications.

### 5.5.1 Required Deposit

(MR Ch.4 s.6.1.15.2)

**Project type** – Other than as approved by the *IESO* Chief Operating Officer (COO) or delegate, the following study deposits are required for SIAs:

**Table 5-1: Study Deposit Amounts**

Type of Project	Amount of Deposit
<i>Load facility</i> or load increase	\$20,000
<i>Generation unit(s)</i> connected to a <i>distribution system</i>	\$20,000

Type of Project	Amount of Deposit
<i>Electricity Storage unit(s) connected to a distribution system</i>	\$20,000
<i>Ancillary services facility</i>	\$20,000
<i>Generation facility connected to the IESO-controlled grid</i>	\$30,000
<i>Electricity storage facility connected to the IESO-controlled grid</i>	\$30,000
<i>Transmission facility</i>	\$40,000

**Final cost** – The above deposits must be remitted against the anticipated cost and expense of the SIA studies for the Project. Final costs are calculated after completion of the SIA, and an *invoice* is issued to the *connection applicant*, as described section 5.9. No guarantee is given that the final costs will be less than the deposit amount.

## 5.6 Missing Information and Information Clarification

(MR Ch.4 s.6.1.14)

**Request for additional information or clarification** – If the *IESO's* review of the submitted CAA application package reveals that any information is missing or requires clarification, the *connection applicant* will receive a request for additional information or clarification.

**Typical values** – If the *connection applicant* cannot provide specific equipment data, the *IESO*, may accept suitable typical values proposed by the *connection applicant* to be used in the study. If typical values are used, *connection applicants* must be aware that they are committing to these values as design specifications, and it is their responsibility to ensure that installed *facilities* have similar or better performance. The *connection applicant* must notify the *IESO* at [connection.assessments@ieso.ca](mailto:connection.assessments@ieso.ca) as soon as they become aware of any changes to the Project scope or data used in the SIA or ESIA assessment. The *IESO* will determine whether these changes require a re-assessment.

## 5.7 SIA Agreement Execution

(MR Ch.4 s.6.1.14)

**Steps** – The execution of an SIA agreement between the *IESO* and the *connection applicant* consists of the following steps:

1. When the *IESO* determines the information contained in the CAA application package is sufficient to produce a draft Scope of Work for the SIA study and the required deposit has been paid, the *IESO* prepares a draft SIA

- agreement and Scope of Work for the SIA study to be presented to the *connection applicant*. This Scope of Work is attached as Schedule 1 to the SIA agreement.
2. The *IESO* sends an undated copy of the SIA agreement, including a proposed Scope of Work, to the *connection applicant*.
  3. The draft SIA agreement and Scope of Work are reviewed by the *connection applicant* and if any discussions are needed, a meeting is scheduled between the *IESO* and the *connection applicant*, normally within ten *business days* of the receipt of the SIA agreement from the *IESO*. Once the draft SIA agreement and Scope of Work are acceptable, the *connection applicant* signs and returns to the *IESO* a signed copy<sup>16</sup> of the SIA agreement.
  4. The *IESO* Chief Operating Officer (COO), or designate, signs the agreement, and assigns a date to the SIA agreement (the agreement execution date).
  5. Normally within 10 *business days* of receipt of the SIA agreement signed by the *connection applicant*, the *IESO* emails the executed and dated SIA agreement to the *connection applicant*.
  6. Any subsequent revisions to Schedule 1 (Scope of Work) that are agreed upon by the *connection applicant* and the *IESO* will be subject to the terms and conditions of the SIA agreement.

## 5.8 Timelines

(MR Ch.4 ss.6.1.14 and 6.1.16.6)

**Individual basis** – The order in which *connection assessments* are conducted will be determined by the *IESO* on an individual basis, in consultation with the *connection applicant*, to meet the needs of both the *connection applicant* and the *IESO*. Considerations will include *reliability* needs, the Project's proposed start of construction date, the Project's proposed in-service date, the Project's equipment procurement timelines and the *connection applicant's* obligations as part of a procurement contract, if applicable. Typical SIA/ESIA and *facility* registration timelines are provided on the [IESO website](#).

**Multiple CAA applications** – In the case where several CAA applications are associated with the same procurement process, the order in which these assessments will be conducted will be based on their executed SIA or ESIA agreement date.

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<sup>16</sup> *IESO* accepts scanned signatures or approved electronic signatures. If the *connection applicant* plans to use an electronic signature, contact the *IESO* to confirm that it is an approved method.



## 5.9 SIA/ESIA Reports

(MR Ch.4 ss.6.1.14 and 6.1.16.2)

**Steps** – The SIA or ESIA report will be sent to the *connection applicant* and the *transmitter* for review. The issuing of the SIA or ESIA report consists of the following steps:

1. A draft SIA or ESIA report will be submitted to the *connection applicant* and to the *transmitter* for review. The *connection applicant* and *transmitter* are expected to review the draft SIA or ESIA report to determine if the information related to the Project and the *transmission system* is accurate and the requirements for connection are well understood. In addition, the *connection applicant* and the *transmitter* are expected to indicate whether the draft report contains commercially sensitive or proprietary information that, in the opinion of the *connection applicant* or *transmitter*, should remain confidential.
2. (If applicable) A revised draft report will be issued by the *IESO* to the *connection applicant* and the *transmitter*. The report will reflect comments received during the draft SIA or ESIA report review, any additional analysis or investigation required as a result of the draft SIA or ESIA report review and, if applicable, preliminary Customer Impact Assessment results.
3. The final SIA or ESIA report, based on the draft or revised draft SIA or ESIA report, whichever is applicable, will be issued to the *connection applicant*, and *transmitter* as an attachment to the Notification of Conditional Approval or the Notification of Disapproval with Reasons. The final report, excluding any Confidential Appendix, will be posted on the *IESO* website, typically at the beginning of the next month. The final report will contain the following information:
  - a high-level description of the Project;
  - the requirements for the Project that must be satisfied before connecting the Project to the *IESO-controlled grid*;
  - if the *IESO* identifies an adverse effect on the *reliability* of the *integrated power system*;
    - a description of such adverse effects;
    - a description of the system upgrades and modifications that are required in order to mitigate such adverse effects;
  - an assessment of whether or not the Project satisfies applicable criteria and, if not, which criteria are not satisfied;

- a description of other inadequacies, if applicable, of the existing power system that were identified in the course of the studies but are not the result of the Project; and
- a summary of relevant study results.

The final SIA or ESIA report may contain information that falls under the definition of *confidential information*, including information that, if disclosed, could reasonably be expected to pose a potential security threat to the *integrated power system*, the *IESO-administered markets*, or those of neighbouring jurisdictions. The *IESO* may place *confidential information* in appendices of the final SIA or ESIA report, which the *IESO*, *connection applicant* and *transmitter* will protect as described in section 8.

4. (If applicable) An addendum to the final SIA or ESIA report may be required if more effective or economic solutions to implement the requirements of the SIA or ESIA are identified by the *connection applicant* or the *transmitter* when the detailed design work is undertaken. Additionally, the *connection applicant* may materially revise the original Project assessed by the *IESO* or the *IESO* may obtain new information due to system changes since the final SIA or ESIA report was issued that were not captured in the study assumptions of the final SIA or ESIA report. In these cases, the *IESO* will consider the proposed changes and will issue an addendum to the final SIA or ESIA report, except when the conditions listed in section 3.2 apply.

## 5.10 Consent for Connection Cost Recovery Agreement Status Request

(MR Ch.4 s.6.1.14)

**CCRA status request form** – If a Project requires a Connection Cost Recovery agreement (CCRA) to be signed with the *transmitter*, the *connection applicant* will be required to complete and sign the “Consent for Connection Cost Recovery Agreement Status Request” form prior to the issuance of the final SIA report. By signing this form, the *connection applicant* allows the *IESO* to request and receive from the *transmitter*:

- the date the *connection applicant* begins discussions with the *transmitter* regarding a CCRA; and
- the date the CCRA is signed by the *transmitter* and *connection applicant*.

The Consent for Connection Cost Recovery Agreement Status request form can be found on the *IESO* website (refer to Appendix A: Forms).

## 5.11 Notification of Conditional Approval or Notification of Disapproval with Reasons

(MR Ch.4 ss.6.1.14, 6.1.16.4 and 6.1.16.5)

**Notification of conditional approval** – If a Project is acceptable to the *IESO*, subject to the implementation of any applicable requirements for connection identified in the final report, a Notification of Conditional Approval of the Project is issued by the *IESO* to the *connection applicant*, and to the *transmitter*.

**Notification of disapproval with reasons** – If there are no feasible system modifications that will mitigate the adverse *reliability* impacts of the Project, the *connection applicant* and the *transmitter* are notified by means of a Notification of Disapproval with Reasons of the Project. The Notification of Disapproval with Reasons of the Project is issued by the *IESO* to the *connection applicant* and to, the *transmitter*.

**Revision or Revocation of notification of conditional approval** – A previously issued Notification of Conditional Approval will be revoked in the event that the *IESO* deems a reassessment is required (i) due to changes to the original Project proposed by either the *transmitter* or the *connection applicant* or (ii) due to new information changing study assumptions of the final SIA report. In the latter case, the *IESO* will notify the *connection applicant* by issuing a Revocation of Notification of Conditional Approval of Connection Proposal letter indicating that the Notification of Conditional Approval has been revoked and that a re-assessment is required.

**Advise the Ontario Energy Board** – The *IESO* will include the relevant information about the result of the SIA or ESIA in its regulatory reporting, in the format required by the *Ontario Energy Board*.

## 5.12 Costs

(MR Ch.4 ss.6.1.14 and 6.1.20)

**Calculation of invoice** – Upon completion of the SIA, the *connection applicant* will receive an *invoice* from the *IESO* to cover the total costs and expenses incurred by the *IESO* and the *transmitter*, if applicable, relating to the processing of the *connection applicant's request for connection assessment*, and to the conduct of the SIA, minus the amount of any deposit paid. If the total costs and expenses are less than the deposit amount, the *connection applicant* will receive a refund for the difference.

**Updates** – The *IESO* will normally update the *connection applicant* during the second and fourth quarters of the year of the estimated assessment costs and expenses incurred to date. The *connection applicant* can then decide whether to continue with the SIA. The costs and expenses provided by the *IESO* will be

backdated two to four weeks due to the *IESO's* internal financial processing schedules.

**Reassessment required** – The *connection applicant* must update its Project information when its design and equipment procurement processes are concluded. Alternatives to the original Project may also be proposed by either the *transmitter* or the *connection applicant*. The *IESO* may also require a re-assessment based on new information obtained by the *IESO* after issuing the Notification of Conditional Approval and the final SIA report. In each of these cases, the *IESO* will study the post-SIA changes and, if applicable, produce any addendum to the final SIA report.

**Invoice for reassessment** – In the cases above, the *connection applicant* will be separately invoiced by the *IESO* for any costs and expenses incurred by the *IESO* in the assessment of alternatives and the preparation of an addendum to the final SIA report. If the *connection applicant* withdraws or is deemed to have withdrawn its Project before the completion of the assessment, the *connection applicant* will receive an *invoice* from the *IESO* to cover the total costs and expenses incurred by the *IESO* in conducting the SIA up to and including the date of the *IESO's* receipt of a Notification of Withdrawal or submission of the Notification of Deemed Withdrawal. The costs and expenses of performing additional SIA studies as a result of the *connection applicant's* withdrawal of its request, up to an amount of \$15,000, will also be invoiced to the *connection applicant*. If the total costs and expenses are less than the deposit amount, the *connection applicant* will receive a refund for the difference.

**Invoice for regulatory proceedings** – The *connection applicant* will be separately invoiced by the *IESO* for any costs and expenses incurred by the *IESO* as the result of the *IESO* supporting and participating in regulatory proceedings associated with the Project.

**- End of Section -**

## 6. Expedited System Impact Assessment

### 6.1 Objectives

(MR Ch.4 s.6.1.5)

**Purpose** – A detailed SIA may not be necessary for Projects that do not represent significant changes and are not expected to have a major impact on the *reliability* of the *integrated power system*. In this case an ESIA, which involves a simple study, will be conducted. The *IESO* will determine whether an SIA or an ESIA is appropriate upon receiving the request for *connection assessment* outlined in section 5.4.

### 6.2 Guidelines for Determining if an ESIA is Appropriate

(MR Ch.4 s.6.1.14)

**Types of eligible projects** – As a guideline, an ESIA will be appropriate for the following Projects. Other Projects of limited complexity not listed here may also qualify for an ESIA. The final determination if a Project qualifies is at the discretion of the *IESO*.

1. Where the electrical characteristics of *generation facilities* or *electricity storage facilities* are modified by less than 10%, do not exceed accepted design standards or tolerances, and are in conformance with **MR App.4.2**;
2. Like-for-like replacement of existing *transmission system facilities* where there is no connectivity change on the system, no new contingencies are created and are not listed in Appendix B;
3. Where the electrical characteristics of a *transmission system facility* are changed by less than 10%;
4. Addition of a *generation unit* or *electricity storage unit* used for load displacement <sup>18</sup> within *load facilities* that are connected to the *IESO-controlled grid* or within *distribution systems* owned or operated by *distributors*;
5. Replacement of existing *generation unit* or *electricity storage unit* controls, including like-for-like replacements of Automatic Voltage Regulators (AVR), excitation systems, governors or power system stabilizers (PSS);

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<sup>18</sup> Load displacement *generation* or *electricity storage units* are often referred to as behind-the-meter.

6. Reactive compensation devices connected at system voltages less than 50 kV (except at the tertiary of a transmission level autotransformer); or
7. Protection changes.

## 6.2.1 Cost Recovery Agreement

(MR Ch.4 s.6.1.14)

**Cost recovery agreement in lieu of deposit** – The *connection applicant* will not be required to submit a deposit for an ESIA but will be required to agree to pay for the total costs and expenses associated with all their ESIA's by signing a Cost Recovery agreement. The *IESO* will execute a Cost Recovery agreement with each unique *connection applicant* before commencing the first ESIA for that *connection applicant*. This Cost Recovery agreement will also cover all subsequent ESIA's initiated by the *connection applicant*.

## 6.3 Costs

(MR Ch.4 ss.6.1.14 and 6.1.20)

**Quarterly invoices** – The *IESO* sends an *invoice* to the *connection applicant* every quarter, if applicable, detailing the total costs and expenses associated with conducting all ESIA's for that *connection applicant* in the previous quarter or quarters.

**Calculation of invoice** – The *invoice* will cover the total costs and expenses incurred by the *IESO* and the *transmitter*, if applicable, relating to the processing of the *connection applicant's request for connection assessment*, and to the conduct of the ESIA.

**Reassessment required** – The *connection applicant* must update its Project information when its design and equipment procurement processes are concluded. Alternatives to the original Project may also be proposed by either the *transmitter* or the *connection applicant*. The *IESO* may also require a re-assessment based on new information obtained by the *IESO* after issuing the Notification of Conditional Approval and the final ESIA report. In each of these cases, the *IESO* will study the post-ESIA changes and, if applicable, produce an addendum to the final ESIA report.

**Invoice for reassessment** – In the cases above, the *connection applicant* will be separately invoiced by the *IESO* for any costs and expenses incurred by the *IESO* in the assessment of alternatives and the preparation of an addendum to the final ESIA report. If the *connection applicant* withdraws or is deemed to have withdrawn its Project before the *invoice* is produced, the *connection applicant* will receive an *invoice* from the *IESO* to cover the total costs and expenses incurred by the *IESO* in conducting the ESIA up to and including the date of the *IESO's* receipt of a

Notification of Withdrawal or submission of the Notification of Deemed Withdrawal. The costs and expenses of performing additional ESIA studies as a result of the *connection applicant's* withdrawal of its request, up to an amount of \$15,000, will also be invoiced to the *connection applicant*.

**Invoice for regulatory proceedings** – The *connection applicant* will be separately invoiced by the *IESO*, if applicable, for any costs and expenses incurred by the *IESO* as the result of the *IESO* supporting and participating in regulatory proceedings associated with the Project.

**- End of Section -**

## 7. Project Status Reporting

(MR Ch.4 s.6.1.14)

**Project Status report form** – All *connection applicants* may periodically be requested by the *IESO* to provide a status report of their proposed connection that is not yet in service with respect to its progress. The [Project Status Report Form](#) can be found on the *IESO* website (refer to Appendix A: Forms).

**Purpose of requests** – Such requests will be made by the *IESO* as often as required to establish *basecase* assumptions for SIAs and ESIA as described in section 5.4.1 of this *market manual* and *reliability* outlook reports as described in **MR Ch.5 s.7**.

**Failure to comply** – Projects for which the *connection applicants* fail to comply with the Project status reporting requirements will be deemed withdrawn by the *IESO* as described in section [3.2](#).

- End of Section -



## 8. Connection Applicant Actions Subsequent to the CAA Process

(MR Ch.2 s.3.1.1)

**Actions subsequent to CAA process** – Following receipt of a Notification of Conditional Approval for a Project from the *IESO*, the *connection applicant* will be required to undertake some or all of the following actions in order to construct and operate a new *generation facility, electricity storage facility, transmission facility, load or ancillary service facility*.<sup>18</sup>

- In accordance with Section 92 of the Ontario Energy Board Act, 1998, the *connection applicant* may be required to seek an order granting leave to construct from the *Ontario Energy Board*.
- The *connection applicant* may be required to enter into an agreement with the *transmitter* to cover the cost of preparing cost estimates for implementing the system modifications required by the *IESO*.
- In accordance with the Transmission System Code, the *connection applicant* may be required to enter into a *connection agreement* with the *transmitter*.
- In accordance with the *market rules* and before the final approval to connect is granted by the *IESO*, the *connection applicant* is required to complete stage 4 (Authorize Market and Program Participation) and stage 5 (Register Equipment) of the [Connecting to Ontario's Power System](#) process in order to connect and participate in one or more of the *IESO-administered markets*. During these stages, *connection applicants* will be required to demonstrate to the *IESO* that all requirements identified in the SIA report have been satisfied.

– End of Section –

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<sup>18</sup> This is included for informational purposes only. Consult the *OEB* if more information is required. The *IESO* does not assume any liability for any changes to the *OEB's* process.

## 9. Technical Feasibility Study (Optional)

**Contact IESO** – Prior to initiating a Technical Feasibility Study (TFS), the prospective applicant should reach out to the connection assessments mailbox to confirm the IESO is accepting applications. At times the IESO may not have the capability to take on TFS study work in lieu of higher work priorities.

**TFS application form** – To initiate a TFS, the TFS applicant completes the appropriate Technical Feasibility Study application form which can be found on the IESO website (refer to Appendix A: Forms).

**Scope of work and TFS agreement** – Upon receipt of the appropriate application, the associated documents and the required deposit, the IESO and the TFS applicant discuss a Scope of Work, including timelines, and execute a [Technical Feasibility Study agreement](#) based on the template located on the IESO website.

**Process** – Following the execution of the Technical Feasibility Study Agreement, the IESO conducts the TFS within the timeline agreed upon. Upon completion, the IESO issues a Technical Feasibility Study Report to the TFS applicant and an *invoice* detailing the total costs and expenses associated with the TFS. If the costs and expenses are less than the deposit amount, the IESO will issue a refund to the TFS applicant.

**TFS not published** – Since the TFS is confidential, the Technical Feasibility Study Report and associated information will not be posted on the IESO website.

### 9.1 Objectives

**Purpose** – A Technical Feasibility Study is an optional study prospective *connection applicants* can request from the IESO. A TFS applicant may request an analysis of several connection options, and therefore, there may be more than one Project being assessed within a TFS. The purpose of the TFS is to:

1. Identify any benefits associated with the Project(s) in addressing an operability or *reliability* issue.
2. Identify general *reliability* and operability concerns on the *integrated power system* associated with the Project(s).
3. Identify considerations, or recommendations with respect to the design of the Project(s) that may address any *reliability* or operability concerns.

When completing the TFS process, it is the responsibility of the TFS applicant to carry out the relevant responsibilities of *connection applicants* as described in section 4. The IESO will also carry out the relevant responsibilities assigned to it as

described in section 4. The exchange of information between the TFS applicant and the *IESO* will follow the methods described in section 1.4.

## 9.2 Scope

**Negotiated scope and timing** – The scope and timing of each TFS will be negotiated with the TFS applicant and will be based on the particular issues and concerns associated with the Project under consideration.

**No Technical Feasibility Study** – The *IESO* will not conduct a TFS for the following instances:

1. a request in which the question(s) have been answered in other *IESO* public studies, product(s), or report(s);
2. a request in which the *IESO* deems to be more suitable in another form of study outside of the CAA process;
3. a request in which the Project(s) is being developed in response to an *IESO* procurement;
4. a request to examine the economic viability of the Project(s); or
5. a request to assess congestion associated with the Project(s).

Accordingly, applicants should not submit a TFS application for any of the above examples. If a TFS application is received for one of the examples listed above, the *IESO* has the right to refuse to perform a TFS.

## 9.3 Consultants – Submitting a Technical Feasibility Study Application

**Submission of application** – A TFS is initiated by the submission of a Technical Feasibility Study Application package to the *IESO*, comprised of the appropriate completed TFS application form, the appropriate supporting documentation including a single-line diagram(s), and the required deposit as described in section 9.3.1. The [Technical Feasibility Study Application Form](#) (refer to Appendix A: Forms) can be downloaded from the *IESO* website. It should be noted that there are specific TFS application forms for *generator connection facilities*, *transmission connection facilities*, *load connection facilities* or *ancillary service facilities*, respectively. To initiate a request for TFS for a new or modified *connection* related to an *electricity storage facility*, the *connection facilities* application form for *generators* is to be used. For *electricity storage facilities* that are not seeking a new or modified connection but are interested in providing *ancillary services*, these *facilities* are to use the Ancillary Services Technical Feasibility Study Application Form. The TFS application package must be submitted as described in section 1.4.

**Signature and deposit** – Relevant sections of the TFS application form must be completed, signed by an authorized representative of the TFS applicant and submitted to the *IESO* with the required deposit.

**Acknowledgement** – By signature, the TFS applicant will be required to acknowledge that the Project will not be developed in response to an *IESO* procurement, adhering to the technical feasibility scope requirement indicated in section 9.2. Upon receipt of a TFS application package and the required deposit, the *IESO* will assign an ID number with the format YEAR-*nnn*, where the first four digits represent the year the TFS application was received, and the three digits following the year are a sequential number. The *IESO* then sends an email to the TFS applicant acknowledging receipt of the TFS application and providing the ID number. The ID number is to be referenced in all subsequent steps in the TS process pertaining to the particular Project.

### 9.3.1 Required Deposit

**Amount of deposit** – A deposit of \$20,000 must be remitted against the anticipated cost and expense of the TFS. Final costs are calculated after completion of the TFS, and an *invoice* is issued to the TFS applicant, as described in section 9.8. No guarantee is given that the final costs will be less than the deposit amount.

**Electronic funds transfer** – TFS applications submitted to the *IESO* with an *electronic funds transfer* will not be processed until the *IESO* confirms that the deposit has been received.

## 9.4 Missing Information and Information Clarification

**Request for more information** – If the *IESO's* review of the submitted material reveals that any information is missing or requires clarification, the TFS applicant will receive a request for additional information or clarification. If the TFS applicant cannot provide specific equipment data, the *IESO*, in consultation with the TFS applicant, may propose suitable typical values to be used in the TFS.

## 9.5 Technical Feasibility Study Agreement Execution

**Steps** – The execution of a TFS agreement between the *IESO* and the TFS applicant consists of the following steps:

1. When the *IESO* determines the information contained in the TFS application package is complete and the required deposit has been paid, the *IESO* prepares the draft Scope of Work for the TFS to be negotiated with the TFS applicant. This Scope of Work is attached as Schedule 1 to the Technical Feasibility Study Agreement.

2. The *IESO* sends an undated copy of the Technical Feasibility Study Agreement, including a proposed Scope of Work, to the TFS applicant.
3. Normally, within 10 *business days* of the receipt of the Technical Feasibility Study Agreement from the *IESO*, the Scope of Work is negotiated between the *IESO* and the TFS applicant. Once the Scope of Work is agreed upon, the TFS applicant prints, signs and returns to the *IESO* a scanned copy<sup>19</sup> of the Technical Feasibility Study Agreement.
4. The *IESO* produces two paper copies of the Technical Feasibility Study Agreement based on the files received from the TFS applicant.
5. The *IESO* Chief Operating Officer (COO), or designate, signs each copy, and assigns a date to the Technical Feasibility Study Agreement (the agreement execution date).
6. Normally within 10 *business days* of receipt of the Technical Feasibility Study Agreement signed by the TFS applicant, the *IESO* mails one copy of the executed and dated Technical Feasibility Study Agreement to the TFS applicant.
7. Any subsequent revisions to Schedule 1 (Scope of Work) that are agreed upon by the TFS applicant and the *IESO* will be subject to the terms and conditions of the Technical Feasibility Study Agreement.

## 9.6 Timelines

The completion date for a TFS is agreed to between the *IESO* and the TFS applicant as part of the Scope of Work. It depends on factors such as the agreed-upon set of study activities, the complexity of the Project, and the availability of *IESO* resources.

## 9.7 Technical Feasibility Study Report

**Content of Technical Feasibility Study Report** – The Technical Feasibility Study Report will provide the following (if applicable):

1. a list of *IESO market rule* and Transmission System Code requirements that need to be satisfied by the Project(s);
2. an examination of existing transmission limitations that may occur in real-time and the impact of the Project(s) on these limitations;

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<sup>19</sup> TSF applicants that require original signatures on the Technical Feasibility Study agreement must mail or courier two signed paper copies to the *IESO* for execution.

3. *reliability* criteria that is/is not satisfied with the Project(s) and possible measures that would need to be implemented by the TFS applicant to ensure that criteria would be met;
4. a description of any benefits and concerns regarding the Project(s) on the operability and *reliability* of the *integrated power system*;
5. a list of any specific issues that require further consideration in a subsequent SIA; and
6. analysis in response to specific technical questions that the TFS applicant may have.

**Exclusions** – The Technical Feasibility Study Report will not provide the following:

1. an economic viability assessment of the Project(s);
2. limit values with respect to network capability to connect *generation*, load, or *electricity storage*;
3. an assessment of the frequency of congestion (if applicable) and whether it is acceptable; or
4. a reassessment of questions that have previously been answered in other *IESO* public studies, products, or reports.

## 9.8 Costs

**Invoice** – Once the Technical Feasibility Study Report has been issued, the TFS applicant will receive an *invoice* from the *IESO* to cover the total costs and expenses incurred by the *IESO* in conducting the TFS. If the total costs and expenses are less than the deposit amount, the TFS applicant will receive a refund for the difference.

**Update** – The *IESO* will normally update the TFS applicant during the second and fourth quarters of the year of the estimated assessment costs and expenses incurred to date. The TFS applicant can then decide whether or not to continue with the TFS. The costs and expenses provided by the *IESO* will be backdated two to four weeks due to the *IESO's* internal financial processing schedules.

**Request for payment** – The *IESO* may request at any time for the TFS applicant to pay amounts owing for the work performed.

**Withdrawal** – If the TFS applicant withdraws or is deemed to have withdrawn its Technical Feasibility Study Application before the completion of the assessment, the TFS applicant will receive an *invoice* from the *IESO* to cover the total costs and expenses incurred by the *IESO* in conducting the TFS up to and including the date of the *IESO's* receipt of a Notification of Withdrawal. If the total costs and expenses

are less than the deposit amount, the TFS applicant will receive a refund for the difference.

**– End of Section –**

## Appendix A: Forms

The following forms, letters and agreements are used in this *market manual*.

**Table A-1: Forms**

Form ID	Form Name
IMO_FORM_1380	Technical Feasibility Study Application – Generation Facilities
IMO_FORM_1381	Technical Feasibility Study Application – Transmission Facilities
IMO_FORM_1052	Technical Feasibility Study Application – Load Facilities
IMO_FORM_1174	Technical Feasibility Study Application – Ancillary Services Facilities
FORM-128	Connection Assessment and Approval Application Form
IMO_FORM_1073	Notification of Withdrawal
IMP_AGR_0001	Technical Feasibility Study Agreement
IMP_AGR_0002	System Impact Assessment Agreement
IMO_FORM_1049	Notification of Deemed Withdrawal
IMO_FORM_1399	Project Status Report
IMO_FORM_1484	Plans for New or Modified Facilities Information Submittal Form for Reliability Outlook
IMO_FORM_1494	Plans for New, Modified or Retiring Transmission Facilities Information Submittal Form for Reliability Assessments
FORM_49	Consent for Connection Cost Recovery Agreement Status Request

**– End of Appendix –**



## Appendix B: Like-for-Like Replacements

An SIA is not required for certain like-for-like replacements of existing equipment, owned by *market participants*, provided the equipment that is subject to the like-for-like replacement qualifies as outlined below and meets the specific equipment requirements and the general requirements in this appendix. If any of the qualifying criteria are not met, the connection assessment process, described in sections 5 or 6 of this *market manual* must be followed.

### B.1 Qualified Equipment

To qualify as a like-for-like replacement for the purposes of this appendix, the following applies:

1. The equipment type must be listed in section B.2 and meet the specific equipment qualifications and requirements in that section.
2. The replacement equipment must have equivalent or better performance specifications than the equipment it replaces, including but not limited to, voltage ratings, current ratings and fault current interrupting capability.
3. Only replacement equipment qualifies. New equipment, irrespective of its complexity, that will be put into service where no such equipment existed previously does not qualify as like-for-like replacement.
4. Protection changes associated with the equipment replacements are not included in this appendix and must follow the process described in section 2.1 of this *market manual*.

### B.2 Specific Equipment Qualifications and Requirements

Like-for-like equipment must have the same or higher: maximum continuous operating voltage, maximum emergency operating voltage, maximum withstand short-circuit capability and continuous and emergency thermal ratings as the equipment it replaces.

Additionally, the replacement like-for-like equipment must not be more restrictive than the series elements it is connected to (e.g. overhead conductor, underground cable, bus section etc.), within its zone of protection. If the existing equipment, that is proposed for replacement, is the most restrictive element in its zone of protection, the like-for-like replacement equipment must be sized in such a way as to match or exceed the next most restrictive element in that zone of protection.

The specific types of equipment, including additional qualifying criteria and requirements, are listed below:

### B.2.1 Circuit Breakers

1. The replacement circuit breaker must have the same, or faster, rated interrupting time as the existing circuit breaker. Additionally, the maximum rated interrupting time must meet the requirements in Appendix 2 of the Transmission System Code (TSC).

### B.2.2 Circuit Switchers

1. The replacement circuit switcher must have the same, or faster, rated interrupting time as the existing circuit switcher.
2. The *market participant* shall ensure that the replacement circuit switchers installed meet the requirements specified in the TSC. In particular, Appendix 1, schedule G, Section 1.5.5 requires that the interrupter and disconnect switch operate independently. Protection systems that trip the interrupter shall simultaneously initiate opening of the disconnect switch. In addition, Appendix 1, schedule G, Section 1.5.6 requires that the direct current voltage supplied to the interrupter and disconnect switch shall be fed from separately fused and monitored direct current supplies: that is, by two direct current cables to the control cabinet.

### B.2.3 Disconnect Switches and Mid-span Openers

1. No additional requirements.

### B.2.4 Low Voltage Capacitors and Low Voltage Reactors

1. Must be installed at a voltage level of 50 kV or less (low voltage).
2. Must not be installed on the tertiary of a transmission level autotransformer (both primary and secondary windings operate at voltage levels higher than 50 kV and are part of a *transmitter's transmission system*).
3. The replacement equipment ratings must not differ by more than 5% from those of the original equipment. In the instance of the replacement device having a higher Mvar rating than the existing device, the following applies:
  - a. A replacement capacitor can be rated up to 10% higher than the existing capacitor, provided it is not more than 5% higher than the largest existing low voltage capacitor at the *facility*.
  - b. A replacement reactor can be rated up to 10% higher than the existing reactor, provided it is not more than 5% higher than the largest existing low voltage reactor at the *facility*, and

- c. Switching of the capacitor or reactor does not result in a voltage change of greater than 4% calculated as follows:

$$\% \text{ Voltage Change} = \text{Mvar} / \text{Short Circuit MVA (at the low voltage bus)}$$

### B.2.5 Load Transformers

These provisions do not apply to:

- a. *Generation* step-up transformers;
  - b. *Transmission* level autotransformers;
  - c. Transformers with the lower voltage winding(s) rated above 50 kV;
  - d. Changes in the transformer connection point;
  - e. Load increases; or
  - f. The addition of a grounding point on the high side of the load transformer replacement(s) that results in a winding configuration of Yg/Yg or Yg/Δ or Yg/Yg/Δ.
1. The *market participant* must ensure that the new load transformers have adequate load supply capability for the load level forecasted for up to 10 years in the future from the date when the replacement transformer is installed.
  2. In the instance when only one transformer is replaced in a Dual Element Spot Network (DESN) *facility*, the *market participant* must ensure the load transformer replacement will not result in impedance imbalance that causes power flow circulation through the load transformers. Should unacceptable power flow circulation occur during operation after the transformer replacement, the low voltage bus tie breaker will be required to operate normally open until the issue is addressed.
  3. The impedance must not change by more than +/- 7.5% (i.e. 0.925 to 1.075) of the existing value.
  4. Consistent with **MR App.4.3**, the *market participant* shall ensure the transformer station has the capability to maintain the power factor within the range of 0.9 lagging and 0.9 leading as measured at the *defined meter point* of the *facility*.

### B.2.6 Unit Refurbishments

These provisions apply to *generation unit* or *electricity storage unit* refurbishments intended to maintain, restore or improve the unit's performance, for units that comply with the current performance requirements of **MR App.4.2**. These

provisions do not apply to units that were approved to connect under an outdated version of **MR App.4.2**, and still have main elements or associated systems that no longer comply with the current performance requirements of **MR App.4.2**. For such units, any non-compliant main element(s) or associated system(s) that are replaced or substantially modified must undergo the SIA process described in sections 5 or 6 of this *market manual*. These provisions are only applicable to:

1. Synchronous unit stator or rotor rewind or refurbishment;
2. Hydro-electric runner replacement;
3. Engine and/or turbine replacement for aero-derivative gas turbines; and
4. Inverter/converter replacement. Note that an SIA is not needed for changes to equipment on the customer side of an inverter/converter, as long as the functionality and performance of the inverter/converter, on the *IESO-controlled grid* side of the inverter/converter, remains unchanged.

### B.3 General Requirements

The *market participant* shall satisfy all applicable requirements specified in the *market rules*, the TSC and *reliability* standards. This section highlights some of the general requirements that are applicable to like-for-like replacements. Failure to meet any of the applicable requirements could result in significant delays to place the modified *facility* in service.

1. The *market participant* must initiate the *IESO's* Market Registration process at least four months prior to the commencement of any *outages* for like-for-like equipment replacement. Once the *IESO's* Market Registration process has been successfully completed, the *IESO* will provide the market participant with a Registration Approval Notification (RAN) document, confirming that the *market participant* is eligible to participate in the *IESO-administered markets* or to cause or permit electricity to be conveyed into, through or out of the *IESO-controlled grid*. For more details about this process, the *market participant* is encouraged to consult [Market Manual 1.5: Market Registration Procedures](#) or to contact *IESO's* Market Registration at [market.registration@ieso.ca](mailto:market.registration@ieso.ca).
2. The *market participant* will be required to provide "as-built" equipment data for their like-for-like replacement during the *IESO's* Market Registration process.
3. *Outages* to perform these replacements must be communicated to the *IESO* via the normal *outage* management process.

4. The *market participant* shall ensure that the equipment replaced like-for-like, meets the voltage requirements specified in sections 4.2 and 4.3 of the Ontario Resource and Transmission Assessment Criteria (ORTAC).
5. According to section 6.1.2 of the TSC, the *transmitter* must ensure that new or modified connections to its transmission system are designed to withstand the fault levels in the area. According to section 6.4.4 of the TSC, if a new or modified connection results in an increased fault level higher than the capability of the equipment subject to like-for-like replacement, the *market participant* must replace that equipment with higher rated equipment capable of withstanding the increased fault level, up to the maximum fault level specified in Appendix 2 of the TSC. It is the *market participant's* responsibility to verify that all equipment and circuit breakers within their facility are appropriately sized for the local fault levels.
6. The *market participant* shall ensure that the connection equipment is designed to be fully operational in all reasonably foreseeable ambient conditions. Failures of the connection equipment must be contained within the *market participant's facility* and have no adverse impact on the *IESO-controlled grid*.
7. The *market participant* shall ensure that the telemetry requirements for their *facility* are satisfied as per the applicable *market rules* requirements. The finalization of telemetry quantities and telemetry testing will be conducted during the *IESO's* Market Registration process.
8. The *market participant* shall ensure that wholesale revenue metering installations comply with **MR Ch.6**. This includes any intermediate stages such as installation of temporary equipment or the use of mobile transformers. For more details, the *market participant* is encouraged to seek advice from their Metering Service Provider (MSP) or from the *IESO* metering group in early stages of the design of their Project.

– End of Appendix –

## Appendix C: System Software Updates

A CAA application is not needed for *generation unit* control system or *electricity storage unit* system software updates at existing *generation facilities* or *electricity storage facilities*, on the condition that the *market participant* performing the update is strictly following the procedure listed in this section. The *market participant* is required to have recorded responses for voltage/ frequency step change tests of the equipment that is subject to software upgrade, before any change is being done to the software. The step change value must have been those approved by the *IESO*.

1. Before the software upgrade is performed, the *market participant* must download all settable parameters of all the equipment they intend to include in the upgrade and save the downloaded file(s) in a secure location. It is crucial to ensure that all parameters that have been customized during commissioning or subsequent field tests and can affect the dynamic response or steady state performance of the *facility* remain unchanged after the software is upgraded.
2. When multiple pieces of equipment of the same type are included in the upgrade, the *market participant* must first perform the upgrade on a single piece of equipment.
3. After upgrade, the *market participant* must download all settable parameters of the equipment and compare against those downloaded before the upgrade. If the software upgrade changed any of those parameters (usually by re-setting them to their default values), the *market participant* must restore the old software, update all parameters that were changed to their pre-upgrade values and contact the manufacturer (software upgrades should not re-set any settable parameters that were previously customized).
4. If the parameters were found to remain unchanged, the *market participant* must perform a reference voltage/ frequency step test and compare the responses with the responses before the upgrade. If the responses are similar and other equipment of the same type within the *facility* is included in the upgrade, the *market participant* can proceed with the next step (otherwise skip to the final step). If the response is different, the *market participant* must restore the old software and contact the manufacturer. The *market participant* must confirm that all settable parameters remained unchanged before placing the equipment back in normal operation.
5. The *market participant* can then perform the upgrade on a cluster of equipment of the same type (e.g. at a feeder level, if the equipment is

- clustered on feeders). After the upgrade, the *market participant* must download all settable parameters of each piece of equipment within the cluster and compare against the values saved before the upgrade. Provided that steps 3 and 4 were successful, if any of the parameters of an individual piece of equipment are found to be different, it could be due to an error during the upgrade or some fault of that particular piece of equipment, so, if possible, the upgrade should be attempted again. If this is not possible, and the second attempt is successful, continue to step 6, otherwise the *market participant* must isolate the equipment and contact the manufacturer.
6. If the parameters were found to remain unchanged, the *market participant* must perform a reference voltage/ frequency step test and compare the responses with the responses before the upgrade. If the responses are similar and there is similar equipment within the *facility* that still need to be upgraded, the *market participant* can proceed with the next step (otherwise skip to the final step). If the response of the cluster is different, the *market participant* must restore the old software on all upgraded equipment and contact the manufacturer. The *market participant* must confirm that all settable parameters remained unchanged before placing the equipment back in normal operation.
  7. The *market participant* can then perform the upgrade on all remaining equipment of the same type, download all settable parameters of each equipment and compare against the values saved before the upgrade. Provided that all previous steps were successful, if any of the parameters of an individual equipment are found to be different, it could be due to an error during the upgrade or some fault of that particular equipment, so, if possible, the upgrade should be attempted again. If this is not possible, and the second attempt is successful, continue to the next step, otherwise isolate the equipment and contact the manufacturer.
  8. If the parameters remained unchanged, the *market participant* must perform a reference voltage/ frequency step test and compare the responses with the responses before the upgrade. If the responses are similar the *facility* can be placed back in normal operation. If the response of the *facility* is different, the *market participant* must restore the old software on all upgraded equipment and contact the manufacturer. Before placing the *facility* in normal operation the *market participant* must confirm that all settable parameters remained unchanged before placing the equipment back in normal operation.
  9. Upon placing the *facility* back in normal operation, the *market participant* must submit the results of the tests described at steps 3 to 8, as applicable, to the IESO at [PAO-PerformanceValidationandModelling@ieso.ca](mailto:PAO-PerformanceValidationandModelling@ieso.ca) in no more than 30 days after the tests were complete.

The software upgrade is considered complete after the *IESO* confirms that all results are satisfactory.

**– End of Appendix –**



## List of Acronyms

Acronym	Term
CAA	<i>Connection Assessment and Approval</i>
CCRA	Connection Cost Recovery Agreement
CIA	Customer Impact Assessment
ESIA	Expedited System Impact Assessment
<i>NERC</i>	<i>North American Electric Reliability Corporation</i>
NoCA	Notification of Conditional Approval
NoDR	Notification of Disapproval with Reasons
<i>NPCC</i>	<i>Northeast Power Coordinating Council</i>
<i>OEB</i>	<i>Ontario Energy Board</i>
SIA	System Impact Assessment
TFS	Technical Feasibility Study
TSC	Transmission System Code

– End of Section –

## List of Defined Terms

Term	Definition
Confidential Appendix	An appendix to the SIA or ESIA that contains <i>confidential information</i> , as further described in section 5.9.
Expedited System Impact Assessment (ESIA)	A type of SIA that only requires a simple study to assess the impact of a new or modified connection to the <i>IESO-controlled grid</i> on the <i>reliability</i> of the <i>integrated power system</i> .
Project	The new or modified <i>connection</i> to the <i>IESO controlled grid</i> that is the object of a <i>request for connection assessment</i> or request for a Technical Feasibility Study, as applicable.
System Impact Assessment (SIA)	A <i>connection assessment</i> that is required prior to the <i>IESO</i> approving a new or modified connection to the <i>IESO-controlled grid</i> .
Technical Feasibility Study (TFS)	A study that an applicant (TFS applicant) may request, and that the <i>IESO</i> may perform, at its discretion, to assess the technical acceptability of a new or modified connection to the <i>IESO-controlled grid</i> and to identify considerations with respect to the connection on the <i>reliability</i> and operability of the <i>integrated power system</i> , as further described in section 9.

– End of Section –



## References

Document ID & Link	Document Title
<a href="#">MDP_RUL_0002</a>	Market Rules for the Ontario Electricity Market
<a href="#">IMO_REQ_0041</a>	Ontario Resource and Transmission Assessment Criteria
N/A	Ontario Energy Board Act, 1998
N/A	Transmission System Code
N/A	Distribution System Code

**– End of Document –**