Market Rule Amendment Proposal

PART 1 – MARKET RULE INFORMATION

Identification No.:	MR-00446-R02			
Subject:	Implementation of the Interim Storage Design			
Title:	Power System Reliability			
Nature of Proposal:	☒ Alteration	☐ Deletion	☒ Addition	
Chapter:	5	Appendix:	Appendix 5.1	
Sections:	Chapter 5: 2.2, 3.2, 3.8, 4.1, 4.5, 4.6, 4.9, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 7.1, 7.2, 7.4, 8.1 10.5A, 11.6, 12.1, 12.2, 12.3 Appendix 5.1: 1.3, 1.4			
Sub-sections proposed for amending:	Various			

PART 2 – PROPOSAL HISTORY

Version	Reason for Issuing	Version Date
1.0	Draft for Technical Panel Review and Comment	September 8, 2020
2.0	Publish for Stakeholder Review and Comment	September 16, 2020
3.0	Submitted for Technical Panel Vote	October 13, 2020

Approved Amendment Publication Date:	
Approved Amendment Effective Date:	

PART 3 – EXPLANATION FOR PROPOSED AMENDMENT

Provide a brief description of the following:

- The reason for the proposed amendment and the impact on the *IESO-administered markets* if the amendment is not made.
- Alternative solutions considered.
- The proposed amendment, how the amendment addresses the above reason and impact of the proposed amendment on the *IESO-administered markets*.

Summary

The market rule changes contained in this proposal are focused on changes required to Chapter 5; Power System Reliability. One of the objects of the IESO is to maintain the reliability of the IESO-controlled grid, and the proposed edits are intended to reflect the obligations electricity storage participants will have in supporting the IESO to meet this object. In a combination of both new sections and additions to existing sections, the edits in this chapter begin by establishing the obligations of the IESO and electricity storage participants. The edits then enable dispatchable electricity storage participants to provide Operating Reserve and certain types of ancillary services. This proposal also extends existing requirements on outages and communication standards to electricity storage participants. For near and long term system planning purposes this proposal includes both the capacity value of storage injections and the additional load of their withdraws. Lastly, edits are proposed to sections 1.3 and 1.4 of Appendix 5.1 to reflect that storage facilities may provide Reactive Support and Voltage Control. While the edits contained in this proposal enable electricity storage over a longer term, note that there are additional requirements to enable this participation for the interim period that are contained in a new section of Chapter 7, which can be found in proposal MR-00446-R04.

Background

The IESO proposes to amend the market rules to address a specific set of barriers to the integration of energy storage resources in the IESO's markets. These barriers within the IESO's purview were identified in the December 2018 IESO report, "Removing Obstacles for Storage Resources in Ontario". Addressing these barriers required changes to both Market Rules and Market Manuals, consistent with one of the report's recommendations that the IESO "should review and amend its market rules, where possible, to clarify the participation of storage resources in IESO-administered markets".

The IESO developed a design to integrate electricity storage resources for an interim and longer term period of time. An interim period was needed to facilitate the near term participation of electricity storage resources until the IESO's scheduling and optimization tool can recognize the unique characteristics of energy storage resources: they participate both as a load and a supply and are limited in each by its state of charge. The suite of changes in MR-00446 are designed to both clarify the participation of storage resources in the interim period and include rules that may not need to change to support the long term design.

Both the interim design for integrating electricity storage resources along with draft market rules were reviewed with stakeholders though the Energy Storage Advisory Group. Feedback has been largely supportive of the proposed amendments. Stakeholders had requested clarifications in a few sections and revisions have been made to reflect this feedback.

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Discussion

Chapter 5

- 2.2.1; Electricity storage is included into the definition of a normal operating state for the IESO-controlled grid.

- 3.2.1; includes electricity storage facilities into a list of resources that the IESO has responsibility to monitor and issue orders, directions or instructions to.

- 3.8; a new section that outlines the obligations of electricity storage participants as it pertains to reliability. The sub-sections in this section are based on section 3.6 which outlines obligations for generation, with some changes to reflect both the injection and withdraws made by storage;

    - 3.8.1 and 3.8.2; These sections introduce the obligations for electricity storage participants and outlines how these obligations shall be fulfilled.

    - 3.8.1.1; outlines requirements for communications in times of emergencies on the IESO-controlled grid.

    - 3.8.1.2; storage providers shall provide information to the IESO on the equipment used.

    - 3.8.1.3; Storage providers shall inform the IESO of any change to their equipment that could have a material effect on the IESO grid or markets. This includes any change that might impact its ability to inject or withdraw energy from the grid, or might impact its state of charge.

    - 3.8.1.4; Storage providers shall notify the IESO if they cannot operate as scheduled.

    - 3.8.1.5; The IESO requires information from storage providers on the maximum capabilities of their equipment to inject energy to facilitate dispatch in an emergency operating state.

    - 3.8.1.6; Electricity storage participants shall comply promptly to directions from the IESO, unless doing so endangers lives, could damage equipment or violate a law.

    - 3.8.1.7; This is similar to 3.8.1.5 only pertains to the maximum capability to withdraw energy.

- 4.1.1; Includes electricity storage facilities in the objectives of the section to ensure adequate capacity.

- 4.5.1; Allows electricity storage resources to provide Operating Reserve, and whose forced outage or performance uncertainty may be a reason for why Operating Reserve is required.

- 4.5.13B; Allows electricity storage facilities that are withdrawing energy to provide Operating Reserve by curtailing those withdraws. Similar to 4.5.13 which allows the same for pumping hydroelectric facilities.

- 4.9.2; The subsections to this section permit the IESO to conduct tests of electricity storage facilities for their ability to provide operating reserve or for those that have been so contracted, their ability to provide reactive support and voltage control (RSVC).

- 6.1.3; Includes electricity storage facilities as resources that may need to have their outages reported and scheduled with the IESO, similar to requirements for generation.

- 6.2.4 ad 6.2.5; Obligates electricity storage facilities over a specified size to provide scheduled outage information for the purposes of supporting the development of the 18-Month Outlook.

- 6.3.6, 6.3.7, 6.3.9, 6.3.10; Allows for an electricity storage participant to arrange replacement energy from an import to support a planned outage request, and outlines the parameters for this to occur.

- 6.4; The IESO may in some cases revoke previous approvals for outage requests, specifically in the case where a transmitter's outage might prevent the delivery of capacity that has been sold as an export; storage capacity has been added to the list of potential capacity exports. Distributors must also report to the IESO outages that potentially constrain an embedded electricity storage facility.

- 6.5; 6.5.1 and 6.5.5 includes electricity storage participants as responsible for providing outage information if requested and the IESO may publish this information.

- 6.6; Electricity storage participants who conduct stability tests that could affect the reliability of the grid are required to notify the IESO. During tests, market participants are to keep the IESO informed of the expected operating facility of the facility.

- 6.7; When an outage has been approved in advance, then this approval is later revoked, an electricity storage participant is entitled to compensation, subject to certain conditions and exceptions.

- 7.1; Electricity storage participants may be required to provide to the IESO their quarterly and daily load forecasts.

- 7.2; IESO load forecasts may be based on data from market participants, including electricity storage participants.

- 7.4; Includes electricity storage participants into the quarterly and daily assessments.

- 8.1; Clarifies that the control actions listed where special protection systems have been installed do pertain to electricity storage facilities.

- 8.4; Under certain conditions, where a Special Protection System is installed and the facility is tripped off-line, the electricity storage participant may be eligible for compensation.

- 10.2; Market Participants that can intentionally and directly interrupt the withdraws by a dispatchable electricity storage facility are required to provide certain notification to the IESO.

- 10.5A; Sets out requirements for storage participants to report and restore abnormal frequency excursions.

- 11.6; Electricity storage participants shall support the emergency system coordinator when IESO operations need to move from the principal control centre.

- 12.1; Sets out requirements for embedded storage participants to have voice communication, monitoring and control equipment as outlined in the appendix of chapter 2.

- 12.2; Includes embedded electricity storage in requirements for voice communication facilities.

- 12.3; IESO energy management system information shall include functions related to control, analysis and scheduling of electricity storage facilities.

Appendix 5.1

- 1.3; Includes electricity storage facilities in requirements for RSVC services, and in 1.3.4A outlines specific services that electricity storage facilities may provide.

- 1.4; Revises title to reflect addition of electricity storage as a resource type.

PART 4 – PROPOSED AMENDMENT

Chapter 5

2.2 Normal Operating State

2.2.1 The *IESO-controlled grid* shall be considered as being in a *normal operating state* when:

2.2.1.3 all other electric plant forming part of, or having or likely to have a material impact on the operation of, the *IESO-controlled grid* is being operated within the equipment ratings defined by the relevant *transmitters*, *generators*, *electricity storage participants*, and *distributors*;

3.2 Obligations of the IESO

3.2.1 The *IESO* shall direct the operations of the *IESO-controlled grid* pursuant to the provisions of all applicable *operating agreements* and shall maintain the *reliability* of the *IESO-controlled grid*. The *IESO's* responsibilities in this regard shall include, but are not limited to, the monitoring of, and the issuing of orders, directions or instructions to *dispatch generation*, *electricity storage facilities*, *dispatchable loads*, distribution *facilities* and transmission *facilities* on the *IESO-controlled grid*.

3.8 Obligations of Electricity Storage Participants (Embedded and Non-embedded)

3.8.1 Each *electricity storage participant* that participates in the *IESO-administered markets* or that causes or permits electricity to be conveyed into, through or out of the *IESO-controlled grid* shall operate and maintain its *electricity storage facilities* and equipment in a manner that is consistent with the *reliable* operation of the *IESO-controlled grid* and shall assist the *IESO* in the discharge of its responsibilities related to *reliability*. Such obligations shall include, but not be limited to, the following:

3.8.1.1 ensuring there are controls, monitoring and secure communication systems to facilitate a manually initiated restoration process in order to assist the *IESO* in the management of a prolonged, major shortage of electrical supply or an extreme disruption to or *emergency* on the *IESO-controlled grid*;

3.8.1.2 providing the *IESO* with functional descriptions, equipment ratings, and operating restrictions for its equipment, as required by the *IESO* to *reliably* operate the *IESO-controlled grid*;

3.8.1.3 promptly informing the *IESO* of any change or anticipated change in the status of any *electricity storage facility* or related equipment that it operates and that is under the *dispatch* control of the *IESO* as described in these *market rules* or of any other change or anticipated change in its *electricity storage facilities* or equipment that could have a material effect on the *IESO-controlled grid* or the operation of the *IESO-administered markets*. Such change shall include, but not be limited to, any change in status that could affect its range of injections and withdrawals of *energy*, *state of charge*, the ability of an *electricity storage unit* to operate with *automatic voltage regulation*, or the availability of an *electricity storage unit* to provide *ancillary services* (unless no application has been made to provide *ancillary services* to the *IESO-administered markets* in respect of a given *electricity storage unit*);

3.8.1.4 promptly informing the *IESO* if any of the *electricity storage facilities* that it operates are unable for any reason to operate in accordance with the schedules determined pursuant to Chapter 7;

3.8.1.5 providing the *IESO* with current information showing the maximum unit capabilities to inject electricity, for each of its *electricity storage units* to facilitate dispatch in an *emergency operating state*. Such maximum unit capabilities shall consist of the maximum amount in MWs that can be injected at that point in time, and for how long, and shall not be limited to the unit capabilities contained in the *offers* submitted for such *electricity storage unit* pursuant to Chapter 7;

3.8.1.6 promptly complying with the *IESO's* directions, including directions to disconnect equipment from the *IESO-controlled grid* for *reliability* purposes, unless the *electricity storage participant* reasonably believes that following the *IESO's* direction poses a real and substantial risk of endangering the safety of any person, damaging equipment, or violating any *applicable law*. In all cases where the *electricity storage participant* does not intend to follow the *IESO's* directions for any such reasons, it shall promptly notify the *IESO* of this fact and shall nonetheless comply with the *IESO's* directions to the fullest extent possible without causing the harms described above; and

3.8.1.7 providing the *IESO* with current information showing the maximum unit capabilities to withdraw energy, for each of its *electricity storage units* to facilitate dispatch in an *emergency operating state*. Such maximum unit capabilities shall consist of the maximum amount in MWs that can be withdrawn at that point in time, and for how long,

and shall not be limited to the unit capabilities contained in the *bids* submitted for such *electricity storage unit* pursuant to Chapter 7;

3.8.2 Each *electricity storage participant* shall carry out its obligations under this Chapter in accordance with all applicable *reliability standards*, subject to the information reporting requirements specified in section 14.1.2.

4. System Reliability

4.1 Objectives

4.1.1 The objective of this section 4 is to set forth the requirements to ensure the availability of sufficient capacity ~~*generation capacity*~~ and *ancillary services* to the *IESO-administered markets.*

4.5 Operating Reserve

4.5.1 *Operating reserve* is capacity that, for any given operating interval or *dispatch interval*, is in excess to that required to meet anticipated requirements for *energy* for that operating interval or *dispatch interval*, and is available to the *integrated power system* for *dispatch* by the *IESO* within a specified time period, such as 10 minutes or 30 minutes. *Operating reserves* may be provided by *generation facilities*, dispatchable *electricity storage facilities*, *dispatchable loads* and *boundary entities* to the extent that each meets the applicable requirements to be a *registered facility* in respect of each category of *operating reserves*. Neighbouring *control areas* may also provide *operating reserve* through simultaneous activation of *operating reserve* and regional reserve sharing programs. *Operating reserve* is required to:

4.5.1.1 cover or offset unanticipated increases in load during a *dispatch day* or *dispatch hour*;

4.5.1.2 replace or offset capacity lost due to the *forced outage* of generation, electricity storage or transmission equipment; or

4.5.1.3 cover uncertainty associated with the performance of *generation facilities*, *electricity- storage facilities* or *dispatchable loads* in responding to the *IESO's dispatch instructions*.

4.5.13B The reduction in load that can be effected by curtailing withdrawals from *electricity storage facilities* is eligible to be treated as *operating reserve* that is synchronized with the *IESO-controlled grid*.

4.9 Auditing and Testing of Ancillary Services

4.9.2 Tests of the *facilities* or *registered facilities* of *ancillary service providers* or of prospective *ancillary service providers* referred to in section 4.9.1 shall include, but not be limited to, testing in the manner set forth in this section 4.9.2, to determine whether the *ancillary service provider* can supply the *ancillary services* which it wishes to supply or has contracted or been registered to supply:

4.9.2.1 the *IESO* may test the synchronized *ten-minute operating reserve* capability of a *generation facility* or an *electricity storage facility* by issuing unannounced *dispatch instructions* requiring the *generation facility* or *electricity storage facility* to ramp up or reduce demand, in either case to its ten-minute capability;

4.9.2.2 the *IESO* may test the non-synchronized *ten-minute operating reserve* capability of a *generation facility*, *electricity storage facility* or *dispatchable load* by issuing unannounced *dispatch instructions* requiring the *generation facility*, *electricity storage facility* or *dispatchable load* to come on line and ramp up or to reduce *demand*, in either case to its ten-minute capability;

4.9.2.3 the IESO may test the *thirty-minute operating reserve* capability of a *generation facility*, *electricity storage facility* or *dispatchable load* by issuing unannounced dispatch instructions requiring the *generation facility*, *electricity storage facility* or *dispatchable load* to come on line and ramp up or to reduce *demand*, in either case to its thirty-minute capability;

4.9.2.5 the *IESO* may test the *reactive support and voltage control* that has been contracted from a *registered facility* that is a *generation facility* or *electricity storage facility* by issuing unannounced *dispatch instructions* requiring the *generation facility* or *electricity storage facility* to provide such support within its contracted capability; and

6. Outage Coordination

6.1 Introduction

6.1.3 The *IESO* shall develop, and include in the applicable *market manual*, a full list of the equipment and *facilities* the *outage* of which must be reported to and scheduled with the *IESO* in accordance with this section 6. The *IESO* shall use as the basis for including *facilities* and equipment on this list that any change or

anticipated change to the *facilities* or equipment could have a material effect on the value of an operating *security limit*, the *reliable* operation of *IESO-controlled grid* or operation of the *IESO-administered markets*, including, but not be limited to, the following:

6.1.3.1 *facilities* forming part of the *IESO-controlled grid*;

6.1.3.2 *generation facilities*, *electricity storage facilities* and auxiliary equipment connected to the *IESO-controlled grid* or in respect of which a *generator* or *electricity storage participant* is participating in the *real-time markets*;

Transmitter, ~~and~~ Generator and Electricity Storage Participant Obligation to Provide Planned Outage Information for 18-Month Assessments

6.2.4 To support the 18-month assessments referred to in section 7.3.1.2, and subject to section 6.2.5, for those *facilities* and equipment on the list developed in accordance with section 6.1.3, *transmitters*, ~~and~~ *generators* and *electricity storage participants* shall, as frequently as may be necessary to maintain the accuracy of the information provided, report to the *IESO* the *outage* plans for transmission *facilities* forming part of the *IESO-controlled grid* and for *generation facilities* or *electricity storage facilities*, respectively, as follows:

6.2.4.1 for *outages* starting 3 months or more in the future, those with a scheduled duration of 5 days or more; and

6.2.4.2 for *outages* starting less than 3 months in the future, those with a scheduled duration of 4 hours or more.

Exclusions of Outages for Generation Facilities or Electricity Storage Facilities

6.2.5 Notwithstanding any other provision of section 6, *outages* to the following *generation facilities* or *electricity storage facilities* do not need to be reported to support the 18-month assessments referred to in section 7.3.1.2:

6.2.5.1 in the case of all *generators*, *generation facilities* having a *capacity* of less than 20 MW; ~~or~~

6.2.5.2 in the case of a *generator* whose total available capacity inside the *IESO control area* exceeds 4000 MW, *generation facilities* that represent less than 0.5 percent of the total *capacity* of such *generator*, unless the *generation facilities* have been identified by the *IESO* as affecting the *reliability* of the *IESO-controlled grid*. The *IESO* shall notify the relevant *generators* of any *generation facilities* so identified; or

6.2.5.3 in the case of all *electricity storage participants*, *electricity storage facilities* with an *electricity storage facility size* of less than 20 MW.

6.3 Outage Scheduling with the IESO

Replacement Energy to Support Planned Outages

6.3.6 A *generator* or *electricity storage participant* may, no later than the time specified in section 6.4.1, in requesting a *planned outage* in accordance with section 6.3.1, notify the *IESO* that the *generator* or *electricity storage participant* shall arrange replacement *energy offers* in the form of an import to support the *outage* request. A *generator* or *electricity storage participant* may, when requesting an extension to an *outage* under section 6.4.7 or resubmitting an *outage* under section 6.4.10, notify the *IESO* that the *generator* or *electricity storage participant* shall arrange replacement *energy offers* in the form of an import to support the *outage* extension or resubmission. For certainty, this section shall not under any circumstances impose any explicit or implicit obligation on either a *generator* or *electricity storage participant* to so notify the *IESO*, or if so notified, the *IESO* to approve or accept any such arrangement. Upon notice to the *IESO*, a *generator* or *electricity storage participant* may withdraw the arrangement for replacement *energy offers* at any time up to final approval of the *outage* or up to the final approval of the extension to or resubmitting of the *outage*.

6.3.7 The *generator* or *electricity storage participant* shall provide the following information to the *IESO* when in accordance with section 6.3.6 it either submits a *planned outage* request or requests the extension to or resubmission of an *outage*

6.3.9 The *IESO* may specify and inform the *generator* or *electricity storage participant* of the minimum amount of replacement *energy* in megawatts and the duration of *offers* necessary to support the *planned outage* request or the request for the extension to or rescheduling of the *outage*.

6.3.10 If the *registered market participant* associated with a *registered facility* that is a *boundary entity* referred to in section 6.3.7.2 fails to submit *offers* for the replacement *energy*, that have been arranged by the *generator* or *electricity storage participant*, the *generator* or *electricity storage participant* shall be subject to the financial penalties calculated in accordance with the provisions of section 6.6.8 of Chapter 3.

6.4 Submission of Outage Schedules and IESO Approval of Outage Schedules

6.4.4A The *IESO* may refuse to provide *advance approval* to a *transmitter's planned outage* if:

6.4.4A.1 the *transmitter's planned outage* is to a *connection facility* that would prevent the delivery of electricity to the *IESO-controlled grid* from a *generation unit* or *electricity storage unit* that has committed capacity to

an external *control area* in accordance with section 20.2 of Chapter 7;

6.4.9.3 the *transmitter's planned outage* is to a *connection facility* that would prevent the delivery to the *IESO-controlled grid* of electricity from a *generation unit* or *electricity storage unit* that has committed capacity to an external *control area* in accordance with section 20.2 of Chapter 7; and

6.4.12 Each *distributor* shall, in reporting to the *IESO* pursuant to sections 6.2 and 6.3, identify to the *IESO* any *outages* that potentially constrain an *embedded generator* or an *embedded electricity storage facility* that is connected to its *distribution system*.

6.5 Information

6.5.1 Each *transmitter*, ~~and~~ each *generator* and each *electricity storage participant* shall provide to the *IESO* such *outage* information as may be requested by the *IESO* to enable the *IESO* to review and schedule *outages*.

6.5.5 The *IESO* shall *publish generator outage* information aggregated by fuel type based on information provided to it by *market participants* and may also *publish* the *outage* information for *electricity storage participants*.~~.~~

6.6 Tests

6.6.3 Tests covered by the requirements of this section 6.6 shall include, but are not limited to:

6.6.3.2 stability tests of *generation facilities*, *electricity storage facilities*, and transmission *facilities*;

6.6.7 During performance testing, a *market participant* shall keep the *IESO* informed of the expected operating capability of the *market participant's generation facility* or *electricity storage facility* using the outage management process as specified in the applicable *market manual*.

6.7 Compensation

Revoke Advance Approvals or Recalls

6.7.2 *Generators*, *electricity storage participants*, *distributors* or *wholesale consumers* whose *outages* have *advance approval* revoked or have *outages* recalled by the *IESO* shall, subject to the exceptions defined in sections 6.7.3A and 6.7.3B, be entitled to compensation for out-of-pocket expenses associated with such revocation or recall only if:

6.7.3A A *market participant* shall not be entitled to compensation under section 6.7.2 with respect to a *planned outage* of its *generation facility* or *electricity storage facility* that received a *quarterly advance approval* or *weekly advance approval* and that *advance approval* was subsequently revoked by the *IESO* if:

6.7.3A.1 the *IESO* revoked the *advance approval* as a result of a *forced outage* of another *generation facility* or *electricity storage facility* with the same *registered market participant* as the *generation facility* or *electricity storage facility* that was the subject of the *planned outage* and the *forced outage* occurred before 16:00 E.S.T. on the third *business day* prior to the scheduled start of the *planned outage*; or

6.7.3A.2 the *advance approval* was revoked as a result of a delayed return to service from a *planned outage* or *forced outage* of another *generation facility* or *electricity storage facility* with the same *registered market participant* as, respectively, the *generation facility* or *electricity storage facility* that was the subject of the *planned outage*.

6.7.4 The out-of-pocket expenses claimed by *generators*, *electricity storage participants*, *distributors* or *wholesale consumers* pursuant to section 6.7.2 shall be subject to verification and audit by the *IESO* and shall, where paid, be recovered by the *IESO* in accordance with section 4.8 of Chapter 9.

6.7.5 A *generator*, *electricity storage participant*, *distributor* or *wholesale consumer* shall not be entitled to compensation for any costs, expenses, losses or damage associated with an *outage* which has been rejected by the *IESO* provided that, in exceptional circumstances and where a *generator*, *electricity storage participant*, *distributor* or *wholesale consumer* has suffered substantial financial harm as a direct result of such rejection, the *generator*, *electricity storage participant*, *distributor* or *wholesale consumer* may request that an *arbitrator* be appointed pursuant to section 2 of Chapter 3 to determine whether and the amount of any compensation which the *generator*, *electricity storage participant*, *distributor* or *wholesale consumer* shall be entitled to recover as a result of the rejection of the *outage* by the *IESO*. In the case of *generators*, and *electricity storage participant*, no such compensation shall be recoverable under this section 6.7.5 unless the *generator* or *electricity storage participant*, demonstrates that the amount claimed cannot be recovered through *market prices*.

7. Forecasts and Assessments

7.1 Forecasts Prepared by the IESO

7.1.6 If required by the *IESO* for the purpose of enabling the *IESO* to produce the forecasts referred to in section 7.1.1, each *electricity storage participant* shall

provide to the *IESO* the load forecasts described in the applicable *market manual* in such form, at such time and having such resolution as may be specified in such *market manual*.

7.1.6 If required by the *IESO* for the purpose of enabling the *IESO* to produce the forecasts referred to in section 7.1.1, each *electricity storage participant* shall provide to the *IESO* the load forecasts described in the applicable *market manual* in such form, at such time and having such resolution as may be specified in such *market manual*.

7.2 Basis for IESO Forecasts

7.2.1 The *IESO* shall develop forecasts of peak *demand* and *energy demand*, by area, that are based on, but potentially differ from, the forecasts provided to it by *distributors*, other load-serving entities and *connected wholesale customers* pursuant to sections 7.1.5, and if required, 7.1.6, ~~,~~ and which account for the *demands* of loads not required to make forecasts. These forecasts shall be developed on an area basis, as required to meet the purposes of these forecasts.

7.4 Purpose of Assessments

7.4.2 The *IESO* shall conduct the quarterly assessments referred to in section 7.3.1.2 to:

7.4.2.1 provide forecasts, by month, of expected *demand*, *generation capacity*, *electricity storage capacity* and transmission capacity, *energy* capability of *generation facilities* and *electricity storage facilities*, and the possibility of any *security*-related events on the *IESO-controlled grid* that could require contingency planning by *market participants* or by the *IESO*;

7.4.2.2 allow the *IESO* to identify exigencies potentially impacting on the coordination of *outages* that could give rise to shortfalls in *generation capacity* and *electricity storage capacity* and thus provide information by which *market participants* could act to reschedule *outage* plans to avoid such projected shortfalls; and

7.4.4 The *IESO* shall conduct the daily assessments referred to in section 7.3.1.4 to:

7.4.4.1 provide forecasts of:

7.4.4.1.1 expected hourly *demand*, *generation capacity*, *electricity storage capacity*, *energy* capability of *generation facilities* and *electricity storage facilities*, exports and imports of *energy*, and *operating reserve* requirements;

8. Special Protection Systems (SPS)

8.1 Objectives

8.1.1 *Special protection systems* ("*SPS*") have been installed in a number of locations on the *IESO-controlled grid* which automatically initiate one or more of the following control actions:

8.1.1.1 load rejection;

8.1.1.2 generation rejection;

8.1.1.3 generation runback;

8.1.1.4 shunt capacitor switching;

8.1.1.5 shunt reactor switching; and

8.1.1.6 cross-tripping.

For further certainty, any of the control actions listed above may be applied by the *IESO* to *electricity storage facilities* if and as applicable.

8.4 Responsibilities of Market Participants Whose Facilities Form Part of an SPS

8.4.1 A *market participant* with a *dispatchable generation facility* or a *dispatchable electricity storage facility* that is not a *quick start facility* and that is part of an *SPS* may, in the time and manner specified in the applicable *market manual*, apply to the *IESO* for compensation, if that *facility* is tripped offline as a result of the activation of the *SPS*. The amount of compensation that may be claimed shall be determined in accordance with the applicable *market manual* and shall be the equivalent of up to the first two hours of constrained off congestion management *settlement* credit payments that would otherwise be calculated if the *facility* had been constrained down to zero and its circuit breaker had remained closed.

10.2 Demand Control Initiated by a Market Participant

10.2.1 *Market participants* shall notify the *IESO* of any action initiated by them to control *demand* in accordance with this section 10.2.

10.2.2 Each *market participant* that can intentionally and directly cut *dispatchable load* or the withdrawals by a dispatchable *electricity storage facility* shall provide the following information to the *IESO*:

10.2.2.1 the proposed date, time, and duration of the cuts by *connection point* on the *IESO-controlled grid*, by hour;

10.2.2.2 the proposed MW reduction of *demand* by *connection point* on the *IESO-controlled grid*, by hour; and

10.2.2.3 the details of the actual decrease in *dispatchable load* or the withdrawals by a dispatchable *electricity storage facility* that was achieved.

10.5A Electricity Storage Participant Obligations During Abnormal Frequency

10.5A.1 Abnormal frequency excursions on the *IESO-controlled grid* may require immediate actions by *electricity storage participants* to restore the frequency to an acceptable level.

10.5A.2 An *electricity storage participant* that observes a frequency excursion greater than 60.2 Hz or less than 59.8 Hz shall immediately report this condition to the *IESO* and shall carry out frequency restoration actions as directed by the *IESO*.

10.5A.3 No *electricity storage participant* shall be precluded by the restoration actions referred to in section 10.5A.2 from taking action for the purpose of ensuring the safety of any person, preventing the damage of equipment, or preventing the violation of any *applicable law*. Any such directives shall be immediately reported to the *IESO*.

11.6 Emergency Facilities

11.6.3 During the interval between the evacuation of the *IESO' s* principal control centre and the establishment of a backup control centre:

11.6.3.1 the *IESO* shall designate an interim emergency system coordinator to act in its stead, as required; and

11.6.3.2 all *generators*, *electricity storage participants* and *transmitters* shall manage their *facilities* and support the emergency system coordinator in the operation of the *IESO-controlled grid*.

12. Communications

12.1 Communication Methods

12.1.1 Communication between the *IESO* and:

12.1.1.1 *market participants*;

12.1.1.2 *embedded generators* required by Appendix 2.2 of Chapter 2 to provide or install and maintain voice communication facilities, facilities relating to monitoring and control or both; ~~and~~

12.1.1.3 *embedded load consumers* required by Appendix 2.2 of Chapter 2 to provide or install and maintain voice communication facilities, facilities relating to monitoring and control or both; and

12.1.1.4 *embedded electricity storage participants* required by Appendix 2.2 of Chapter 2 to provide or install and maintain voice communication facilities, facilities relating to monitoring and control, or both;

shall take place through a combination of methods as identified in Appendix 2.2 of Chapter 2 and as directed by the *IESO* pursuant to section 12.2.3.2.

12.2 Voice Communication

12.2.3 Each *market participant*, *embedded generator*, *embedded electricity storage participant* and *embedded load consumer* shall provide and maintain:

12.2.3.1 the applicable voice communication facilities required by Appendix 2.2 of Chapter 2 and that meet the requirements of that Appendix; and

12.2.3.2 such additional or other voice communication facilities as the *IESO* may direct in respect of *facilities* that the *IESO* considers to be significant for purposes of maintaining the *reliability* of the *IESO-controlled grid*.

12.3 Electronic Data

12.3.1 Energy management system (EMS) information shall be exchanged between the communication system of the *IESO* and the communication system of each *market participant* in order to support real-time functions such as:

12.3.1.1 the monitoring of the *IESO-controlled grid*;

12.3.1.2 the control and analysis of *generation facilities* and *electricity storage facilities*;

12.3.1.3 an analysis of the *security* of the *IESO-controlled grid*;

12.3.1.4 the scheduling of *generation facilities* and *electricity storage facilities*;~~;~~

12.3.1.5 the monitoring of compliance with *dispatch instructions*; and

12.3.1.6 [Intentionally left blank]

12.3.1.7 reports.

12.3.3 For the exchange of schedules referred to in Chapter and of *outage* and planning data between *market participants* and the *IESO*, a computer path distinct from the EMS path shall be used. Communications shall occur over separate data links using a different protocol than that used for EMS information. Real-time *dispatch instructions* for *generation facilities*, *electricity storage facilities*, ~~-~~transmission *facilities* and load shall be communicated electronically through the EMS path and shall be integrated with the EMS messaging system for logging purposes.

Appendix 5.1

1.3 Reactive Support and Voltage Control – Generation and Electricity Storage Facilities

1.3.1 All *registered facilities* that are *generation facilities* or *electricity storage facilities* providing *reactive support service* and *voltage control service* must be capable of meeting the requirements specified in Chapter 4.

1.3.2 Subject to section 1.3.6, *automatic voltage regulators* shall be in service and in automatic mode as indicated in Chapter 4 unless the *registered* facility that is a *generation facility* or *electricity storage facility* is specifically directed by the *IESO* to operate the *AVRs* in manual mode.

1.3.3 Subject to section 1.3.4, *registered* facilities that are *generation facilities* or *electricity storage facilities* providing *reactive support service* and *voltage control service* shall be operated to within the standard power factor range described in Appendix 4.2 of Chapter 4.

1.3.4 The *IESO* may direct a *registered facility* that is a *generation facility* providing *reactive support service* and *voltage control service* to operate in an under- or over-excited state for a certain period of time in order to maintain prescribed voltages on the *IESO-controlled grid*. Such direction may require such *registered facility* to operate in the condense mode or to reduce real power output in order to increase its ability to provide reactive power.

1.3.4A The IESO may direct a *registered facility* that is an *electricity storage facility* to provide *reactive support service* and *voltage control service* to absorb reactive power or inject reactive power for a certain period of time in order to maintain the prescribed voltages on the *IESO-controlled grid*. If applicable and required, the IESO may direct such *registered facility* to reduce the withdrawal or injection of active power in order to increase its ability to provide reactive power.

1.3.5 Unless otherwise specified by the *IESO*, each *registered facility* that is a *generation facility* or *electricity storage facility* providing *reactive support service* and *voltage control service* shall respond to voltage or reactive power schedules immediately following receipt of the *IESO's* request. Where such *registered facility* cannot be *dispatched* as directed by the *IESO*, the *ancillary service provider* shall immediately provide the *IESO* with notice to this effect.

1.3.6 Each *ancillary service provider* shall:

1.3.6.1 notify the *IESO* immediately upon the *forced outage* of the *AVR* at its *registered facility* that is a *generation facility* or *electricity storage facility* being forced out of service; or

1.3.6.2 for *planned outages*, prior to the *AVR* being removed from its *registered facility* that is a *generation facility* or *electricity storage facility* for maintenance, follow the procedures outlined in section 6.

1.3.7 Following a *contingency event*, each *registered facility* that is a *generation facility* or an *electricity storage facility* shall automatically respond to provide or absorb the reactive power in accordance with the established maximum and minimum reactive power capabilities of such *registered facility*. Each *ancillary service provider* shall immediately notify the *IESO* whenever its *registered facility* that is a *generation facility* or an *electricity storage facility* cannot perform to the established maximum and minimum reactive power capabilities of such *registered facility*.

1.4 Reactive Support and Voltage Control – ~~Non-Generation~~ Facilities that are neither Generation nor Electricity Storage