Market Rule Amendment Proposal Form

Part 1 - Market Rule Information

Identification No.:	MR-00456-R01
Subject:	Market Renewal Program: Settlements and Billing – Chapter 9 Appendices
Title:	Market Renewal Program: Settlements and Billing – Chapter 9 Appendices
Nature of Proposal:	☒ Alteration ☒ Deletion ☒ Addition
Chapter:	Chapter 9
Appendix:	Appendix 9.1: VEE Process, Appendix 9.2 (NEW): Data Inputs and Variables, Appendix 9.3 (NEW): Pseudo-Unit Translation, and Appendix 9.4 (NEW): Settlement Mitigation
Sections:	
Sub-sections proposed for amending:	
Current Market Rules Baseline:	

Part 2 - Proposal History

Version	Reason for Issuing	Version Date
1.0	Draft for Stakeholder Review	December 1, 2022
2.0	Draft following Stakeholder Review Period	April 24, 2023

Version	Reason for Issuing	Version Date

Approved Amendment Publication Date:

Approved Amendment Effective Date:

Part 3 - Explanation for Proposed Amendment

Provide a brief description that includes some or all of the following points:

- 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

Background

Discussion

Part 4 - Proposed Amendment

Appendix 9.1 – VEE Process

1.1 Introduction and Interpretation

1.1.1 This Appendix sets forth the obligations of the *IESO* and of *metered market participants* with respect to the validation, estimation and editing of *metering data*.

~~1.1.2 [Intentionally left blank – section deleted]~~

1.1.~~3~~2 For the purposes of this Appendix, a reference to an interval means:

1.1.~~3~~2.1 in the case of a *metering installation* that collates *metering data* by *metering intervals*, a *metering interval*; and

1.1.~~3~~2.2 in all other cases, such multiple of *metering intervals* for which the *metering installation* collates *metering data*.

1.2 Manner of Data Collection by the IESO

1.2.1 The *IESO* shall collect or receive *metering data* for *settlement* purposes using, in respect of a given ~~*RWM*~~*registered wholesale meter*, one or more of the following methods as may be applicable:

1.2.1.1 electronic access to the ~~*RWM*~~*registered wholesale meter* as described in ~~Chapter~~MR Ch.6;

1.2.1.2 a wide area network; or

1.2.1.3 such manual collection method as may be required to resolve a trouble call in respect of the ~~*RWM*~~*registered wholesale meter*.

1.3 Obligation of the Metered Market Participant to Provide Data

1.3.1 Each *metered market participant* shall, for each ~~*RWM*~~*registered wholesale meter* in respect of which it is the *metered market participant* and that is a *main/alternate metering installation*, provide to the *IESO*, for validation purposes, *metering data* from each of the main *meter* and the alternate *meter* in accordance with the provisions of ~~Chapter~~MR Ch.6 and the *VEE standard*.

~~1.3.2 [Intentionally left blank – section deleted]~~

~~1.3.3 [Intentionally left blank – section deleted]~~

1.3.~~4~~2 Each *metered market participant* shall, for each ~~*RWM*~~*registered wholesale meter* in respect of which it is the *metered market participant* and that is a *single metering installation*, provide to the *IESO*, for validation purposes:

1.3.~~4~~2.1 *metering data* from the *meter* in accordance with the provisions of ~~Chapter~~MR Ch.6 and the *VEE standard*; and

1.3.~~4.~~2.2 the validation criteria for *single metering installations* set forth in section 2.4 of the *VEE standard*.

1.4 Automated Processes and Trouble Calls

1.4.1 The validation and estimation procedures described in this Appendix 9.1 shall be effected by means of automated processes following the collection or receipt of *metering data* by the *IESO's* automated systems.

1.4.2 Where the *metering data* from any *meter* in ~~an *RWM*~~a *registered wholesale meter* is unavailable or fails to successfully pass the validation procedures referred to in:

1.4.2.1 sections 1.5.1 and, where applicable, 1.5.2; or

1.4.2.2 sections 1.6.1 and, where applicable, 1.6.2,

as the case may be, the *IESO* shall:

1.4.2.3 issue a trouble call to the *metering service provider* for the *metering installation* to which the *metering data* relates; and

1.4.2.4 notify the *metered market participant* for the *metering installation* of the issuance of the trouble call.

1.4.3 A *metering service provider* to whom a trouble call has been issued pursuant to section 1.4.2.3 shall respond to and resolve the trouble call in accordance with the requirements of ~~sections~~MR Ch.6 ss.11.1.2.1 and 11.1.2.2~~ of Chapter 6~~.

1.4.4 A *metering service provider* that has resolved a trouble call issued pursuant to section 1.4.2.3 shall:

1.4.4.1 so notify the *IESO*;

1.4.4.2 provide the *IESO* with a written description of the cause of and the actions taken to resolve the trouble call; and

1.4.4.3 where applicable, provide to the *IESO* a request for an adjustment to the *metering data* that was the subject of the trouble call, together with auditable documentary justification for the adjustment,

in accordance with the requirements of the *VEE standard* and in such form and manner as may be required by the *IESO*.

1.5 Validation, Estimation and Editing: Main/Alternate Metering Installation

1.5.1 The following validation procedures shall be conducted, in accordance with the *VEE standard*, by the *IESO's* automated validation process in respect of each ~~*RWM*~~*registered wholesale meter* that is a *main/alternate metering installation* to the extent permitted by the configuration of such *metering installation*:

1.5.1.1 determine whether any *metering data* has failed to be delivered to or received by the *IESO* from each of:

a. the main *meter*; and

b. the alternate *meter*,

in the manner and at the time required by these *market rules* and the intervals for which such *metering data* is missing;

1.5.1.2 test current and voltage data, if it has been provided;

1.5.1.3 conduct the data transmission/multiplier verification;

1.5.1.4 test for synchronization of the clock in each of:

a. the main *meter*; and

b. the alternate *meter*,

against the standard of accuracy described in ~~section~~MR Ch.6 s.11.2.2 ~~of Chapter 6~~;

1.5.1.5 test for replacement of the *data logger* in each of the main *meter* and the alternate *meter*;

1.5.1.6 monitor error messages, flags and alarms received from each of:

a. the main *meter*; and

b. the alternate *meter*; and

1.5.1.7 compare the *metering data* collected or received from the main *meter* with the *metering data* collected or received from the alternate *meter*.

1.5.2 The *IESO* may, in addition to the validation procedures referred to in section 1.5.1, carry out such additional automated validation procedures in respect of ~~*RWMs*~~*registered wholesale meters* that are *main/alternate metering installations* as it determines appropriate.

1.5.3 Where the *metering data* from each of:

1.5.3.1 the main *meter*; and

1.5.3.2 the alternate *meter*,

~~in an *RWM*~~In a *registered wholesale meter* that is a *main/alternate metering installation* has successfully passed the validation procedures referred to in sections 1.5.1 and, where applicable, 1.5.2, such *metering data* shall be deemed validated *metering data* and the *metering data* from the main *meter* shall, subject to any adjustment and totalization that may be required pursuant to ~~Chapter~~ MR Ch.6 be used by the *IESO* for *settlement* purposes.

1.5.4 Where the *metering data* from the main *meter* in ~~an *RWM*~~a *registered wholesale meter* that is a *main/alternate metering installation* has successfully passed the validation procedures described in sections 1.5.1 and, where applicable, 1.5.2, such *metering data* shall, subject to:

1.5.4.1 any adjustment and totalization that may be required pursuant to ~~Chapter~~ MR Ch.6; and

1.5.4.2 any subsequent adjustment made pursuant to section 1.5.10.2,

be used for *settlement* purposes notwithstanding that the *metering data* from the alternate *meter* is unavailable or has not successfully passed such validation procedures.

1.5.5 Where the *metering data* from the main *meter* in ~~an *RWM*~~a *registered wholesale meter* that is a *main/alternate metering installation* is unavailable or has not successfully passed the validation procedures referred to in section 1.5.1 and, where applicable, 1.5.2, the *metering data* from the alternate *meter* shall, subject to:

1.5.5.1 any adjustment and totalization that may be required pursuant to ~~Chapter~~ MR Ch.6; and

~~1.5.5.2 [Intentionally left blank – section deleted]~~

1.5.5.~~3~~2 any subsequent adjustment made pursuant to section 1.5.11.2,

be used for *settlement* purposes provided that the *metering data* from the alternate *meter* has successfully passed the validation procedures referred to in sections 1.5.1 and, where applicable, 1.5.2. ~~-~~The substitution of the *metering data* from the alternate *meter* for the *metering data* from the main *meter* shall be flagged in the *metering database*.

1.5.6 Where the *metering data* from both *meters* in ~~an *RWM*~~a *registered wholesale meter* that is a *main/alternate metering installation* is unavailable or has not

successfully passed the validation procedures referred to in sections 1.5.1 and, where applicable, 1.5.2, an estimate of the *metering data* shall be prepared by automated process in accordance with section 1.5.7 and the *VEE standard*. Such estimate shall, subject to:

1.5.6.1 any adjustment and totalization that may be required pursuant to ~~Chapter~~ MR Ch.6; and

1.5.6.2 any subsequent adjustment made pursuant to section 1.5.12.2,

be used for *settlement* purposes. Such estimation shall be flagged in the *metering database*.

1.5.7 An estimate of *metering data* referred to in section 1.5.6, 1.6.4 or 1.7.1.2 shall be based:

1.5.7.1 where the period for which the *metering data* is unavailable or has not successfully passed the validation procedures described in:

a. section 1.5.1 and, where applicable, 1.5.2; or

b. section 1.6.1 and, where applicable, 1.6.2,

is less than one hour, on a straight line joining the demand observed in the *metering data* in the interval immediately preceding such period and the interval immediately following such period; or

1.5.7.2 where such period is one hour or more, on validated *metering data* collected or received from the *metering installation* in the three most recent comparable *trading days* selected in accordance with section 1.5.8.

1.5.8 For the purposes of section 1.5.7.2, where the *metering data*:

1.5.8.1 relates to a *generation* ~~*facility*~~*resource*, the *metering data* for the interval recording the lowest quantity shall be used for estimation;

1.5.8.2 relates to a *load* ~~*facility*~~*resource*, the *metering data* for the interval recording the highest quantity shall be used for estimation;

1.5.8.3 relates to the injections for an *electricity storage* ~~*facility*~~*resource*; the *metering data* for the interval recording the lowest quantity shall be used for estimation; and

1.5.8.4 relates to the withdrawals for an *electricity storage* ~~*facility*~~*resource*, the *metering data* for the interval recording the highest quantity shall be used for estimation.

1.5.9 For the purposes of section 1.5.7.2, validated *metering data* shall include, where applicable, *metering data* that has been:

1.5.9.1 used in accordance with section 1.5.4 or 1.6.3;

1.5.9.2 substituted in accordance with section 1.5.5; or

1.5.9.3 estimated in accordance with section 1.5.6, 1.6.4 or 1.7.1.2,

subject to such adjustments as may have been made to such *metering data* in accordance with those sections at the time that the estimate is prepared pursuant to section 1.5.7.2.

1.5.10 Upon receipt of the notification, the description and, where applicable, the request referred to in section 1.4.4, the *IESO* shall, where the *metering data* from the main *meter* is being used in accordance with section 1.5.4:

1.5.10.1 use such *metering data* for *settlement* purposes provided that the *IESO* is satisfied that such *metering data* is correct and any flags in respect of the *metering data* previously entered into the *metering database* shall be modified accordingly; or

1.5.10.2 adjust such *metering data* in accordance with section 1.7.1 if the *IESO* is satisfied that such *metering data* has been affected by the failure of the alternate *meter*.

1.5.11 Upon receipt of the notification, the description and, where applicable, the request referred to in section 1.4.4, the *IESO* shall, where the *metering data* from the alternate *meter* is being used in accordance with section 1.5.5:

1.5.11.1 use such *metering data* for *settlement* purposes provided that the *IESO* is satisfied that such *metering data* is correct and any flags in respect of the *metering data* previously entered into the *metering database* shall be modified accordingly; or

1.5.11.2 adjust such *metering data* in accordance with section 1.7.1 if the *IESO* is satisfied that such *metering data* has been affected by the failure of the main *meter*.

1.5.12 Upon receipt of the notification, the description and, where applicable, the request referred to in section 1.4.4, the *IESO* shall, where an estimate has been prepared pursuant to section 1.5.6:

1.5.12.1 adjust such estimate in accordance with section 1.7.1 if the *IESO* is satisfied that resolution of the trouble call has identified a source of *metering data* that is more accurate that such estimate; or

1.5.12.2 in all other cases, use such estimate for *settlement* purposes.

1.6 Validation, Estimation and Editing: Single Metering Installations

1.6.1 The following validation procedures shall be conducted, in accordance with the *VEE standard*, by the *IESO's* automated validation process in respect of each ~~*RWM*~~*registered wholesale meter* that is a *single metering installation*:

1.6.1.1 determine whether any *metering data* has failed to be delivered to or received by the *IESO* from the *meter* in the manner and at the time required by these *market rules* and the intervals for which such *metering data* is missing;

1.6.1.2 test current and voltage data, if it has been provided;

1.6.1.3 conduct the data transmission/multiplier verification;

1.6.1.4 test for synchronization of the *meter* clock against the standard of accuracy described in ~~section~~MR Ch.6 s.11.2.2 ~~of Chapter 6~~;

1.6.1.5 test for replacement of the *data logger* in the *meter*; and

1.6.1.6 monitor error messages, flags and alarms received from the *meter*.

1.6.2 The *IESO* may, in addition to the validation procedures referred to in section 1.6.1, carry out such additional automated validation procedures in respect of ~~*RWMs*~~*registered wholesale meters* that are *single metering installations* as it determines appropriate.

1.6.3 Where the *metering data* from the *meter* in a *single metering installation* has not successfully passed the validation procedures referred to in section 1.6.1 and, where applicable, 1.6.2, such *metering data* shall, subject to:

1.6.3.1 any adjustment and totalization that may be required pursuant to ~~Chapter~~ MR Ch.6; and

1.6.3.2 any adjustment made pursuant to section 1.6.5.2,

nonetheless be used for *settlement* purposes by the *IESO*. Such failure of validation shall be flagged in the *metering database*.

1.6.4 Where the *metering data* from the *meter* in a *single metering installation* is unavailable, an estimate of the *metering data* shall be prepared by automated process in accordance with section 1.5.7 and the *VEE standard*. Such estimate shall, subject to:

1.6.4.1 any adjustment and totalization that may be required pursuant to ~~Chapter~~ MR Ch.6; and

1.6.4.2 any subsequent adjustment made pursuant to section 1.6.6.1,

be used for *settlement* purposes. Such estimation shall be flagged in the *metering database*.

1.6.5 Upon receipt of the notification, the description and, where applicable, the request referred to in section 1.4.4, the *IESO* shall, where the *metering data* from the *meter* is being used pursuant to section 1.6.3:

1.6.5.1 use such *metering data* for *settlement* purposes if the *IESO* is satisfied that such *metering data* is correct and any flags in respect of the *metering data* previously entered into the *metering database* shall be modified accordingly; or

1.6.5.2 adjust such *metering data* in accordance with section 1.7.1.

1.6.6 Upon the notification, the description and, where applicable, the request referred to in section 1.4.4, the *IESO* shall, where an estimate has been prepared pursuant to section 1.6.4:

1.6.6.1 adjust such estimate in accordance with section 1.7.1 if the *IESO* is satisfied that resolution of the trouble call has identified a source of *metering data* that is more accurate than such estimate; or

1.6.6.2 in all other cases, use such estimate for *settlement* purposes.

1.7 Adjustments and Failure to Resolve Trouble Call

1.7.1 An adjustment referred to in section 1.5.10.2, 1.5.11.2, 1.5.12.1, 1.6.5.2 or 1.6.6.1, as the case may be, shall be effected by the *IESO* by means of:

1.7.1.1 the application of a multiplier, an adder or subtractor or an absolute value for each applicable *metering interval*; or

1.7.1.2 the application of the estimation process referred to in section 1.5.7,

as the *IESO* determines appropriate in accordance with section 1.7.2, having regard to the written description and, where applicable, the request made by the *metering service provider* pursuant to section 1.4.4. Any flags in respect of the *metering data* previously entered into the *metering database* shall be modified accordingly.

1.7.2 The *IESO* shall, as between the adjustment methods referred to in section 1.7.1, select the method that in the *IESO's* opinion will result in the use of *metering data* for *settlement* purposes that most closely reflects the flow of *energy* through the ~~*RWM*~~*registered wholesale meter* during the applicable intervals. Where both methods are determined by the *IESO* to be equivalent in this regard, the *IESO* shall select the method that is less likely to result in the *metered market participant* for the ~~*RWM*~~*registered wholesale meter* to which the *metering data* relates obtaining a benefit from the adjustment relative to what the *metered market participant's* position would otherwise have been.

1.7.3 Where a trouble call has been issued pursuant to section 1.4.2.3 and:

1.7.3.1 the *IESO* does not receive the notification referred to in section 1.4.4.1;

1.7.3.2 the *IESO* does not receive the written description referred to in section 1.4.4.2; or

1.7.3.3 the trouble call is not resolved to the satisfaction of the *IESO*,

the *IESO* shall for *settlement* purposes use:

1.7.3.4 the *metering data*, substituted *metering data* or estimated *metering data* referred to in section 1.5.4, 1.5.5, 1.5.6, 1.6.3 or 1.6.4, as the case may be; and

1.7.3.5 where applicable, the estimates referred to in ~~section~~MR Ch.6 s.11.1.4A ~~of Chapter 6~~, until such time as the trouble call is resolved to the satisfaction of the *IESO*.

Appendix 9.2 - Data Inputs and Variables

Note: New Appendix 9.2 has been shown without track changes for ease of review.

1 General/Overview

1.1 In MR Ch.9, and the appendices thereto, the following variables have the following meanings:

1.1.1 In regards to *class r reserve*, the following are the three types of *class r reserve*:

1.1.1.1 r1 is spinning *ten-minute operating reserve*;

1.1.1.2 r2 is non-spinning *ten-minute operating reserve*; and

1.1.1.3 r3 is *thirty-minute operating reserve*.

1.1.2 In regards to pre-dispatch run 'pdr', the following are the three types of pre-dispatch run 'pdr' of the *pre-dispatch calculation engine*:

1.1.2.1 'pdm' is the pre-dispatch run that issued the most recent *start-up notice* or extended *pre-dispatch operational commitment* for a single *delivery point* 'm';

1.1.2.2 'pd1' is the hour-ahead pre-dispatch run in the hour preceding *settlement hour* 'h';

1.1.2.3 'pdi' is the pre-dispatch run that issued the *start up notice* for the *pre-dispatch operational commitment.*

1.2 In MR Ch.9, and the appendices thereto, the following subscripts and superscripts shall have the following meanings unless otherwise specified:

1.2.1 'M' is the set of all *delivery points* 'm';

1.2.2 'K' is the set of all *market participants* 'k';

1.2.3 'T' is the set of all *metering intervals* 't' in *settlement hour* 'h';

1.2.4 'I' is the set of all *intertie metering points* 'i';

1.2.5 'S' is the set of all *selling market participants* 's';

1.2.6 'B' is the set of all *buying market participants* 'b';

1.2.7 'V' is the set of all *virtual zonal resources* 'v';

1.2.8 'R' is the set of each applicable *class r reserve;* and

1.2.9 'H' is the set of all *settlement hours* 'h' in the *trading day.*

2 Registration and General Data and Information

2.1 The *IESO* shall provide directly to the *settlement process* any relevant registration data and any adjustments required pursuant to the *market rules,* including any as a result of a compliance and enforcement action described in MR Ch.3 s.6.

3 Day-Ahead Market Variables, Data and Information

3.1 The *IESO* shall determine the following *day-ahead market energy market prices* and scheduled *energy* quantities from the set of results from the *day-ahead market calculation engine*, unless otherwise specified, and provide them directly to the *settlement process*:

3.1.1 $DAM\_QSI^{i}_{k,h}$ = quantity of *energy* (in MWh) scheduled for injection by *market participant* 'k' for an import transaction at *intertie metering point* 'i' in *settlement hour* 'h'.

3.1.2 $DAM\_QSI^{m}_{k,h}$ = quantity of *energy* (in MWh) scheduled for injection by *market participant* 'k' at *delivery point* 'm' in *settlement hour* 'h'.

3.1.3 $DAM\_QSI^{p}_{k,h}$ = quantity of *energy* (in MWh) scheduled for injection by *market participant* 'k' at *pseudo-unit delivery point* 'p' in *settlement hour* 'h'.

3.1.4 $DAM\_QSI^{c}_{k,h}$ = quantity of *energy* (in MWh) scheduled for injection by *market participant* 'k' at combustion turbine *delivery point* 'c' in *settlement hour* 'h'.

3.1.5 $DAM\_QSI^{s}_{k,h}$ = quantity of *energy* (in MWh) scheduled for injection by *market participant* 'k' at steam turbine *delivery point* 's' in *settlement hour* 'h'.

3.1.6 $DAM\_QVSI^{v}_{k,h}$ = quantity of *energy* (in MWh) scheduled for injection by *market participant* 'k' at *virtual zonal resource* 'v' in *settlement hour* 'h'.

3.1.7 $DAM\_QSW^{m}_{k,h}$ = quantity of *energy* scheduled (in MWh) for withdrawal by *market participant* 'k' at *delivery point* 'm' in *settlement hour* 'h'.

3.1.8 $DAM\_QSW^{i}_{k,h}$ = quantity of *energy* scheduled (in MWh) for withdrawal by *market participant* 'k' for an export transaction at *intertie metering point* 'i' in *settlement hour* 'h'.

3.1.9 $DAM\_HDR\_QSW^{m}_{k,h}$ = quantity of *energy* (in MWh) scheduled for withdrawal by *market participant* 'k' at physical *hourly demand response resource* 'm' in *settlement hour* 'h'.

3.1.10 $DAM\_QVSW^{v}_{k,h}$ = quantity of *energy* (in MWh) scheduled for withdrawal by *market participant* 'k' at *virtual zonal resource* 'v' in *settlement hour* 'h'.

3.1.11 $DAM\_QSW^{d}_{k,h}$ = quantity of *energy* (in MWh) scheduled for withdrawal by *market participant* 'k' at *hourly demand response resource* 'd' in *settlement hour* 'h'.

3.1.12 $DAM\_QSI^{i,p1}_{k,h}$ = quantity of *energy* (in MWh) scheduled for injection by *market participant* 'k' at *intertie metering point* 'i' in *settlement hour* 'h', as scheduled by Pass 1: Market Commitment and Market Power Mitigation.

3.1.13 $DAM\_QSI^{i,p2}_{k,h}$ = quantity of *energy* (in MWh) scheduled for injection by *market participant* 'k' at *intertie metering point* 'i' in *settlement hour* 'h', as scheduled by Pass 2: Reliability Scheduling and Commitment.

3.1.14 $ST\_Portion^{p}_{k,d}$ = the steam turbine portion (in %) of the *energy* calculated by the *day-ahead market calculation engine* as being attributed to the steam turbine for *market participant* 'k' at *pseudo-unit delivery point* 'p' in operating region 'd'.

3.1.15 $DAM\_LMP^{z}_{h}$ = the *day-ahead market Ontario zonal price* for *energy* (in $/MWh) at electrical zone 'z' in *settlement hour* 'h', where the relevant electrical zone is Ontario.

3.1.16 $DAM\_LMP^{m}_{h}$ = the *day-ahead market locational marginal price* for *energy* (in $/MWh) at *delivery point* 'm' in *settlement hour* 'h'.

3.1.17 $DAM\_LMP^{c}_{h}$ = the *day-ahead market locational marginal price* for *energy* (in $/MWh) at combustion turbine *delivery point* 'c' in *settlement hour* 'h'.

3.1.18 $DAM\_LMP^{s}_{h}$ = the *day-ahead market locational marginal price* for *energy* (in $/MWh) at steam turbine *delivery point* 's' in *settlement hour* 'h'.

3.1.19 $DAM\_LMP_h^i$ = the *day-ahead market locational marginal price* for *energy* (in $/MWh) at *intertie metering point* 'i' in *settlement hour* 'h'.

3.1.20 $DAM\_LMP_h^{vz}$ = the *day-ahead market virtual zonal price* for *energy* (in $/MWh) at *virtual transaction zone* 'vz' in *settlement hour* 'h'.

3.1.21 $DAM\_PEC_h^i$ = the external congestion component (in $/MWh) of the *day-ahead market locational marginal price* at *intertie metering point* 'i' in *settlement hour* 'h'.

3.1.22 $DAM\_PNISL_h^i$ = the net interchange scheduling limit component (in $/MWh) of the *day-ahead market locational marginal price* at *intertie metering point* 'i' in *settlement hour* 'h'.

3.2 The *IESO* shall, for each of the three types "r" of *class r reserves*, determine the following *day-ahead market operating reserve market prices* and scheduled *operating reserve* quantities from the set of results from the *day-ahead market calculation engine*, unless otherwise specified, and provide them directly to the *settlement process*:

3.2.1 $DAM\_QSOR_{r,k,h}^m$=scheduled quantity (in MWh) of *class r reserve* for *market participant* 'k' at *delivery point* 'm' in *settlement hour* 'h', where r1, r2, and r3 are all applicable.

3.2.2 $DAM\_QSOR_{r,k,h}^i$= scheduled quantity (in MWh) of *class r reserve* for *market participant* 'k' at *intertie metering point* 'i' in *settlement hour* 'h' described in the *day-ahead schedule*, where only r2 and r3 are applicable.

3.2.3 $DAM\_QSOR_{r,k,h}^c$ = scheduled quantity (in MWh) of *class r reserve* for *market participant* 'k' at combustion turbine *delivery point* 'c' in *settlement hour* 'h' described in the *day-ahead schedule,* where r1, r2, and r3 are all applicable.

3.2.4 $DAM\_QSOR_{r,k,h}^p$ = scheduled quantity (in MWh) of *class r reserve* for *market participant* 'k' at *pseudo-unit delivery point* 'p' in *settlement hour* 'h' described in the *day-ahead schedule,* where r1, r2, and r3 are all applicable.

3.2.5 $DAM\_QSOR_{r,k,h}^s$ = scheduled quantity (in MWh) of *class r reserve* for *market participant* 'k' at steam turbine *delivery point* 's' in *settlement hour* 'h' described in the *day-ahead schedule,* where r1, r2, and r3 are all applicable.

3.2.6 $DAM\_QSOR_{r,k,h}^{i,p1}$ = scheduled quantity (in MWh) of *class r reserve* for *market participant* 'k' at *intertie metering point* 'i' in *settlement hour* 'h', as scheduled by Pass 1: Market Commitment and Market Power Mitigation, where r1, r2, and r3 are all applicable.

3.2.7 $DAM\_QSOR_{r,k,h}^{i,p2}$ = scheduled quantity (in MWh) of *class r reserve* for *market participant* 'k' at *intertie metering point* 'i' in *settlement hour* 'h', as scheduled

by Pass 2: Reliability Scheduling and Commitment, where r1, r2, and r3 are all applicable.

3.2.8 $DAM\_PROR^{m}_{r,h}$ = the *day-ahead market locational marginal price* (in $/MWh) of *class r reserve* at *delivery point* 'm' in *settlement hour* 'h', where r1, r2, and r3 are all applicable.

3.2.9 $DAM\_PROR^{c}_{r,h}$ = the *day-ahead market locational marginal price* (in $/MWh) of *class r reserve* at combustion turbine *delivery point* 'c' in *settlement hour* 'h', where r1, r2, and r3 are all applicable.

3.2.10 $DAM\_PROR^{s}_{r,h}$ = the *day-ahead market locational marginal price* (in $/MWh) of *class r reserve* at steam turbine *delivery point* 's' in *settlement hour* 'h', where r1, r2, and r3 are all applicable.

3.2.11 $DAM\_PROR^{i}_{r,h}$ = the *day-ahead market locational marginal price* (in $/MWh) of *class r reserve* at *intertie metering point* 'i' in *settlement hour* 'h', where only r2 and r3 are applicable.

3.3 The *IESO* shall provide the following *dispatch data* directly to the *settlement process*:

3.3.1 $DAM\_BE^{m}_{k,h}$ = *energy offers* submitted in the *day-ahead market*, represented as an N-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h' arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2, as may be replaced by the *IESO* pursuant to MR Ch.7 App.7.5.

3.3.2 $DAM\_BE^{i}_{k,h}$ = *energy offers* submitted in the *day-ahead market*, represented as an N-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at *intertie metering point* 'i' for *settlement hour* 'h' arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2.

3.3.3 $DAM\_BE^{p}_{k,h}$ = *energy offers* submitted in the *day-ahead market*, represented as an N-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at *pseudo-unit delivery point* 'p' for *settlement hour* 'h' arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2, as may be replaced by the *IESO* pursuant to MR Ch.7 App.7.5.

3.3.4 $DAM\_BE\_SU^{m}_{k,h}$ = *start-up offer* submitted in the *day-ahead market* (in $/start) for the first *settlement hour* 'h' of the *day-ahead operational commitment* at *delivery point* 'm' for *market participant* 'k', as may be replaced by the *IESO* pursuant to MR Ch.7 App.7.5.

3.3.5 $DAM\_BE\_SU^{p}_{k,h}$ = *start-up offer* submitted in the *day-ahead market* (in $/start) for the first *settlement hour* 'h' of the *day-ahead operational commitment* at *pseudo-unit delivery point* 'p' for *market participant* 'k', as may be replaced by the *IESO* pursuant to MR Ch.7 App.7.5.

3.3.6 $DAM\_BE\_SU^{m}_{k,f}$ = *start-up offer* submitted in the *day-ahead market* (in $/start) at *delivery point* 'm' for *market participant* 'k' committed by the *day-ahead market calculation engine* for the *day-ahead operational commitment* that bridges with the *pre-dispatch operational commitment* that *generator failure* 'f' occurred in, as may be replaced by the *IESO* pursuant to MR Ch.7 App.7.5.

3.3.7 $DAM\_BE\_SU^{p}_{k,f}$ = *start-up offer* submitted in the *day-ahead market* (in $/start) at *pseudo-unit delivery point* 'p' for *market participant* 'k' committed by the *day-ahead market calculation engine* for the *day-ahead operational commitment* that bridges with the *pre-dispatch operational commitment* that the combustion turbine *generator failure* 'f' occurred in, as may be replaced by the *IESO* pursuant to MR Ch.7 App.7.5.

3.3.8 $DAM\_BE\_SNL^{m}_{k,h}$ = *speed no-load offer* submitted in the *day-ahead market* (in $/start), subject to pro-rata reduction based on $N^{m}_{k,h}$, for *settlement hour* 'h' at *delivery point* 'm' for *market participant* 'k', as may be replaced by the *IESO* pursuant to MR Ch.7 App.7.5, where:

$N^{m}_{k,h}$ = the number of 5-minute *metering intervals* that *market participant* 'k' was injecting *energy* at *delivery point* 'm' within the *settlement hour* 'h'.

3.3.9 $DAM\_BE\_SNL^{p}_{k,h}$ = *speed no-load offer* submitted in the *day-ahead market* (in $/start) for *settlement hour* 'h' at *pseudo-unit delivery point* 'p' for *market participant* 'k', as may be replaced by the *IESO* pursuant to MR Ch.7 App.7.5.

3.3.10 $DAM\_BL^{m}_{k,h}$ = *energy bids* submitted in the *day-ahead market*, represented as an N-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h' arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2.

3.3.11 $DAM\_BL^{i}_{k,h}$ = *energy bids* submitted in the *day-ahead market*, represented as an N-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at *intertie metering point* 'i' for *settlement hour* 'h' arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2.

3.3.12 $DAM\_HDR\_BL^{m}_{k,h}$ = *energy bids* submitted in the *day-ahead market*, represented as an N-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at physical *hourly demand response resource* 'm' for *settlement hour* 'h'

arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2.

3.3.13 $DAM\_BOR^{m}_{r,k,h}$ = *class r reserve offers* submitted in the *day-ahead market*, represented as an N-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h' arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2, where r1, r2, and r3 are all applicable, as may be replaced by the *IESO* pursuant to MR Ch.7 App.7.5.

3.3.14 $DAM\_BOR^{i}_{r,k,h}$ = *Class r reserve offers* submitted in the *day-ahead market*, represented as an N-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at *intertie metering point* 'i' for *settlement hour* 'h' arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2, where only r2 and r3 are applicable.

3.3.15 $DAM\_BOR^{p}_{r,k,h}$ = *Class r reserve offers* submitted in the *day-ahead market* by *market participant* 'k' for *pseudo-unit delivery point* 'p' for *settlement hour* 'h', represented as an M-by-2 matrix (where M is M^{p}_{k}) of *price-quantity pairs* arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2, where r1, r2, and r3 are all applicable, as may be replaced by the *IESO* pursuant to MR Ch.7 App.7.5.

3.3.16 MLP^{m}_{k} = *minimum loading point* (in MW) for a *resource* at *delivery point* 'm' for *market participant* 'k'.

3.3.17 MLP^{c}_{k} = *minimum loading point* (in MW) for a combustion turbine *generation unit* at combustion turbine *delivery point* 'c' for *market participant* 'k'.

3.3.18 MLP^{s}_{k} = *minimum loading point* (in MW) for a steam turbine *generation unit* at steam turbine *delivery point* 's' for *market participant* 'k'.

3.3.19 MLP^{p}_{k} = *minimum loading point* (in MW) for a *pseudo-unit* at *pseudo-unit delivery point* 'p' for *market participant* 'k'.

3.4 The *IESO* shall determine the following *day-ahead market* data in accordance with the following formulations, and provide them directly to the *settlement process*:

3.4.1 $DAM\_EOP^{m}_{k,h}$ = the *day-ahead market* economic operating point of *energy* for *market participant* 'k' at *delivery point* 'm' in *settlement hour* 'h', and determined in accordance with the applicable *market manual*.

3.4.2 $DAM\_EOP^{i}_{k,h}$= the *day-ahead market* economic operating point of *energy* for *market participant* 'k' at *intertie metering point* 'i' in *settlement hour* 'h', and determined in accordance with the applicable *market manual*.

3.4.3 $DAM\_EOP^{p}_{k,h}$= the *day-ahead market* economic operating point of *energy* for *market participant* 'k' at *pseudo-unit delivery point* 'p' in *settlement hour* 'h', and determined in accordance with the applicable *market manual*.

3.4.4 $DAM\_EOP^{c}_{k,h}$= the *day-ahead market* economic operating point of *energy* for *market participant* 'k' at combustion turbine *delivery point* 'c' in *settlement hour* 'h', and determined in accordance with the applicable *market manual.*

3.4.5 $DAM\_OR\_EOP^{i}_{r,k,h}$= the *day-ahead market* economic operating point of *class r reserve* for *market participant* 'k' at *intertie metering point* 'i' in *settlement hour* 'h', where r1, r2, and r3 are all applicable, and determined in accordance with the applicable *market manual.*

3.4.6 $DAM\_OR\_EOP^{s}_{r,k,h}$= the *day-ahead market* economic operating point of *class r reserve* for *market participant* 'k' at steam turbine *delivery point* 's' in *settlement hour* 'h', where r1, r2, and r3 are all applicable, and determined in accordance with the applicable *market manual.*

3.4.7 $DAM\_OR\_EOP^{c}_{r,k,h}$= the *day-ahead market* economic operating point of *class r reserve* for *market participant* 'k' at combustion turbine *delivery point* 'c' for *settlement hour* 'h', where r1, r2, and r3 are all applicable, and determined in accordance with the applicable *market manual.*

3.4.8 $DAM\_OR\_EOP^{m}_{r,k,h}$= the *day-ahead market* economic operating point of *class r reserve* for *market participant* 'k' at *delivery point* 'm' in *settlement hour* 'h', where r1, r2, and r3 are all applicable, and determined in accordance with the applicable *market manual.*

3.4.9 $DAM\_OR\_EOP^{p}_{r,k,h}$ = the *day-ahead market* economic operating point of *class r reserve* for *market participant* 'k' at *pseudo-unit delivery point* 'p' in *settlement hour* 'h', where r1, r2, and r3 are all applicable, and determined in accordance with the applicable *market manual.*

3.4.10 $DAM\_DIPC^{c}_{k,h}$ = the *day-ahead market energy* price curve for a *non-quick start resource* for *market participant* 'k' at combustion turbine *delivery point* 'c' in *settlement hour* 'h', and determined in accordance with Appendix 9.3.

3.4.11 $DAM\_DIPC^{s}_{k,h}$ = the *day-ahead market energy* price curve for a *non-quick start resource*, for *market participant* 'k' at steam turbine *delivery point* 's' in *settlement hour* 'h', and determined in accordance with Appendix 9.3.

3.4.12 $DAM\_DIGQ^{s}_{k,h}$ = the portion of the *day-ahead market schedule* quantity of *energy* scheduled for injection for *market participant* 'k' at steam turbine

delivery point 's' in *settlement hour* 'h', and determined in accordance with Appendix 9.3.

3.4.13 $DAM\_EOP\_DIGQ^{s}_{k,h}$ = the *day-ahead market* economic operating point of the portion of the *day-ahead market schedule* quantity of *energy* scheduled for injection for *market participant* 'k' at steam turbine *delivery point* 's' in *settlement hour* 'h', and determined in accordance with Appendix 9.3.

3.4.14 $DAM\_OR\_DIPC^{c}_{r,k,h}$ = the *day-ahead market class r reserve* price curve for a *non-quick start resource* for *market participant* 'k' at combustion turbine *delivery point* 'c' during *settlement hour* 'h', and determined in accordance with Appendix 9.3.

3.4.15 $DAM\_OR\_DIPC^{s}_{r,k,h}$= the *day-ahead market class r reserve* price curve for a *non-quick start resource* for *market participant* 'k' at steam turbine *delivery point* 's' during *settlement hour* 'h', and determined in accordance with Appendix 9.3.

3.4.16 $DAM\_STP\_QSI^{p}_{k,h}$ = the steam turbine portion of the *day-ahead schedule* of *energy* for injection (in MWh) for *market participant* 'k' at *pseudo-unit delivery point* 'p' in *settlement hour* 'h', and derived as the difference between $DAM\_QSI^{p}_{k,h}$ and $DAM\_QSI^{c}_{k,h}$.

4 Pre-Dispatch Variables, Data and Information

4.1 The *IESO* shall determine the following pre-dispatch *energy market prices* and scheduled *energy* quantities from the last valid set of results from the *pre-dispatch calculation engine,* unless otherwise specified*,* and provide them directly to the *settlement process*:

4.1.1 $PD\_QSI^{i}_{k,h}$ = pre-dispatch quantity of *energy* scheduled for injection (in MWh) by *market participant* 'k' at *intertie metering point* 'i' in *settlement hour* 'h' by pre-dispatch run 'pd1'.

4.1.2 $PD\_QSI^{m,pdm}_{k,h}$ = pre-dispatch quantity of *energy* scheduled for injection (in MWh) by *market participant* 'k' at *delivery point* 'm' in *settlement hour* 'h' for pre-dispatch run 'pdm'.

4.1.3 $PD\_QSI^{p,pdm}_{k,h}$ = *pre-dispatch schedule* quantity of *energy* (in MWh) scheduled for injection by pre-dispatch run 'pdm' for *market participant* 'k' at *pseudo-unit delivery point* 'p' in *settlement hour* 'h'.

4.1.4 $PD\_QSI_{k,h}^{c,pdm}$ = *pre-dispatch schedule* quantity of *energy* (in MWh) scheduled for injection by pre-dispatch run 'pdm' for *market participant* 'k' at combustion turbine *delivery point* 'p' in *settlement hour* 'h'.

4.1.5 $PD\_QSW_{k,h}^{i}$ = pre-dispatch quantity of *energy* scheduled for withdrawal (in MWh) by *market participant* 'k' at *intertie metering point* 'i' in *settlement hour* 'h'.

4.1.6 $PD\_LMP_{h}^{m,pd1}$ = *pre-dispatch locational marginal price* for *energy* (in $/MWh) at *delivery point* 'm' in *settlement hour* 'h' for pre-dispatch run 'pd1'.

4.1.7 $PD\_LMP_{h}^{m,pdm}$ = *pre-dispatch locational marginal price* for *energy* (in $/MWh) at *delivery point* 'm' in *settlement hour* 'h' for pre-dispatch run 'pdm'.

4.1.8 $PD\_LMP_{h}^{c,pd1}$ = pre-dispatch *locational marginal price* for *energy* (in $/MWh) at combustion turbine *delivery point* 'c' in *settlement hour* 'h' for pre-dispatch run 'pd1'.

4.1.9 $PD\_LMP_{h}^{c,pdm}$ = pre-dispatch *locational marginal price* for *energy* (in $/MWh) at combustion turbine *delivery point* 'c' in *settlement hour* 'h' for pre-dispatch run 'pdm'.

4.1.10 $PD\_LMP_{h}^{s,pdm}$ = pre-dispatch *locational marginal price* for *energy* (in $/MWh) at steam turbine *delivery point* 's' in *settlement hour* 'h' for pre-dispatch run 'pdm'.

4.1.11 $PD\_IBP_{h}^{i}$ = the pre-dispatch *intertie border price* for *energy* (in $/MWh) at *intertie metering point* 'i' in *settlement hour* 'h'.

4.2 The *IESO* shall provide directly to the *settlement process*:

4.2.1 $PD\_BE_{k,h}^{m,pdm}$ = *energy offer* submitted in the *pre-dispatch process*, represented as an N-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h' in a given pre-dispatch run 'pdm', arranged in ascending order by the *offered* price in each price-quantity pair where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2.

4.2.2 $PD\_BE_{k,h}^{p,pdm}$ = *energy offer* submitted in pre-dispatch run 'pdm' by *market participant* 'k' at *pseudo-unit delivery point* 'p' for *settlement hour* 'h', represented as an M-by-2 matrix (where M is M_k^p) of *price-quantity pairs* arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2.

4.2.3 $PD\_BE\_SU^{m}_{k,h}$ = *start-up offer* submitted in the *pre-dispatch process* (in $/start) for the first *settlement hour* 'h' of the *pre-dispatch operational commitment* at *delivery point* 'm' for *market participant* 'k'.

4.2.4 $PD\_BE\_SU^{p}_{k,h}$ = *start-up offer* submitted in the *pre-dispatch process* (in $/start) for the first *settlement hour* 'h' of the *pre-dispatch operational commitment* at *pseudo-unit* 'p' for *market participant* 'k'.

4.2.5 $PD\_BE\_SU^{p,pdm}_{k,f}$ = *start-up offer* submitted in the *pre-dispatch process* (in $/start) at *pseudo-unit* 'p' for *market participant* 'k' for the first *settlement hour* 'h' of the *pre-dispatch operational commitment* committed by the *pre-dispatch calculation engine* in pre-dispatch run 'pdm' that the *generator failure* 'f' occurred in.

4.2.6 $PD\_BE\_SU^{m,pdm}_{k,f}$ = *start-up offer* submitted in the *pre-dispatch process* (in $/start) at *delivery point* 'm' for *market participant* 'k' committed by the *pre-dispatch calculation engine* in pre-dispatch run 'pdm' that the *generator failure* 'f' occurred in.

4.2.7 $PD\_BE\_SNL^{m}_{k,h}$ = *speed no-load offer* submitted in the *pre-dispatch process* (in $) for *settlement hour* 'h' at *delivery point* 'm' for *market participant* 'k'.

4.2.8 $PD\_BE\_SNL^{p}_{k,h}$ = *speed no-load offer* submitted in the *pre-dispatch process* (in $) for *settlement hour* 'h' at *pseudo-unit delivery point* 'p' for *market participant* 'k'.

4.2.9 $PD\_BE\_SNL^{m,pdm}_{k,h}$ = *speed no-load offer* submitted in pre-dispatch run 'pdm' (in $) for *settlement hour* 'h' at *delivery point* 'm' for *market participant* 'k'.

4.3 The *IESO* shall determine the following pre-dispatch data in accordance with the following formulations, and provide them directly to the *settlement process*:

4.3.1 $PD\_STP\_QSI^{p,pdm}_{k,h}$ = the steam turbine portion of the *pre-dispatch schedule* of *energy* for injection (in MWh) from pre-dispatch run 'pdm' for *market participant* 'k' at *pseudo-unit delivery point* 'p' in *settlement hour* 'h', and derived as the difference between $PD\_QSI^{p,pdm}_{k,h}$ and $PD\_QSI^{c,pdm}_{k,h}$.

4.3.2 $PD\_DIPC^{c,t}_{k,h}$ = *generator failure* charge – guarantee cost component *energy* price curve of a *GOG-eligible resource* for *market participant* 'k' at combustion turbine *delivery point* 'c' during *metering interval* 't' of *settlement hour* 'h', and determined in accordance with Appendix 9.3.

4.3.3 $PD\_DIPC^{s,t}_{k,h}$ = *generator failure* charge – guarantee cost component *energy* price curve of a *GOG-eligible resource* for *market participant* 'k' at steam

turbine *delivery point* 's' during *metering interval* 't' of *settlement hour* 'h', and determined in accordance with Appendix 9.3.

4.3.4 $PD\_DIGQ_{k,h}^{s,t}$ = the *generator failure* charge – guarantee cost component portion of the *pre-dispatch schedule* quantity of *energy* of a *GOG-eligible resource* scheduled for injection for *market participant* 'k' at *steam turbine* 's' during *metering interval* 't' of *settlement hour* 'h', and determined in accordance with Appendix 9.3.

5 Real-Time Market Variables, Data and Information

5.1 The *IESO* shall determine the following *real-time market energy market prices* from the set of results from the *real-time calculation engine*, unless otherwise specified, and scheduled *energy* quantities from the *real-time schedules,* as may be modified by the *IESO*, and provide them directly to the *settlement process*:

5.1.1 $RT\_QSI_{k,h}^{m,t}$ = quantity of *energy* scheduled for injection (in MWh) in the *real-time market* by *market participant* 'k' at *delivery point* 'm' in *metering interval* 't' of *settlement hour* 'h'.

5.1.2 $RT\_QSI_{k,h}^{c,t}$ = quantity of *energy* scheduled for injection (in MWh) in the *real-time market* by *market participant* 'k' at combustion turbine *delivery point* 'c' in *metering interval* 't' of *settlement hour* 'h'.

5.1.3 $RT\_QSI_{k,h}^{p}$ = quantity of *energy* (in MWh) scheduled for injection by *market participant* 'k' at *pseudo-unit delivery point* 'p' in *settlement hour* 'h'.

5.1.4 $RT\_QSW_{k,h}^{m,t}$ = quantity of *energy* scheduled for withdrawal (in MWh) in the *real-time market* by *market participant* 'k' at *delivery point* 'm' in *metering interval* 't' of *settlement hour* 'h'.

5.1.5 $RT\_ST\_Portion_{k,h,d}^{p,t}$ = the real-time steam turbine portion (in %) of the *energy* calculated by the *real-time calculation engine* as being attributed to the steam turbine in *metering interval* 't' of *settlement hour* 'h' for *market participant* 'k' at *pseudo-unit delivery point* 'p' in operating region 'd'.

5.1.6 $SQEW_{k,h}^{i,t}$ = quantity of *energy* scheduled for withdrawal (in MWh) in the *real-time market* by *market participant* 'k' at *intertie metering point* 'i' in *metering interval* 't' of *settlement hour* 'h', as described in the *interchange schedule*.

5.1.7 $SQEI_{k,h}^{i,t}$ = quantity of *energy* scheduled for injection (in MWh) in the *real-time market* by *market participant* 'k' at *intertie metering point* 'i' in *metering interval* 't' of *settlement hour* 'h', as described in the *interchange schedule*.

5.1.8 $RT\_LMP_h^{m,t}$ = the *real-time market locational marginal price* for *energy* (in $/MWh) at *delivery point* 'm' in *metering interval* 't' of *settlement hour* 'h'.

5.1.9 $RT\_LMP_h^{vz,t}$ = the *real-time market locational marginal price* for *energy* (in $/MWh) at *virtual transaction zone* 'vz' in *metering interval* 't' of *settlement hour* 'h'.

5.1.10 $RT\_LMP_h^{d,t}$ = the *real-time market locational marginal price* for *energy* (in $/MWh) at *hourly demand response resource* 'd' in *metering interval* 't' of *settlement hour* 'h'.

5.1.11 $RT\_LMP_h^{c,t}$ = the *real-time market locational marginal price* for *energy* (in $/MWh) at combustion turbine *delivery point* 'c' in *metering interval* 't' of *settlement hour* 'h'.

5.1.12 $RT\_LMP_h^{s,t}$ = the *real-time market locational marginal price* for *energy* (in $/MWh) at steam turbine *delivery point* 's' in *metering interval* 't' of *settlement hour* 'h'.

5.1.13 $RT\_LMP_h^{i,t}$ = the *real-time market locational marginal price* for *energy* (in $/MWh) at *intertie metering point* 'i' in *metering interval* 't' of *settlement hour* 'h'.

5.1.14 $RT\_PEC_h^{i,t}$ = the *real-time market* price of external congestion component (in $/MWh) of the *locational marginal price* at *intertie metering point* 'i' in *metering interval* 't' of *settlement hour* 'h'.

5.1.15 $RT\_PNISL_h^{i,t}$ = the *real-time market* price of the net interchange scheduling limit component (in $/MWh) of the *locational marginal price* at *intertie metering point* 'i' in *metering interval* 't' of *settlement hour* 'h'.

5.1.16 $RT\_IBP_h^{i,t}$ = the *real-time market intertie border price* for *energy* (in $/MWh) at *intertie metering point* 'i' in *metering interval* 't' of *settlement hour* 'h'.

5.2 The *IESO* shall provide the following *dispatch data* directly to the *settlement process*:

5.2.1 $BE_{k,h}^{m,t}$ = *energy offers* submitted in the *real-time market*, represented as an N-by-2 matrix of *price-quantity pairs* at *delivery point* 'm' for *market participant* 'k' for *metering interval* 't' of *settlement hour* 'h', arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2, as may be replaced by the *IESO* pursuant to MR Ch.7 App.7.5A.

5.2.2 $BE_{k,h}^{i,t}$ = *energy offers* submitted in the *real-time market*, represented as an N-by-2 matrix of *price-quantity pairs* at *intertie metering point* 'i' for *market participant* 'k' for *metering interval* 't' of *settlement hour* 'h', arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2.

5.2.3 $BE_{k,h}^{p,t}$ = *energy offers* submitted in the *real-time market*, represented as an N-by-2 matrix of *price-quantity pairs* at *pseudo-unit delivery point* 'p' for *market participant* 'k' for *metering interval* 't' of *settlement hour* 'h', arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2, as may be replaced by the *IESO* pursuant to MR Ch.7 App.7.5A.

5.2.4 $BL_{k,h}^{m,t}$ = *energy bids* submitted in the *real-time market*, represented as an N-by-2 matrix of *price-quantity pairs* at *delivery point* 'm' for *market participant* 'k' for *metering interval* 't' of *settlement hour* 'h', arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2.

5.2.5 $BL_{k,h}^{i,t}$ = *energy bids* submitted in the *real-time market*, represented as an N-by-2 matrix of *price-quantity pairs* at *intertie metering point* 'i' for *market participant* 'k' for *metering interval* 't' of *settlement hour* 'h', arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2.

5.2.6 $BOR_{r,k,h}^{m,t}$ = *class r reserve offers* submitted in the *real-time market*, represented as an N-by-2 matrix of *price-quantity pairs* at *delivery point* 'm' for *market participant* 'k' for *metering interval* 't' of *settlement hour* 'h', arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2, where r1, r2, and r3 are all applicable, as may be replaced by the *IESO* pursuant to MR Ch.7 App.7.5A.

5.2.7 $BOR_{r,k,h}^{i,t}$ = *class r reserve offers* submitted in the *real-time market*, represented as an N-by-2 matrix of *price-quantity pairs* at *intertie metering point* 'i' for *market participant* 'k' for *metering interval* 't' of *settlement hour* 'h', arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2, where only r2 and r3 are applicable.

5.2.8 $BOR_{r,k,h}^{p,t}$ = *class r reserve offers* submitted in the *real-time market*, represented as an N-by-2 matrix of *price-quantity pairs* at *pseudo-unit delivery point* 'p' for *market participant* 'k' for *metering interval* 't' of *settlement hour* 'h', arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered*

quantities 'Q' are in column 2, where r1, r2, and r3 are all applicable, as may be replaced by the *IESO* pursuant to MR Ch.7 App.7.5A.

5.2.9 $RT\_GOG\_SU_{k,h}^{m}$ = *start-up offer* submitted in the *real-time market* (in $/start) for the real-time *generator offer* guarantee *settlement amount*, at *delivery point* 'm' for *market participant* 'k' in *settlement hour* 'h', as may be replaced by the *IESO* pursuant to MR Ch.7 App.7.5A.

5.3 The *IESO* shall, for each of the three types "r" of *class r reserves,* determine the following *real-time market operating reserve market prices* from the set of results from the *real-time calculation engine*, unless otherwise specified, and scheduled *operating reserve* quantities from the *real-time schedules* and provide them directly to the *settlement process*:

5.3.1 $RT\_PROR_{r,h}^{m,t}$ = the *real-time market locational marginal price* (in $/MWh) of *class r reserve* at *delivery point* 'm' in *metering interval* 't' of *settlement hour* 'h', where r1, r2, and r3 are all applicable.

5.3.2 $RT\_PROR_{r,h}^{c,t}$ = the *real-time market locational marginal price* (in $/MWh) of *class r reserve* at combustion turbine *delivery point* 'c' in *metering interval* 't' of *settlement hour* 'h', where r1, r2, and r3 are all applicable.

5.3.3 $RT\_PROR_{r,h}^{s,t}$ = the *real-time market locational marginal price* (in $/MWh) of *class r reserve* at steam turbine *delivery point* 's' in *metering interval* 't' of *settlement hour* 'h', where r1, r2, and r3 are all applicable.

5.3.4 $RT\_PROR_{r,h}^{i,t}$ = the *real-time market locational marginal price* (in $/MWh) of *class r reserve* at *intertie metering point* 'i' in *metering interval* 't' of *settlement hour* 'h', where only r2 and r3 are applicable.

5.3.5 $RT\_QSOR_{r,k,h}^{m,t}$ = scheduled quantity (in MWh) of *class r reserve* in the *real-time market* at *delivery point* 'm' for *market participant* 'k' in *metering interval* 't' of *settlement hour* 'h', where r1, r2, and r3 are all applicable.

5.3.6 $RT\_QSOR_{r,k,h}^{c,t}$ = scheduled quantity (in MWh) of *class r reserve* in the *real-time market* at combustion turbine *delivery point* 'm' for *market participant* 'k' in *metering interval* 't' of *settlement hour* 'h', where r1, r2, and r3 are all applicable.

5.3.7 $RT\_QSOR_{r,k,h}^{s,t}$ = scheduled quantity (in MWh) of *class r reserve* in the *real-time market* at steam turbine *delivery point* 's' for *market participant* 'k' in *metering interval* 't' of *settlement hour* 'h', where r1, r2, and r3 are all applicable.

5.3.8 $RT\_QSOR^{p,t}_{r,k,h}$ = scheduled quantity (in MWh) of *class r reserve* in the *real-time market* at *pseudo-unit delivery point* 'p' for *market participant* 'k' in *metering interval* 't' of *settlement hour* 'h', where r1, r2, and r3 are all applicable.

5.3.9 $RT\_QSOR^{i,t}_{r,k,h}$ = scheduled quantity (in MWh) of *class r reserve* in the *real-time market* at *intertie metering point* 'i' for *market participant* 'k' in *metering interval* 't' of *settlement hour* 'h' as described in the *interchange schedule*, where only r2 and r3 are applicable.

5.4 The *IESO* shall determine the following *real-time market* data in accordance with the following formulations*,* and provide them directly to the *settlement process*:

5.4.1 $RT\_LC\_EOP^{m,t}_{k,h}$ = the *real-time market* lost cost economic operating point of *energy* for *market participant* 'k' at *delivery point* 'm' in *metering interval* 't' of *settlement hour* 'h', and determined in accordance with the applicable *market manual.*

5.4.2 $RT\_LC\_EOP^{i,t}_{k,h}$ = the *real-time market* lost cost economic operating point of *energy* for *market participant* 'k' at *intertie metering point* 'i' in *metering interval* 't' of *settlement hour* 'h', and determined in accordance with the applicable *market manual.*

5.4.3 $RT\_LC\_EOP^{p,t}_{k,h}$ = the *real-time market* lost cost economic operating point of *energy* for *market participant* 'k' at *pseudo-unit delivery point* 'p' in *metering interval* 't' of *settlement hour* 'h', and determined in accordance with the applicable *market manual*.

5.4.4 $RT\_LC\_EOP^{c,t}_{k,h}$ = the *real-time market* lost cost economic operating point of *energy* for *market participant* 'k' at combustion turbine *delivery point* 'c' in *metering interval* 't' of *settlement hour* 'h', and determined in accordance with the applicable *market manual.*

5.4.5 $RT\_LOC\_EOP^{m,t}_{k,h}$ = the *real-time market* lost opportunity cost economic operating point of *energy* for *market participant* 'k' at *delivery point* 'm' in *metering interval* 't' of *settlement hour* 'h', and determined in accordance with the applicable *market manual.*

5.4.6 $RT\_LOC\_EOP^{p,t}_{k,h}$ = the *real-time market* lost opportunity cost economic operating point of *energy* for *market participant* 'k' at *pseudo-unit delivery point* 'p' in *metering interval* 't' of *settlement hour* 'h', and determined in accordance with the applicable *market manual*.

5.4.7 $RT\_LOC\_EOP^{i,t}_{k,h}$ = the *real-time market* lost opportunity cost economic operating point of *energy* for *market participant* 'k' at *intertie metering point* 'i' in *metering interval* 't' of *settlement hour* 'h', and determined in accordance with the applicable *market manual.*

5.4.8 $RT\_LOC\_EOP_{k,h}^{c,t}$ = the *real-time market* lost opportunity cost economic operating point of *energy* for *market participant* 'k' at combustion turbine *delivery point* 'c' in *metering interval* 't' of *settlement hour* 'h', and determined in accordance with the applicable *market manual.*

5.4.8 $RT\_OR\_LC\_EOP_{r,k,h}^{m,t}$ = the *real-time market* lost cost economic operating point of *class r reserve* for *market participant* 'k' at *delivery point* 'm' in *metering interval* 't' of *settlement hour* 'h', where r1, r2, and r3 are all applicable, and determined in accordance with the applicable *market manual*.

5.4.9 $RT\_OR\_LC\_EOP_{r,k,h}^{p,t}$ = the *real-time market* lost cost economic operating point of *class r reserve* for *market participant* 'k' at *pseudo-unit delivery point* 'p' in *metering interval* 't' of *settlement hour* 'h', where r1, r2, and r3 are all applicable, and determined in accordance with the applicable *market manual*.

5.4.10 $RT\_OR\_LC\_EOP_{r,k,h}^{i,t}$ = the *real-time market* lost cost economic operating point of *class r reserve* for *market participant* 'k' at *intertie metering point* 'i' in *metering interval* 't' of *settlement hour* 'h', where only r2 and r3 are applicable, and determined in accordance with the applicable *market manual*.

5.4.11 $RT\_OR\_LC\_EOP_{r,k,h}^{c,t}$ = the *real-time market* lost cost economic operating point of *class r reserve* for *market participant* 'k' at combustion turbine *delivery point* 'c' in *metering interval* 't' of *settlement hour* 'h', where r1, r2, and r3 are all applicable, and determined in accordance with the applicable *market manual*.

5.4.12 $RT\_OR\_LC\_EOP_{r,k,h}^{s,t}$ = the *real-time market* lost cost economic operating point of *class r reserve* for *market participant* 'k' at steam turbine *delivery point* 's' in *metering interval* 't' of *settlement hour* 'h', where r1, r2, and r3 are all applicable, and determined in accordance with the applicable *market manual*.

5.4.13 $RT\_OR\_LOC\_EOP_{r,k,h}^{m,t}$ = the *real-time market* lost opportunity cost economic operating point of *class r reserve* for *market participant* 'k' at *delivery point* 'm' in *metering interval* 't' of *settlement hour* 'h', where r1, r2, and r3 are all applicable, and determined in accordance with the applicable *market manual*.

5.4.14 $RT\_OR\_LOC\_EOP_{r,k,h}^{i,t}$ = the *real-time market* lost opportunity cost economic operating point of *class r reserve* for *market participant* 'k' at *intertie metering point* 'i' in *metering interval* 't' of *settlement hour* 'h', where only r2 and r3 are applicable, and determined in accordance with the applicable *market manual*.

5.4.15 $RT\_OR\_LOC\_EOP_{r,k,h}^{c,t}$ = the *real-time market* lost opportunity cost economic operating point of *class r reserve* for *market participant* 'k' at combustion turbine *delivery point* 'c' in *metering interval* 't' of *settlement hour* 'h', where

r1, r2, and r3 are all applicable, and determined in accordance with the applicable *market manual*.

5.4.16 $RT\_OR\_LOC\_EOP_{r,k,h}^{s,t}$ = the *real-time market* lost opportunity cost economic operating point of *class r reserve* for *market participant* 'k' at steam turbine *delivery point* 's' in *metering interval* 't' of *settlement hour* 'h', where r1, r2, and r3 are all applicable, and determined in accordance with the applicable *market manual*.

5.4.17 $RT\_STP\_QSI_{k,h}^{p,t}$ = the steam turbine portion of the *real-time schedule* of *energy* for injection (in MWh) for *market participant* 'k' at *pseudo-unit delivery point* 'p' in *metering interval* 't' of *settlement hour* 'h', and derived as the difference between $RT\_QSI_{k,h}^{p,t}$ and $RT\_QSI_{k,h}^{c,t}$.

5.4.18 $PB\_IM_h^t$ = the price bias adjustment factor for import transactions in effect for *metering interval* 't' of *settlement hour* 'h', as *published* by the *IESO* in accordance with MR Ch.9 s.3.7.2.

5.4.19 $PB\_EX_h^t$ = the price bias adjustment factor for export transactions in effect for *metering interval* 't' of *settlement hour* 'h', as *published* by the *IESO* in accordance with MR Ch.9 s.3.7.2.

5.4.20 $RT\_DIPC_{k,h}^{c,t}$ = the *real-time market energy* price curve for a *non-quick start resource* for *market participant* 'k' at combustion turbine *delivery point* 'c' in *metering interval* 't' of *settlement hour* 'h', as determined in accordance with Appendix 9.3.

5.4.21 $RT\_CMT\_DIPC_{k,h}^{c,t}$ = the *real-time market energy* price curve for a combustion turbine that is associated with the *pseudo-unit* that was operationally constrained by the *pre-dispatch calculation engine* for *market participant* 'k' at combustion turbine *delivery point* 'c' in *metering interval* 't' of *settlement hour* 'h', as determined in accordance with Appendix 9.3.

5.4.22 $RT\_DIPC_{k,h}^{s,t}$ = the *real-time market energy* price curve for a *non-quick start resource* for *market participant* 'k' at steam turbine *delivery point* 's' in *metering interval* 't' of *settlement hour* 'h', as determined in accordance with Appendix 9.3.

5.4.23 $RT\_CMT\_DIPC_{k,h}^{s,t}$ = the *real-time market energy* price curve of a *non-quick start resource* for *market participant* 'k' at steam turbine *delivery point* 's' in *metering interval* 't' of *settlement hour* 'h', as determined in accordance with Appendix 9.3.

5.4.24 $RT\_QSI\_DIGQ_{k,h}^{s,t}$ = the portion of the *real-time schedule* quantity of *energy* scheduled for injection for *market participant* 'k' at steam turbine *delivery*

point 's' in *metering interval* 't' of *settlement hour* 'h', as determined in accordance with Appendix 9.3.

5.4.25 $RT\_CMT\_DIGQ_{k,h}^{s,t}$ = the portion of the *real-time schedule* quantity of *energy* scheduled for injection that is eligible for the real-time *generator offer* guarantee *settlement amount* for the steam turbine that is associated with the *pseudo-unit* that was operationally constrained by the *pre-dispatch calculation engine* for *market participant* 'k' at steam turbine *delivery point* 's' in *metering interval* 't' of *settlement hour* 'h', as determined in accordance with Appendix 9.3.

5.4.26 $RT\_LC\_EOP\_DIGQ_{k,h}^{s,t}$ = the portion of the steam turbine's $RT\_LC\_EOP_{k,h}^{p,t}$ that is eligible for the real-time make-whole payment *settlement amount* for *market participant* 'k' at steam turbine *delivery point* 's' in *metering interval* 't' of *settlement hour* 'h', as determined in accordance with Appendix 9.3.

5.4.27 $RT\_LOC\_EOP\_DIGQ_{k,h}^{s,t}$ = the portion of the steam turbine's $RT\_LOC\_EOP_{k,h}^{p,t}$ that is eligible for the real-time make-whole payment *settlement amount* for *market participant* 'k' at steam turbine *delivery point* 's' in *metering interval* 't' of *settlement hour* 'h', as determined in accordance with Appendix 9.3.

5.4.28 $RT\_OR\_DIPC_{r,k,h}^{c,t}$ = *real-time market class r reserve* price curve for a *non-quick start resource* for *market participant* 'k' at combustion turbine *delivery point* 'c' during *metering interval* 't' of *settlement hour* 'h', as determined in accordance with Appendix 9.3.

5.4.29 $RT\_OR\_DIPC_{r,k,h}^{s,t}$ = the *real-time market class r reserve* price curve for a *non-quick start resource* for *market participant* 'k' at steam turbine *delivery point* 's' during *metering interval* 't' of *settlement hour* 'h' as determined in accordance with Appendix 9.3.

5.4.30 $RT\_OR\_CMT\_DIPC_{r,k,h}^{s,t}$ = the *real-time market class r reserve* price curve of a steam turbine that is associated with the *pseudo-unit* that was operationally constrained by the *pre-dispatch calculation engine* for *market participant* 'k' at steam turbine *delivery point* 's' during *metering interval* 't' of *settlement hour* 'h' as determined in accordance with Appendix 9.3.

5.4.31 $RT\_OR\_CMT\_DIGQ_{r,k,h}^{s,t}$ = the portion of the *real-time schedule* quantity of *class r reserve* scheduled for injection that is eligible for the real-time *generator offer* guarantee *settlement amount* for *market participant* 'k' at steam turbine *delivery point* 's' in *metering interval* 't' of *settlement hour* 'h', as determined in accordance with Appendix 9.3.

6 Physical Bilateral Contract Variables, Data and Information

6.1 *Physical bilateral contract quantities* shall be determined for each *settlement hour* by the *IESO* using *physical bilateral contract data* submitted by *selling market participant*s and, where so required by the nature of the *physical bilateral contract data*, operating results. The *IESO* shall divide each hourly *physical bilateral contract quantity* into equal *physical bilateral contract quantities* if determination of *settlement amounts* requires quantities for each *metering interval* of each *settlement hour*. The *IESO* shall provide the following variables and data directly to the *settlement process*:

6.1.1 $DAM\_BCQ^{m}_{s,k,h}$ = *physical bilateral contract quantity* of *energy* in the *day-ahead market* (in MWh) bought by *buying market participant* 'k' from *selling market participant* 's' at *delivery point* 'm' in *settlement hour* 'h'.

6.1.2 $DAM\_BCQ^{m}_{k,b,h}$ = *physical bilateral contract quantity* of *energy* in the *day-ahead market* (in MWh) sold by *selling market participant* 'k' to *buying market participant* 'b' at *delivery point* 'm' in *settlement hour* 'h'.

6.1.3 $DAM\_BCQ^{i}_{s,k,h}$ = *physical bilateral contract quantity* of *energy* in the *day-ahead market* (in MWh) bought by *buying market participant* 'k' from *selling market participant* 's' at *intertie metering point* 'i' in *settlement hour* 'h'.

6.1.4 $DAM\_BCQ^{i}_{k,b,h}$ = *physical bilateral contract quantity* of *energy* in the *day-ahead market* (in MWh) sold by *selling market participant* 'k' to *buying market participant* 'b' at *intertie metering point* 'i' in *settlement hour* 'h'.

6.1.5 $BCQ^{m,t}_{s,k,h}$ = *physical bilateral contract quantity* of *energy* in the *real-time market* (in MWh) bought by *buying market participant* 'k' from *selling market participant* 's' at *delivery point* 'm' in *metering interval* 't' of *settlement hour* 'h'.

6.1.6 $BCQ^{m,t}_{k,b,h}$ = *physical bilateral contract quantity* of *energy* in the *real-time market* (in MWh) sold by *selling market participant* 'k' to *buying market participant* 'b' at *delivery point* 'm' in *metering interval* 't' of *settlement hour* 'h'.

6.1.7 $BCQ^{i,t}_{s,k,h}$ = *physical bilateral contract quantity* of *energy* in the *real-time market* (in MWh) bought by *buying market participant* 'k' from *selling market participant* 's' at *intertie metering point* 'i' in *metering interval* 't' of *settlement hour* 'h'.

6.1.8 $BCQ^{i,t}_{k,b,h}$ = *physical bilateral contract quantity* of *energy* in the *real-time market* (in MWh) sold by *selling market participant* 'k' to *buying market*

participant 'b' at *intertie metering point* 'i' in *metering interval* 't' of *settlement hour* 'h'.

6.1.9 $RQ_{k,h}^{m,i,t}$ = the net sum of any *day-ahead market* and *real-time market physical bilateral contract quantities* of *energy*, indicated in all relevant *physical bilateral contract data* in which the transfer of the *hourly uplift settlement amount* has been agreed to between the *selling market participant* and the *buying market participant*, for *market participant* 'k' at *delivery point* 'm' and *intertie metering point* 'i' in *metering interval* 't' of *settlement hour* 'h', and derived as follows:

$$RQ_{k,h}^{m,i,t} = \left[\sum_B \frac{DAM\_BCQ_{k,b,h}^{m,i}}{12} - \sum_S \frac{DAM\_BCQ_{s,k,h}^{m,i}}{12} + \sum_B BCQ_{k,b,h}^{m,i,t} - \sum_S BCQ_{s,k,h}^{m,i,t}\right]$$

7 Transmission Rights Variables, Data and Information

7.1 The *IESO* shall provide the following *TR* data directly to the *settlement process*:

7.1.1 $QTR_{k,h}^{i,j}$ = quantity of *TRs* (in MW) assigned to *market participant* 'k' for transmission from injection *TR zone* 'i' to withdrawal *TR zone* 'j' for *settlement hour* 'h'.

8 Allocated Quantities

8.1 The *IESO* shall determine the following allocated physical quantities for each *market participant* for each primary *registered wholesale meter* and each *intertie metering point* using *metering data*, operating results and *interchange schedule* data. If physical quantities are provided only for each *settlement hour* (as they may be for *interchange schedules*, *non-dispatchable loads, non-dispatchable generation resources*, and *self-scheduling electricity storage facilities*), the *IESO* shall, if necessary for *settlement* purposes, determine the interval amounts defined below by dividing the hourly amounts into twelve equal interval amounts:

8.1.1 $AQEI_{k,h}^{m,t}$ = allocated quantity (in MWh) of *energy* injected by *market participant* 'k' at primary *registered wholesale meter* 'm' in *metering interval* 't' of *settlement hour* 'h'.

8.1.2 $AQEI_{k,h}^{c,t}$ = allocated quantity (in MWh) of *energy* injected by *market participant* 'k' at combustion turbine primary *registered wholesale meter* 'c' in *metering interval* 't' of *settlement hour* 'h'.

8.1.3 $AQEI_{k,h}^{s,t}$ = allocated quantity (in MWh) of *energy* injected by *market participant* 'k' at steam turbine primary *registered wholesale meter* 's' in *metering interval* 't' of *settlement hour* 'h'.

8.1.4 $AQEW_{k,h}^{m,t}$ = allocated quantity (in MWh) of *energy* withdrawn by *market participant* 'k' at primary *registered wholesale meter* 'm' in *metering interval* 't' of *settlement hour* 'h'.

8.1.5 $AQOR_{r,k,h}^{m,t}$ = allocated quantity (in MW) of *class r reserve* for *market participant* 'k' at primary *registered wholesale meter* or *intertie metering point* 'm' in *metering interval* 't' of *settlement hour* 'h'.

9 Market Power Mitigation

9.1 The *IESO* shall determine the following market power mitigation data in accordance with Appendix 9.4 and provide them directly to the *settlement process*:

9.1.1 $EMFC\_DAM\_BE_{k,h}^{m}$ = enhanced mitigated for conduct *offer* for *energy* in the *day-ahead market* for *market participant* 'k' at *delivery point* 'm' in *settlement hour* 'h'.

9.1.2 $EMFC\_DAM\_BOR_{r,k,h}^{m}$ = enhanced mitigated for conduct *offer* for *class r reserve* in the *day-ahead market* for *market participant* 'k' at *delivery point* 'm' in *settlement hour* 'h'.

9.1.3 $EMFC\_DAM\_BE\_SU_{k,h}^{m}$ = enhanced mitigated for conduct *start-up offer* in the *day-ahead market* for the *thermal state* indicated in the *dispatch data* for *market participant* 'k' at *delivery point* 'm' in *settlement hour* 'h'.

9.1.4 $EMFC\_DAM\_SNL_{k,h}^{m}$ = enhanced mitigated for conduct *speed no-load offer* in the *day-ahead market* for *market participant* 'k' at *delivery point* 'm' in *settlement hour* 'h'.

9.1.5 $EMFC\_RT\_BE_{k,h}^{m}$ = enhanced mitigated for conduct *offer* for *energy* in the *real-time market* for *market participant* 'k' at *delivery point* 'm' in *settlement hour* 'h'.

9.1.6 $EMFC\_RT\_BOR_{r,k,h}^{m}$ = enhanced mitigated for conduct *offer* for *class r reserve* in the *real-time market* for *market participant* 'k' at *delivery point* 'm' in *settlement hour* 'h'.

9.1.7 $EMFC\_RT\_SU_{k,h}^{m}$ = enhanced mitigated for conduct *start-up offer* in the *real-time market* for the *thermal state* determined in accordance with section 2.12.2 for *market participant* 'k' at *delivery point* 'm' in *settlement hour* 'h'.

9.1.8 $EMFC\_RT\_SNL_{k,h}^{m}$ = enhanced mitigated for conduct *speed-no-load offer* in the *real-time market* for *market participant* 'k' at *delivery point* 'm' in *settlement hour* 'h'.

9.1.9 $DAM\_RLL_{k,h}^{m}$ = is the *day-ahead market energy offer reference level value* based on the *resource's* lower cost profile for *market participant* 'k' at *delivery point* 'm' of *settlement hour* 'h', as set by the *IESO* pursuant to MR. Ch. 7 s. 22.5.8.

9.1.10 $DAM\_RLH_{k,h}^{m}$ is the *day-ahead market energy offer reference level value* based on the *resource's* higher cost profile for *market participant* 'k' at *delivery point* 'm' of *settlement hour* 'h', as set by the *IESO* pursuant to MR. Ch. 7 s. 22.5.8.

9.1.11 $RT\_RLL_{k,h}^{m}$ is the *real-time market energy offer reference level value* based on the *resource's* lower cost profile for *market participant* 'k' at *delivery point* 'm' of *settlement hour* 'h', as set by the *IESO* pursuant to MR. Ch. 7 s. 22.5.8.

9.1.12 $RT\_RLH_{k,h}^{m}$ is the *real-time market energy offer reference level value* based on the *resource's* higher cost profile for *market participant* 'k' at *delivery point* 'm' of *settlement hour* 'h', as set by the *IESO* pursuant to MR. Ch. 7 s. 22.5.8.

10 Mathematical Functions

10.1 The *IESO* shall utilize the following mathematical functions as directed in this MR Ch.9:

10.1.1 The following is the operating profit function:

Let OP(P,Q,B) be a profit function of Price (P), Quantity (Q) and an N-by-2 matrix (B) of *price-quantity pairs*:

$$\mathrm{OP(P,Q,B)} = \mathrm{P}\cdot\mathrm{Q} - \sum_{n=1}^{s^*} \mathrm{P_n}\cdot(\mathrm{Q_n} - \mathrm{Q_{n-1}}) - (\mathrm{Q} - \mathrm{Q_{s^*}})\cdot \mathrm{P_{s^*+1}}$$

Using matrix notation for parameter 'B' this may be expressed as follows:

$$\mathrm{OP(P,Q,B)} = \mathrm{P}\cdot\mathrm{Q} - \sum_{n=1}^{s^*} [\mathrm{B[n,1]}\cdot(\mathrm{B[n,2]} - \mathrm{B[n-1,2]})] - [(\mathrm{Q} - \mathrm{B[s^*,2]})\cdot \mathrm{B[s^*+1,1]}]$$

Where:

(a) s* is the highest indexed row of B such that $Q_{s^*} \le Q \le Q_n$; and
(b) $Q_0=0$

10.1.2 In MR Ch.9 and its appendices any function within an equation that is structured as OP(x,y,z) where x, y, and z are variables or equations, shall be a reference to the operating profit function specified in this section 10.1, where x is P, y is Q and z is B.

Appendix 9.3 - Pseudo-Unit Translation

Note: New Appendix 9.3 has been shown without track changes for ease of review.

1.1 Introduction/General

1.1.1 In this Appendix 9.3, the following variables have the following meanings:

1.1.1.1 In regards to operating region 'd', the following are the three types of operating regions:

a. 'd1' is the *pseudo-unit* operating region quantity for the *minimum loading point* operating region, as defined in MR Ch.7 App 7.5;

b. 'd2' is the *pseudo-unit* operating region quantity for the *dispatchable* operating region, as defined in MR Ch.7 App 7.5*;* and

c. 'd3' is the *pseudo-unit* operating region quantity for the duct firing operating region, as defined in MR Ch.7 App 7.5;

1.1.1.2 M_k^p = the maximum number of *price-quantity pairs* in an *energy offer* that may be submitted by *market participant* 'k' in the *day-ahead market*, *pre-dispatch process*, and *real-time market* at *pseudo-unit delivery point* 'p', set equal to five *price-quantity pairs;* and

1.1.1.3 N_k^s = the number of combustion turbine *delivery points* registered as associated with steam turbine *delivery point* 's' for *market participant* 'k'.

1.2 Day-Ahead Market – Energy

1.2.1 The *IESO* shall determine the following *day-ahead market* data in accordance with the following formulations*,* and provide them directly to the *settlement process*:

Intermediate Variables

1.2.1.1 $DAM\_ORRQ_{k,d}^p$ = the *day-ahead market* operating region range quantity, which is the *pseudo-unit* operating region quantity of *energy* (in MW) calculated by the *day-ahead market calculation engine* for *market participant* 'k' at *pseudo-unit delivery point* 'p' in operating region 'd', where 'd1', 'd2', and 'd3' are all applicable.

1.2.1.2 $DAM\_CRRQ_k^p$ = the *day-ahead market* collapsed region range quantity, which is the portion of the *pseudo-unit* operating region quantity of

energy (in MW) calculated by the *day-ahead market calculation engine* at *pseudo-unit delivery point* 'p' that is in the *minimum loading point* operating region 'd1' and *dispatchable* operating region 'd2' before any de-ratings are applied for *market participant* 'k', and is derived as follows:

$$DAM\_CRRQ_{k}^{p} = DAM\_ORRQ_{k,d1}^{p} + DAM\_ORRQ_{k,d2}^{p}$$

1.2.1.3 $DAM\_MRRQ_{k,h}^{p}$ = the *day-ahead market minimum loading point* region range quantity (in MW), which is the portion of the greater of the $DAM\_QSI_{k,h}^{p}$ and $DAM\_EOP_{k,h}^{p}$ associated with *pseudo-unit delivery point* 'p' that is in the *minimum loading point* operating region 'd1' for *pseudo-unit delivery point* 'p' for *market participant* 'k' in *settlement hour* 'h', and is derived as follows:

$$DAM\_MRRQ_{k,h}^{p} = Min\left(DAM\_ORRQ_{k,d1}^{p}, Max\left(DAM\_QSI_{k,h}^{p}, DAM\_EOP_{k,h}^{p}\right)\right)$$

1.2.1.4 $DAM\_DRRQ_{k,h}^{p}$ = the *day-ahead market dispatchable* region range quantity (in MW), which is the portion of the greater of the $DAM_QSI_{k,h}^{c}$and $DAM\_EOP_{k,h}^{c}$ associated with *pseudo-unit delivery point* 'p' that is in the *minimum loading point* operating region 'd1' and *dispatchable* operating region 'd2' for *market participant* k' in *settlement hour* 'h', and is derived as follows:

$$DAM\_DRRQ_{k,h}^{p} = Min\left(DAM\_CRRQ_{k}^{p}, DAM\_MRRQ_{k,h}^{p} + \frac{Max\left(0, Max\left(DAM\_QSI_{k,h}^{c}, DAM\_EOP_{k,h}^{c}\right) - MLP_{k}^{c}\right)}{\left(1 - ST\_Portion_{k,d2}^{p}\right)}\right)$$

Where:

a. 'c' is the combustion turbine *delivery point* associated with *pseudo-unit delivery point* 'p'.

1.2.1.5 $DAM\_DFRRQ_{k,h}^{p}$ = the *day-ahead market* duct firing region range quantity (in MW), which is the portion of the greater of the $DAM\_QSI_{k,h}^{p}$ and $DAM\_EOP_{k,h}^{p}$ associated with *pseudo-unit delivery point* 'p' that is in the *minimum loading point* operating region 'd1', *dispatchable* operating region 'd2', and duct firing operating region 'd3' of the *pseudo-unit* for *market participant* 'k' in *settlement hour* 'h', and is derived as follows:

$$DAM\_DFRRQ^{p}_{k,h} = Min\Big(DAM\_ORRQ^{p}_{k,d1} + DAM\_ORRQ^{p}_{k,d2} + DAM\_ORRQ^{p}_{k,d3}, Max\big(Max\big(DAM\_QSI^{p}_{k,h}, DAM\_EOP^{p}_{k,h}\big) + DAM\_CRRQ^{p}_{k} - DAM\_DRRQ^{p}_{k,h}, DAM\_CRRQ^{p}_{k}\big)\Big)$$

1.2.1.6 $DAM\_ST\_Q^{p}_{k,h}$ = an M-by-1 matrix (where M is M^{p}_{k}) of steam turbine quantity values (in MW), calculated from the $DAM\_BE^{p}_{k,h}$ and $ST\_Portion^{p}_{k,d}$ for *market participant* 'k' at *pseudo-unit delivery point* 'p' during *settlement hour* 'h', and is derived as follows:

Scenario	Domain	$DAM\_ST\_Q^{p}_{k,h}$
1	$0 < DAM\_BE[i,2]^{p}_{k,h} \leq DAM\_MRRQ^{p}_{k,h}$	$DAM\_BE[i,2]^{p}_{k,h} \times ST\_Portion^{p}_{k,d1}$
2	$DAM\_MRRQ^{p}_{k,h} < DAM\_BE[i,2]^{p}_{k,h} \leq DAM\_DRRQ^{p}_{k,h}$	$DAM\_MRRQ^{p}_{k,h} \times ST\_Portion^{p}_{k,d1} + \big(DAM\_BE[i,2]^{p}_{k,h} - DAM\_MRRQ^{p}_{k,h}\big) \times ST\_Portion^{p}_{k,d2}$
3	$DAM\_DRRQ^{p}_{k,h} < DAM\_BE[i,2]^{p}_{k,h} \leq CRRQ^{p}_{k}$	$DAM\_MRRQ^{p}_{k,h} \times ST\_Portion^{p}_{k,d1} + \big(DAM\_DRRQ^{p}_{k,h} - DAM\_MRRQ^{p}_{k,h}\big) \times ST\_Portion^{p}_{k,d2}$
4	$CRRQ^{p}_{k} < DAM\_BE[i,2]^{p}_{k,h} \leq DAM\_DFRRQ^{p}_{k,h}$	$DAM\_MRRQ^{p}_{k,h} \times ST\_Portion^{p}_{k,d1} + \big(DAM\_DRRQ^{p}_{k,h} - DAM\_MRRQ^{p}_{k,h}\big) \times ST\_Portion^{p}_{k,d2} + \big(DAM\_BE[i,2]^{p}_{k,h} - CRRQ^{p}_{k}\big) \times ST\_Portion^{p}_{k,d3}$
5	$DAM\_DFRRQ^{p}_{k,h} < DAM\_BE[i,2]^{p}_{k,h}$	$DAM\_MRRQ^{p}_{k,h} \times ST\_Portion^{p}_{k,d1} + \big(DAM\_DRRQ^{p}_{k,h} - DAM\_MRRQ^{p}_{k,h}\big) \times ST\_Portion^{p}_{k,d2} + \big(DAM\_DFRRQ^{p}_{k,h} - CRRQ^{p}_{k}\big) \times ST\_Portion^{p}_{k,d3}$

or simplified as:

$$DAM\_ST\_Q[i]^{p}_{k,h} = Min\big(DAM\_MRRQ^{p}_{k,h}, DAM\_BE[i,2]^{p}_{k,h}\big) \times ST\_Portion^{p}_{k,d1} + Max\big(0, Min\big(DAM\_DRRQ^{p}_{k,h}, DAM\_BE[i,2]^{p}_{k,h}\big) - DAM\_MRRQ^{p}_{k,h}\big) \times ST\_Portion^{p}_{k,d2} + Max\big(0, Min\big(DAM\_DFRRQ^{p}_{k,h}, DAM\_BE[i,2]^{p}_{k,h}\big) - DAM\_CRRQ^{p}_{k}\big) \times ST\_Portion^{p}_{k,d3}$$

1.2.1.7 $DAM\_ST\_PC^{p}_{k,h}$ = an M-by-2 matrix (where M is M^{p}_{k}) of *price-quantity pairs* representing the incremental quantity of *energy* at each price for each *pseudo-unit*, calculated from the price component of $DAM_BE^{p}_{k,h}$and

the quantity component of $DAM\_ST\_Q^{p}_{k,h}$ for *market participant* 'k' at *pseudo-unit delivery point* 'p' during *settlement hour* 'h', and is derived as follows:

PQ Pair Matrix	=	Price [Row 'i', Column 1)	Quantity [Row 'i', Column 2]
$DAM\_ST\_PC^{p}_{k,h}$	Row i = 1	$DAM\_BE[i,1]^{p}_{k,h}$	0
	Row i ≥ 2	$DAM\_BE[i,1]^{p}_{k,h}$	$DAM\_ST\_Q[i]^{p}_{k,h} - DAM\_ST\_Q[i-1]^{p}_{k,h}$

1.2.1.8 $DAM\_ST\_PC^{s}_{k,h}$ = a Y-by-2 matrix (where $Y \leq \sum_{p=1}^{N} M^{p}_{k}$) of *price-quantity pairs* calculated from the price component and the quantity component from all the calculated $DAM\_ST\_PC^{p}_{k,h}$ for *market participant* 'k' associated with steam turbine *delivery point* 's' during *settlement hour* 'h', and is derived as follows:

PQ Pair Matrix (assuming 4 included *PSUs*)	=	Price [Row 'i', Column 1]	Quantity [Row 'i', Column 2]
$DAM\_ST\_PC^{s}_{k,h}$	Rows i=1 to m1, j=1 to m1	$DAM\_ST\_PC[j,1]^{p1}_{k,h}$	$DAM\_ST\_PC[j,2]^{p1}_{k,h}$
	Rows i=(m1+1) to (m1+m2), j=1 to m2	$DAM\_ST\_PC[j,1]^{p2}_{k,h}$	$DAM\_ST\_PC[j,2]^{p2}_{k,h}$
	Rows i=(m2+1) to (m1+m2+m3), j=1 to m3	$DAM\_ST\_PC[j,1]^{p3}_{k,h}$	$DAM\_ST\_PC[j,2]^{p3}_{k,h}$
	Rows i=(m3+1) to (m1+m2+m3+m4), j=1 to m4	$DAM\_ST\_PC[j,1]^{p4}_{k,h}$	$DAM\_ST\_PC[j,2]^{p4}_{k,h}$

Where:

a. For a *pseudo-unit* to be included in the $DAM\_ST\_PC^{s}_{k,h}$ matrix, for the relevant *settlement hour*:

i. it must not have *offered* in the *day-ahead market* in *single cycle mode*; and

ii. the associated combustion turbine must have received a *day-ahead schedule* greater than or equal to its *minimum loading point.*

b. $DAM\_ST\_PC^{s}_{k,h}$ matrix will be modified in the following order:

i. any *price-quantity pairs* with the same price shall have their quantities aggregated into a single *price-quantity pair*;

ii. any *price-quantity pairs* with a zero quantity shall be removed from the $DAM\_ST\_PC^{s}_{k,h}$ matrix;

iii. the *price-quantity pairs* shall be sorted by increasing price; and

iv. a new first row will be added and a *price-quantity pair* will be inserted into the first row. The inserted *price-quantity pair* will have a quantity value of zero and its price value will be equal to the price value of the *price-quantity pair* in the new row 2.

c. m1 is the number of rows in $DAM\_ST\_PC^{p}_{k,h}$ from *PSU1.*

d. m2 is the number of rows in $DAM\_ST\_PC^{p}_{k,h}$ from *PSU2.*

e. m3 is the number of rows in $DAM\_ST\_PC^{p}_{k,h}$ from *PSU3.*

f. m4 is the number of rows in $DAM\_ST\_PC^{p}_{k,h}$ from *PSU4.*

DIPC

1.2.1.9 $DAM\_DIPC^{s}_{k,h}$= the *day-ahead market energy* price curve for a *non-quick start resource*, represented as an N-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at steam turbine *delivery point* 's' in *settlement hour* 'h', arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2, and where 'i' is the current row of the matrix of *price-quantity pairs,* and is derived as follows:

Derived Interval Price Curve Matrix	=	Price [Row 'i', Column 1]	Quantity [Row 'i', Column 2]
$DAM\_DIPC^{s}_{k,h}$	Row i	$DAM\_ST\_PC[i,1]^{s}_{k,h}$	$\sum_{j=1}^{i} DAM\_ST\_PC[j,2]^{s}_{k,h}$

1.2.1.10 $DAM\_DIPC^{c}_{k,h}$= the *day-ahead market energy* price curve for a *non-quick start resource*, represented as an N-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at combustion turbine *delivery point* 'c' in *settlement hour* 'h', arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2, and where 'i' is the current row of the matrix of *price-quantity pairs,* and is derived as follows:

Scenario	Domain	CT Quantity
1	$0 < DAM\_BE[i,2]^{p}_{k,h} \leq DAM\_MRRQ^{p}_{k,h}$	$DAM\_BE[i,2]^{p}_{k,h} \times \left(1 - ST\_Portion^{p}_{k,d1}\right)$
2	$DAM\_MRRQ^{p}_{k,h} < DAM\_BE[i,2]^{p}_{k,h} \leq DAM\_DRRQ^{p}_{k,h}$	$DAM\_MRRQ^{p}_{k,h} \times \left(1 - ST\_Portion^{p}_{k,d1}\right) + \left(DAM\_BE[i,2]^{p}_{k,h} - DAM\_MRRQ^{p}_{k,h}\right) \times \left(1 - ST\_Portion^{p}_{k,d2}\right)$
3	$DAM\_DRRQ^{p}_{k,h} < DAM\_BE[i,2]^{p}_{k,h}$	$DAM\_MRRQ^{p}_{k,h} \times \left(1 - ST\_Portion^{p}_{k,d1}\right) + \left(DAM\_DRRQ^{p}_{k,h} - DAM\_MRRQ^{p}_{k,h}\right) \times \left(1 - ST\_Portion^{p}_{k,d2}\right)$

or simplified as:

Derived Interval Price Curve Matrix	=	Price [Row 'i', Column 1]	Quantity [Row 'i', Column 2]
$DAM\_DIPC^{c}_{k,h}$	Row i	$DAM\_BE[i,1]^{p}_{k,h}$	$Min\left(DAM\_BE[i,2]^{p}_{k,h}, DAM\_DRRQ^{p}_{k,h}\right) - \left[Min\left(DAM\_MRRQ^{p}_{k,h}, DAM\_BE[i,2]^{p}_{k,h}\right) \times ST\_Portion^{p}_{k,d1} + Max\left(0, Min\left(DAM\_DRRQ^{p}_{k,h}, DAM\_BE[i,2]^{p}_{k,h}\right) - DAM\_MRRQ^{p}_{k,h}\right) \times ST\_Portion^{p}_{k,d2}\right]$

Where:

a. Any *price-quantity pairs* in the $DAM\_DIPC^{c}_{k,h}$ price curve matrix that have the same quantity value as a prior quantity value in the price curve matrix shall have their price component and quantity component set to zero.

DIGQ

1.2.1.11 $DAM\_DIGQ^{s}_{k,h}$= the portion of the *day-ahead schedule* quantity of *energy* (in MW) scheduled for injection for *market participant* 'k' at steam turbine *delivery point* 's' in *settlement hour* 'h', and is derived as follows:

$$DAM\_DIGQ^{s}_{k,h} = \sum_{p=1}^{N} DAM\_STP\_QSI_{k,h}$$

Where:

a. N is the set of all *pseudo-units* associated with steam turbine *delivery point* 's' that for the relevant *settlement hour*:

i. did not *offer* in the *day-ahead market* in *single cycle mode*; and

ii. had a *day-ahead schedule* greater than or equal to its *minimum loading point*.

1.2.1.12 $DAM\_EOP\_DIGQ^{s}_{k,h}$= the *day-ahead market* economic operating point of the portion of the *day-ahead schedule* quantity of *energy* scheduled for injection for *market participant* 'k' at steam turbine *delivery point* 's' in *settlement hour* 'h', and is derived as follows:

$$DAM\_EOP\_DIGQ^{s}_{k,h} = \sum_{p=1}^{N} \left[DAM\_EOP^{p}_{k,h} - DAM\_EOP^{c}_{k,h} \right]$$

Where:

a. N is the set of all *pseudo-units* associated with steam turbine *delivery point* 's' that for the relevant *settlement hour* 'h':

i. did not *offer* in the *day-ahead market* in *single cycle mode*; and

ii. had a *day-ahead schedule* greater than or equal to its *minimum loading point*.

1.3 Day-Ahead Market – Operating Reserve

1.3.1 The *IESO* shall determine the following *day-ahead market* data in accordance with the following, and provide them directly to the *settlement process:*

1.3.1.1 $OR\_DAM\_DRRQ^{p}_{r,k,h}$ = the *day-ahead market dispatchable* region range quantity for *operating reserve* (in MW), which is the portion of the greater of the $DAM\_QSOR^{c}_{r,k,h}$ and $DAM\_OR\_EOP^{c}_{r,k,h}$ associated with *pseudo-unit delivery point* 'p' that is in the *dispatchable* operating region 'd2' for *market participant* 'k' in *settlement hour* 'h', and is derived as follows:

$$OR\_DAM\_DRRQ^{p}_{r,k,h} = \frac{Max\left(DAM\_QSOR^{c}_{r,k,h}, DAM\_OR\_EOP^{c}_{r,k,h}\right)}{\left(1 - ST\_Portion^{p}_{k,d2}\right)}$$

Where:

a. 'c' is the combustion turbine *delivery point* associated with *pseudo-unit delivery point* 'p'

1.3.1.2 $OR\_DAM\_DFRRQ^{p}_{r,k,h}$ = the *day-ahead market* duct-firing region range quantity for *operating reserve* (in MW), which is the portion of the greater of the $DAM\_QSOR^{p}_{r,k,h}$ and $DAM\_OR\_EOP^{p}_{r,k,h}$ associated with *pseudo-unit delivery point* 'p' that is in the *dispatchable* operating region 'd2' and duct firing operating region 'd3' for *market participant* 'k' in *settlement hour* 'h', and is derived as follows:

$$OR\_DAM\_DFRRQ^{p}_{r,k,h} = Max\left(OR\_DAM\_DRRQ^{p}_{r,k,h}, Max\left(DAM\_QSOR^{p}_{r,k,h}, DAM\_OR\_EOP^{p}_{r,k,h}\right)\right)$$

1.3.1.3 $DAM\_OR\_ST\_Q^{p}_{r,k,h}$ = an M-by-1 matrix (where M is M^{p}_{k}) of steam turbine quantity values (in MW) calculated from the $DAM\_BOR^{p}_{r,k,h}$ and the $ST\_Portion^{p}_{k,d}$ for *market participant* 'k' at *pseudo-unit delivery point* 'p' during *settlement hour* 'h', and is derived as follows:

$$DAM\_ST\_Q^{p}_{r,k,h} = Min\left(OR\_DAM\_DRRQ^{p}_{r,k,h}, DAM\_BOR[i,2]^{p}_{r,k,h}\right) \times ST\_Portion^{p}_{k,d2} + Max\left[0, Min\left(OR\_DAM\_DFRRQ^{p}_{k,r,h}, DAM\_BOR[i,2]^{p}_{r,k,h}\right) - OR\_DAM\_DRRQ^{p}_{r,k,h}\right] \times ST\_Portion^{p}_{k,d3}$$

1.3.1.4 $DAM\_OR\_ST\_PC^{p}_{r,k,h}$ = an M-by-2 matrix (where M is M^{p}_{k}) of *price-quantity pairs*, calculated from the price component of $DAM\_BOR^{p}_{r,k,h}$ and the quantity component of $DAM\_ST\_Q^{p}_{r,k,h}$ for *market participant* 'k' at *pseudo-unit delivery point* 'p' during *settlement hour* 'h', and is derived as follows:

PQ Pair Matrix	=	Price [Row 'i', Column 1]	Quantity [Row 'i', Column 2]
$DAM\_OR\_ST\_PC^{p}_{r,k,h}$	Row $i = 1$	$DAM\_BOR[i,1]^{p}_{r,k,h}$	0
	Row $i \geq 2$	$DAM\_BOR[i,1]^{p}_{r,k,h}$	$DAM\_OR\_ST\_Q[i]^{p}_{r,k,h} - DAM\_ST\_Q[i-1]^{p}_{r,k,h}$

1.3.1.5 $DAM\_OR\_ST\_PC^{s}_{r,k,h}$ = a Y-by-2 matrix (where $Y \leq \sum^{N}_{p=1} (M^{p}_{k})$) of *price-quantity pairs*, calculated from the price component and the quantity component from all the calculated $DAM\_OR\_ST\_PC^{p}_{r,k,h}$ for *market*

participant 'k', associated with steam turbine *delivery point* 's' during *settlement hour* 'h', and is derived as follows:

DAM PQ Pair Matrix (assuming 4 included *PSUs*)	=	Price [Row 'i', Column 2]	Quantity [Row 'i', Column 2]
$DAM\_OR\_ST\_PC^{s}_{r,k,h}$	Rows i=1 to m1, j=1 to m1	$DAM\_OR\_ST\_PC[j,1]^{p1}_{r,k,h}$	$DAM\_OR\_ST\_PC[j,2]^{p1}_{r,k,h}$
	Rows i=(m1+1) to (m1+m2), j=1 to m2	$DAM\_OR\_ST\_PC[j,1]^{p2}_{r,k,h}$	$DAM\_OR\_ST\_PC[j,2]^{p2}_{r,k,h}$
	Rows i=(m2+1) to (m1+m2+m3), j=1 to m3	$DAM\_OR\_ST\_PC[j,1]^{p3}_{r,k,h}$	$DAM\_OR\_ST\_PC[j,2]^{p3}_{r,k,h}$
	Rows i=(m3+1) to (m1+m2+m3+m4), j=1 to m4	$DAM\_OR\_ST\_PC[j,1]^{p4}_{r,k,h}$	$DAM\_OR\_ST\_PC[j,2]^{p4}_{r,k,h}$

Where:

a. For a *pseudo-unit* to be included in the $DAM\_OR\_ST\_PC^{s}_{r,k,h}$ matrix, for the relevant *settlement hour,* it must have received a *day-ahead schedule* greater than or equal to its *minimum loading point*.

b. the *price-quantity pairs* shall be sorted by increasing price;

c. $DAM\_OR\_ST\_PC^{s}_{r,k,h}$ matrix will be modified in the following order:

   i. the *price-quantity pairs* shall be sorted by increasing price;
   ii. any *price-quantity pairs* with the same price shall have their quantities aggregated into a single *price-quantity pair;*
   iii. any *price-quantity pairs* with a zero quantity shall be removed from the $DAM\_OR\_ST\_PC^{s}_{r,k,h}$ matrix; and
   iv. a new first row will be added and a *price-quantity pair* will be inserted into the first row. The inserted *price-quantity pair* will have a quantity value of zero and its price value will be equal to the price value of the *price-quantity pair* in the new row 2;

d. m1 is the number of rows in $DAM\_OR\_ST\_PC^{p}_{r,k,h}$ from *PSU1*.

e. m2 is the number of rows in $DAM\_OR\_ST\_PC^{p}_{r,k,h}$ from *PSU2*.

f. m3 is the number of rows in $DAM\_OR\_ST\_PC^{p}_{r,k,h}$ from *PSU3*.

g. m4 is the number of rows in $DAM\_OR\_ST\_PC^{p}_{r,k,h}$ from *PSU4*.

DIPC

1.3.1.6 $DAM\_OR\_DIPC^{s}_{r,k,h}$= the *day-ahead market class r reserve* price curve for a *non-quick start resource*, represented as an X-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at steam turbine *delivery point* 's' during *settlement hour* 'h' arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2, where r1, r2, and r3 are all applicable, and is derived as follows:

Derived Interval Price Curve Matrix	=	Price [Row 'i', Column 1]	Quantity [Row 'i', Column 2]
$DAM\_OR\_DIPC^{s}_{r,k,h}$	Row i	$DAM\_OR\_ST\_PC[i,1]^{s}_{r,k,h}$	$\sum_{j=1}^{i} DAM\_OR\_ST\_PC[j,2]^{s}_{r,k,h}$

Where:

a. any *price-quantity pairs* in the $DAM\_OR\_DIPC^{s}_{r,k,h}$ price curve matrix that have the same quantity value as a prior quantity value in the price curve matrix shall have their price component and quantity component set to zero.

1.3.1.7 $DAM\_OR\_DIPC^{c}_{r,k,h}$= the *day-ahead market class r reserve* price curve for a *non-quick start resource*, represented as an X-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at combustion turbine *delivery point* 'c' during *settlement hour* 'h' arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2, where r1, r2, and r3 are all applicable, and is derived as follows:

Derived Interval Price Curve Matrix	=	Price [Row 'i', Column 1]	Quantity [Row 'i', Column 2]
$DAM\_OR\_DIPC^{c}_{r,k,h}$	Row i	$DAM\_BOR[i,1]^{p}_{r,k,h}$	$Min\left(DAM\_BOR[i,2]^{p}_{r,k,h}, OR\_DAM\_DRRQ^{p}_{r,k,h}\right) \times \left(1 - ST\_Portion^{p}_{k,d2}\right)$

Where:

a. any *price-quantity pairs* in the $DAM\_OR\_DIPC^{c}_{r,k,h}$ price curve matrix that have the same quantity value as a prior quantity value in the price curve matrix shall have their price component and quantity component set to zero.

1.4 Pre-Dispatch – Energy

1.4.1 The *IESO* shall determine the following *pre-dispatch process* data in accordance with the following, and provide them directly to the *settlement process:*

Intermediate Variables

1.4.1.1 $PD\_MRRQ_{k,h}^{p,t}$= the pre-dispatch *minimum loading point* region range quantity (in MW), which is the portion of the $PD\_QSI_{k,h}^{p,pdm}$ associated with *pseudo-unit delivery point* 'p' in the *minimum loading point* operating region 'd1' for *market participant* 'k' in *metering interval* 't' of *settlement hour* 'h', and is derived as follows:

$$PD\_MRRQ_{k,h}^{p,t} = Min\left(ORRQ_{k,d1}^{p}, PD\_QSI_{k,h}^{p,pdm}\right)$$

Where:

a. $PD\_MRRQ_{k,h}^{p,t}$ is only calculated for *pseudo-units* whose associated combustion turbine was determined to have experienced a *generator failure*.

1.4.1.2 $PD\_DRRQ_{k,h}^{p,t}$= the pre-dispatch *dispatchable* region range quantity (in MW), which is the portion of the $PD\_QSI_{k,h}^{p,pdm}$ associated with *pseudo-unit delivery point* 'p' in the *minimum loading point* operating region 'd1' and *dispatchable* operating region 'd2' for *market participant* 'k' in *metering interval* 't' of *settlement hour* 'h', and derived as follows:

$$PD\_DRRQ_{k,h}^{p,t} = Min\left(CRRQ_{k}^{p}, PD\_MRRQ_{k,h}^{p,t} + \frac{Max\left(PD\_QSI_{k,h}^{c,pdm} - MLP_{k}^{c}, 0\right)}{\left(1 - ST\_Portion_{k,d2}^{p}\right)} \right)$$

Where:

a. 'c' is the combustion turbine *delivery point* associated with *pseudo-unit delivery point* 'p'; and

b. $PD\_DRRQ_{k,h}^{p,t}$ is only calculated for *pseudo-units* whose associated combustion turbine was determined to have experienced a *generator failure*.

1.4.1.3 $PD\_DFRRQ_{k,h}^{p,t}$ = the pre-dispatch duct firing region range quantity (in MW), which is the portion of the $PD\_QSI_{k,h}^{p,pdm}$ associated with *pseudo-unit delivery point* 'p' that is in the *minimum loading point* operating region 'd1', *dispatchable* operating region 'd2', and duct firing operating region 'd3' of the *pseudo-unit* for *market participant* 'k' in *metering interval* 't' of *settlement hour* 'h', and derived as follows:

$$PD\_DFRRQ_{k,h}^{p,t} = Min\Big(ORRQ_{k,d1}^{p} + ORRQ_{k,d2}^{p} + ORRQ_{k,d3}^{p}, Max\big(PD\_QSI_{k,h}^{p,pdm} + CRRQ_{k}^{p} - PD\_DRRQ_{k,h}^{p,t}, CRRQ_{k}^{p}\big)\Big)$$

Where:

a. $PD\_DFRRQ_{k,h}^{p,t}$ is only calculated for *pseudo-units* whose associated combustion turbine was determined to have experienced a *generator failure*.

1.4.1.4 $PD\_ST\_Q_{k,h}^{p,t}$= an M-by-1 matrix (where M is M_{k}^{p}) of steam turbine quantity values (in MW) calculated from the $PD\_BE_{k,h}^{p,pdm}$ and $ST\_Portion_{k,d}^{p}$ for *market participant* 'k' at *pseudo-unit delivery point* 'p' during *metering interval* 't' of *settlement hour* 'h', and derived as follows:

Scenario	Domain	$PD\_ST\_Q_{k,h}^{p,t}$
1	$0 < PD\_BE[i,2]_{k,h}^{p,pdm} \leq PD\_MRRQ_{k,h}^{p,t}$	$PD\_BE[i,2]_{k,h}^{p,pdm} \times ST\_Portion_{k,d1}^{p}$
2	$PD\_MRRQ_{k,h}^{p,t} < PD\_BE[i,2]_{k,h}^{p,pdm} \leq PD\_DRRQ_{k,h}^{p,t}$	$PD\_MRRQ_{k,h}^{p,t} \times ST\_Portion_{k,d1}^{p} + \left(PD\_BE[i,2]_{k,h}^{p,pdm} - PD\_MRRQ_{k,h}^{p,t}\right) \times ST\_Portion_{k,d2}^{p}$
3	$PD\_DRRQ_{k,h}^{p,t} < PD\_BE[i,2]_{k,h}^{p,pdm} \leq CRRQ_{k}^{p}$	$PD\_MRRQ_{k,h}^{p,t} \times ST\_Portion_{k,d1}^{p} + \left(PD\_DRRQ_{k,h}^{p,t} - PD\_MRRQ_{k,h}^{p,t}\right) \times ST\_Portion_{k,d2}^{p}$
4	$CRRQ_{k}^{p} < PD\_BE[i,2]_{k,h}^{p,pdm} \leq PD\_DFRRQ_{k,h}^{p,t}$	$PD\_MRRQ_{k,h}^{p,t} \times ST\_Portion_{k,d1}^{p} + \left(PD\_DRRQ_{k,h}^{p,t} - PD\_MRRQ_{k,h}^{p,t}\right) \times ST\_Portion_{k,d2}^{p} + \left(PD\_BE[i,2]_{k,h}^{p,pdm} - CRRQ_{k}^{p}\right) \times ST\_Portion_{k,d3}^{p}$
5	$PD\_DFRRQ_{k,h}^{p,t} < PD\_BE[i,2]_{k,h}^{p,pdm}$	$PD\_MRRQ_{k,h}^{p,t} \times ST\_Portion_{k,d1}^{p} + \left(PD\_DRRQ_{k,h}^{p,t} - PD\_MRRQ_{k,h}^{p,t}\right) \times ST\_Portion_{k,d2}^{p} + \left(PD\_DFRRQ_{k,h}^{p,t} - CRRQ_{k}^{p}\right) \times ST\_Portion_{k,d3}^{p}$

or simplified as:

$$PD\_ST\_Q_{k,h}^{p,t} = Min\left(PD\_MRRQ_{k,h}^{p,t}, PD\_BE[i,2]_{k,h}^{p,pdm}\right) \times ST\_Portion_{k,d1}^{p} + Max\left(0, Min\left(PD\_DRRQ_{k,h}^{p,t}, PD\_BE[i,2]_{k,h}^{p,pdm}\right) - PD\_MRRQ_{k,h}^{p,t}\right) \times ST\_Portion_{k,d2}^{p} + Max\left(0, Min\left(PD\_DFRRQ_{k,h}^{p,t}, PD\_BE[i,2]_{k,h}^{p,pdm}\right) - CRRQ_{k}^{p}\right) \times ST\_Portion_{k,d3}^{p}$$

1.4.1.5 $PD\_ST\_PC_{k,h}^{p,t}$ = an M-by-2 matrix (where M is M_k^p) of *price-quantity pairs,* calculated from the price component of $PD\_BE_{k,h}^{p,pdm}$ and quantity component of the $PD\_ST\_Q_{k,h}^{p,t}$ for *market participant* 'k' at *pseudo-unit delivery point* 'p' during *metering interval* 't' of *settlement hour* 'h', and is derived as follows:

PQ Pair Matrix	=	Price [Row 'i', Column 1)	Quantity [Row 'i', Column 2]
$PD\_ST\_PC_{k,h}^{p,t}$	Row i = 1	$PD\_BE[i,1]_{k,h}^{p,pdm}$	0
	Row i ≥ 2	$PD\_BE[i,1]_{k,h}^{p,pdm}$	$PD\_ST\_Q[i]_{k,h}^{p,t} - PD\_ST\_Q[i-1]_{k,h}^{p,t}$

1.4.1.6 $PD\_S\_ST\_PC_{k,h}^{s,t}$ = a Y-by-2 matrix (where $Y \leq \sum_{p=1}^{N} M_k^p$) of *price-quantity pairs,* calculated from the price component and the quantity component from all calculated $PD\_ST\_PC_{k,h}^{p,t}$ for *market participant* 'k' associated with steam turbine *delivery point* 's' during *metering interval* 't' of *settlement hour* 'h', and is derived as follows:

PQ Pair Matrix (assuming 4 included *PSUs*)	=	Price [Row 'i', Column 1]	Quantity [Row 'i', Column 2]
$PD\_S\_ST\_PC_{k,h}^{s,t}$	Rows i=1 to m1, j=1 to m1	$PD\_ST\_PC[j,1]_{k,h}^{p1,t}$	$PD\_ST\_PC[j,2]_{k,h}^{p1,t}$
	Rows i=(m1+1) to (m1+m2), j=1 to m2	$PD\_ST\_PC[j,1]_{k,h}^{p2,t}$	$PD\_ST\_PC[j,2]_{k,h}^{p2,t}$
	Rows i=(m2+1) to (m1+m2+m3), j=1 to m3	$PD\_ST\_PC[j,1]_{k,h}^{p3,t}$	$PD\_ST\_PC[j,2]_{k,h}^{p3,t}$
	Rows i=(m3+1) to (m1+m2+m3+m4), j=1 to m4	$PD\_ST\_PC[j,1]_{k,h}^{p4,t}$	$PD\_ST\_PC[j,2]_{k,h}^{p4,t}$

Where:

a. $PD\_S\_ST\_PC_{k,h}^{s,t}$ matrix will be modified in the following order:

i. any *price-quantity pairs* with the same price shall have their quantities aggregated into a single *price-quantity pair*;

ii. any *price-quantity pairs* with a zero quantity shall be removed from the $PD\_S\_ST\_PC_{k,h}^{s,t}$ matrix;

iii. the *price-quantity pairs* shall be sorted by increasing price; and

iv. a new first row will be added and a *price-quantity pair* will be inserted into the first row. The inserted *price-quantity pair* will

have a quantity value of zero and its price value will be equal to the price value of the *price-quantity pair* in the new row 2.

b. m1 is the number of rows in $PD\_ST\_PC_{k,h}^{p,t}$ from *PSU1.*

c. m2 is the number of rows in $PD\_ST\_PC_{k,h}^{p,t}$ from *PSU2.*

d. m3 is the number of rows in $PD\_ST\_PC_{k,h}^{p,t}$ from *PSU3.*

e. m4 is the number of rows in $PD\_ST\_PC_{k,h}^{p,t}$ from *PSU4.*

DIPC

1.4.1.7 $PD\_DIPC_{k,h}^{s,t}$= *generator failure* charge – guarantee cost component *energy* price curve of a *GOG-eligible resource*, represented as a N-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at steam turbine *delivery point* 's' during *metering interval* 't' of *settlement hour* 'h', arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and the *offered* quantities 'Q' are in column 2, and is derived as follows:

Price Curve Matrix	=	Price [Row 'i', Column 1]	Quantity [Row 'i', Column 2]
$PD\_DIPC_{k,h}^{s,t}$	Row i	$PD\_S\_ST\_PC[i,1]_{k,h}^{s,t}$	$\sum_{j=1}^{i} PD\_S\_ST\_PC[j,2]_{k,h}^{s,t}$

Where:

a. the $PD\_DIPC_{k,h}^{s,t}$ price curve matrix shall only be constructed for each combustion turbine determined to have experienced a *generator failure*.

1.4.1.8 $PD\_DIPC_{k,h}^{c,t}$ = *generator failure* charge – guarantee cost component *energy* price curve of a *GOG-eligible resource*, represented as an N-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at combustion turbine *delivery point* 'c' during *metering interval* 't' of *settlement hour* 'h', arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and the *offered* quantities 'Q' are in column 2, and is derived as follows:

Derived Interval Price Curve Matrix	=	Price [Row 'i', Column 1]	Quantity [Row 'i', Column 2]
$PD\_DIPC_{k,h}^{c,t}$	Row i	$PD\_BE[i,1]_{k,h}^{p,pdm}$	$Min\left(PD\_BE[i,2]_{k,h}^{p,pdm}, PD\_DRRQ_{k,h}^{p,t}\right)$ $-\left[Min\left(PD\_MRRQ_{k,h}^{p,t}, PD\_BE[i,2]_{k,h}^{p,pdm}\right)\right.$ $\times ST\_Portion_{k,d1}^{p}$ $+ Max\left(0, Min\left(PD\_DRRQ_{k,h}^{p,t}, PD\_BE[i,2]_{k,h}^{p,pdm}\right)\right.$ $\left.\left. - PD\_MRRQ_{k,h}^{p,t}\right) \times ST\_Portion_{k,d2}^{p}\right]$

Where:

a. any *price-quantity pairs* in the $PD\_DIPC_{k,h}^{c,t}$ price curve matrix that have the same quantity value as a prior quantity value in the price curve matrix shall have their price component and quantity component set to zero; and

b. the $PD\_DIPC_{k,h}^{c,t}$ price curve matrix shall only be constructed for each combustion turbine determined to have experienced a *generator failure*.

DIGQ

1.4.1.9 $PD\_DIGQ_{k,h}^{s,t}$ = the *generator failure* charge – guarantee cost component portion of the *pre-dispatch schedule* quantity of *energy* of a *GOG-eligible resource* scheduled for injection for *market participant* 'k' at *steam turbine delivery point* 's' during *metering interval* 't' of *settlement hour* 'h', and is derived as follows:

$$PD\_DIGQ_{k,h}^{s,t} = \sum_{p=1}^{F} PD\_STP\_QSI_{k,h}^{p,pdm}$$

Where:

a. the $PD\_DIGQ_{k,h}^{s,t}$ price curve matrix shall only be constructed for each combustion turbine determined to have experienced a *generator failure*.

b. 'F' is the set of all *pseudo-units* associated with steam turbine *delivery point* 's' associated with the combustion turbines determined to have experienced a *generator failure*.

1.5 Real-Time Market – Energy

1.5.1 The *IESO* shall determine the following *real-time market* data in accordance with the following, and provide them directly to the *settlement process*:

Intermediate Variables

1.5.1.1 $RT\_ORRQ_{k,d}^{p}$ = the *real-time market* operating region range quantity (in MW), which is the *pseudo-unit* operating region quantity of *energy* calculated by the *real-time calculation engine* for *market participant* 'k' at *pseudo-unit delivery point* 'p' in operating region 'd', where 'd1', 'd2' and 'd3' are all applicable.

1.5.1.2 $RT\_CRRQ_{k}^{p}$= the *real-time market* collapsed region range quantity (in MW), which is the portion of the *pseudo-unit* operating region quantity of *energy* calculated by the *real-time calculation engine* at *pseudo-unit*

delivery point 'p' that is in the *minimum loading point* operating region 'd1' and *dispatchable* operating region 'd2' before any de-ratings are applied for *market participant* 'k', and is derived as follows:

$$RT\_CRRQ_{k}^{p} = RT\_ORRQ_{k,d1}^{p} + RT\_ORRQ_{k,d2}^{p}$$

1.5.1.3 $RT\_MRRQ_{k,h}^{p,t}$ = the *real-time market minimum loading point* region range quantity (in MW), which is the portion of the greater of the $RT\_QSI_{k,h}^{p,t}$ and $RT\_LC\_EOP_{k,h}^{p,t}$ associated with *pseudo-unit delivery point* 'p' that is in the *minimum loading point* operating region 'd1' for *market participant* 'k' in *metering interval* 't' of *settlement hour* 'h', and is derived as follows:

$$RT\_MRRQ_{k,h}^{p,t} = Min\left(RT\_ORRQ_{k,d1}^{p,t}, Max\left(RT\_LC\_EOP_{k,h}^{p,t}, RT\_QSI_{k,h}^{p,t}\right)\right)$$

1.5.1.4 $RT\_DRRQ_{k,h}^{p,t}$ = the *real-time market dispatchable* region range quantity (in MW), which is the portion of the greater of the $RT\_QSI_{k,h}^{c,t}$ and $RT\_LC\_EOP_{k,h}^{c,t}$ associated with *pseudo-unit delivery point* 'p' that is in the *minimum loading point* operating region 'd1' and *dispatchable* operating region 'd2' for *market participant* 'k' in *metering interval* 't' of *settlement hour* 'h', and is derived as follows:

$$RT\_DRRQ_{k,h}^{p,t} = Min\left(RT\_CRRQ_{k}^{p}, RT\_MRRQ_{k,h}^{p,t} + \frac{Max\left(0, Max\left(RT\_LC\_EOP_{k,h}^{c,t}, RT\_QSI_{k,h}^{c,t}\right) - MLP_{k}^{c}\right)}{\left(1 - RT\_ST\_Portion_{k,h,d2}^{p,t}\right)}\right)$$

Where:

a. 'c' is the combustion turbine *delivery point* associated with *pseudo-unit delivery point* 'p'

1.5.1.5 $RT\_DFRRQ_{k,h}^{p,t}$ = the *real-time market* duct firing region range quantity (in MW), which is the portion of the greater of the $RT_QSI_{k,h}^{p,t}$and $RT\_LC\_EOP_{k,h}^{p,t}$ associated with *pseudo-unit delivery point* 'p' that is in the *minimum loading point* operating region 'd1', *dispatchable* operating region 'd2', and duct firing operating region 'd3', plus any quantity of *energy* associated with a combustion turbine derate on the *pseudo-unit* for *market participant* 'k' in *metering interval* 't' of *settlement hour* 'h', and is derived as follows:

$$RT\_DFRRQ_{k,h}^{p,t} = Min\left(RT\_ORRQ_{k,d1}^{p} + RT\_ORRQ_{k,d2}^{p} + RT\_ORRQ_{k,d3}^{p}, Max\left(Max\left(RT\_LC\_EOP_{k,h}^{p,t}, RT\_QSI_{k,h}^{p,t}\right) + RT\_CRRQ_{k}^{p} - RT\_DRRQ_{k,h}^{p,t}, RT\_CRRQ_{k}^{p}\right)\right)$$

1.5.1.6 $RT\_LC\_EOP\_DRRQ_{k,h}^{p,t}$ = the portion of the $RT\_LC\_EOP_{k,h}^{c,t}$ associated with *pseudo-unit delivery point* 'p' that is in the *minimum loading point* operating region 'd1' and *dispatchable* operating region 'd2' for *market participant* 'k' in *metering interval* 't' of *settlement hour* 'h', and is derived as follows:

$$RT\_LC\_EOP\_DRRQ_{k,h}^{p,t} = Min\left(RT\_CRRQ_{k}^{p}, RT\_MRRQ_{k,h}^{p,t} + \frac{Max\left(0, RT\_LC\_EOP_{k,h}^{c,t} - MLP_{k}^{c}\right)}{\left(1 - RT\_ST\_Portion_{k,h,d2}^{p,t}\right)}\right)$$

1.5.1.7 $RT\_LOC\_EOP\_DRRQ_{k,h}^{p,t}$= the portion of the $RT\_LOC\_EOP_{k,h}^{c,t}$ associated with *pseudo-unit delivery point* 'p' that is in the *minimum loading point* operating region 'd1' and *dispatchable* operating region 'd2' for *market participant* 'k' in *metering interval* 't' of *settlement hour* 'h', and derived as follows:

$$RT\_LOC\_EOP\_DRRQ_{k,h}^{p,t} = Min\left(RT\_CRRQ_{k}^{p}, RT\_MRRQ_{k,h}^{p,t} + \frac{Max\left(0, RT\_LOC\_EOP_{k,h}^{c,t} - MLP_{k}^{c}\right)}{\left(1 - RT\_ST\_Portion_{k,h,d2}^{p,t}\right)}\right)$$

Where:

a. 'c' is the combustion turbine *delivery point* associated with *pseudo-unit delivery point* 'p'

1.5.1.8 $RT\_ST\_Q_{k,h}^{p,t}$ = An M-by-1 matrix (where M is M_{k}^{p}) of steam turbine quantity values (in MW) calculated from the $BE_{k,h}^{p}$ and $RT\_ST\_Portion_{k,h,d}^{p,t}$ for *market participant* 'k' at *pseudo-unit delivery point* 'p' during *metering interval* 't' of *settlement hour* 'h', and derived as follows:

$$\begin{aligned} RT\_ST\_Q_{k,h}^{p,t} = {} & Min\left(RT\_MRRQ_{k,h}^{p,t}, BE[i,2]_{k,h}^{p}\right) \times RT\_ST\_Portion_{k,h,d1}^{p,t} \\ & + Max\left(0, Min\left(RT\_DRRQ_{k,h}^{p,t}, BE[i,2]_{k,h}^{p}\right) - RT\_MRRQ_{k,h}^{p,t}\right) \\ & \times RT\_ST\_Portion_{k,h,d2}^{p,t} \\ & + Max\left(0, Min\left(RT\_DFRRQ_{k,h}^{p,t}, BE[i,2]_{k,h}^{p}\right) - RT\_CRRQ_{k}^{p}\right) \\ & \times RT\_ST\_Portion_{k,h,d3}^{p,t} \end{aligned}$$

1.5.1.9 $RT\_ST\_PC_{k,h}^{p,t}$ = An M-by-2 matrix (where M is M_{k}^{p}) of *price-quantity pairs* representing the incremental quantity of *energy* at each price for each *pseudo-unit*, calculated from the price component of $BE_{k,h}^{p}$and the quantity component of $RT\_ST\_Q_{k,h}^{p,t}$ for *market participant* 'k' at *pseudo-*

unit delivery point 'p' during *metering interval* 't' of *settlement hour* 'h', and is derived as follows:

PQ Pair Matrix	=	Price [Row 'i', Column 1)	Quantity [Row 'i', Column 2]
$RT\_ST\_PC_{k,h}^{p,t}$	Row i = 1	$BE[i,1]_{k,h}^{p}$	0
	Row i ≥ 2	$BE[i,1]_{k,h}^{p}$	$RT\_ST\_Q[i]_{k,h}^{p,t} - RT\_ST\_Q[i-1]_{k,h}^{p,t}$

1.5.1.10 $RT\_ST\_PC_{k,h}^{s,t}$ = A Y-by-2 matrix (where $Y \leq \sum_{p=1}^{N} M_k^p$) of *price-quantity pairs,* calculated from the price component and the quantity component from all calculated $RT\_ST\_PC_{k,h}^{p,t}$ for *market participant* 'k' associated with steam turbine *delivery point* 's' during *metering interval* 't' of *settlement hour* 'h', and is derived as follows:

PQ Pair Matrix (assuming 4 included *PSUs*)	=	Price [Row 'i', Column 1]	Quantity [Row 'i', Column 2]
$RT\_ST\_PC_{k,h}^{s,t}$	Rows i=1 to m1, j=1 to m1	$RT\_ST\_PC[j,1]_{k,h}^{p1,t}$	$RT\_ST\_PC[j,2]_{k,h}^{p1,t}$
	Rows i=(m1+1) to (m1+m2), j=1 to m2	$RT\_ST\_PC[j,1]_{k,h}^{p2,t}$	$RT\_ST\_PC[j,2]_{k,h}^{p2,t}$
	Rows i=(m2+1) to (m1+m2+m3), j=1 to m3	$RT\_ST\_PC[j,1]_{k,h}^{p3,t}$	$RT\_ST\_PC[j,2]_{k,h}^{p3,t}$
	Rows i=(m3+1) to (m1+m2+m3+m4), j=1 to m4	$RT\_ST\_PC[j,1]_{k,h}^{p4,t}$	$RT\_ST\_PC[j,2]_{k,h}^{p4,t}$

Where:

a. For a *pseudo-unit* to be included in the $RT\_ST\_PC_{k,h}^{s,t}$ matrix, for the relevant *metering interval*:

i. it must not have *offered* in the *real-time market* in *single cycle mode*; and

ii. the associated combustion turbine received a *real-time schedule* greater than or equal to its *minimum loading point;*

b. $RT_ST_PC_{k,h}^{s,t}$matrix will be modified in the following order:

i. any *price-quantity pairs* with the same price shall have their quantities aggregated into a single *price-quantity pair*;

ii. any *price-quantity pairs* with a zero quantity shall be removed from the $RT_ST_PC_{k,h}^{s,t}$matrix;

iii. the *price-quantity pairs* shall be sorted by increasing price; and

iv. a new first row will be added and a *price-quantity pair* will be inserted into the first row. The inserted *price-quantity pair* will have a quantity value of zero and its price value will be equal to the price value of the *price-quantity pair* in the new row 2.

c. m1 is the number of rows in $RT\_ST\_PC_{k,h}^{p,t}$ from *PSU1.*

d. m2 is the number of rows in $RT\_ST\_PC_{k,h}^{p,t}$ from *PSU2.*

e. m3 is the number of rows in $RT_ST_PC_{k,h}^{p,t}$from *PSU3.*

f. m4 is the number of rows in $RT_ST_PC_{k,h}^{p,t}$from *PSU4.*

1.5.1.11 $RT\_CMT\_ST\_PC_{k,h}^{s,t}$= A Y-by-2 matrix (where $Y \leq \sum_{p=1}^{N} M_{k,h}^{p,t}$) of *price-quantity pairs*, calculated from the price component and quantity component from all calculated $RT\_ST\_PC_{k,h}^{p,t}$ for *market participant* 'k' associated with steam turbine *delivery point* 's' during *metering interval* 't' of *settlement hour* 'h', and is derived as follows:

PQ Pair Matrix (assuming 4 included *PSUs*)	=	Price [Row 'i', Column 1]	Quantity [Row 'i', Column 2]
$RT\_CMT\_ST\_PC_{k,h}^{s,t}$	Rows i=1 to m1, j=1 to m1	$RT\_ST\_PC[j,1]_{k,h}^{p1,t}$	$RT\_ST\_PC[j,2]_{k,h}^{p1,t}$
	Rows i=(m1+1) to (m1+m2), j=1 to m2	$RT\_ST\_PC[j,1]_{k,h}^{p2,t}$	$RT\_ST\_PC[j,2]_{k,h}^{p2,t}$
	Rows i=(m2+1) to (m1+m2+m3), j=1 to m3	$RT\_ST\_PC[j,1]_{k,h}^{p3,t}$	$RT\_ST\_PC[j,2]_{k,h}^{p3,t}$
	Rows i=(m3+1) to (m1+m2+m3+m4), j=1 to m4	$RT\_ST\_PC[j,1]_{k,h}^{p4,t}$	$RT\_ST\_PC[j,2]_{k,h}^{p4,t}$

Where:

a. For a *pseudo-unit* to be included in the $RT\_CMT\_ST\_PC_{k,h}^{s,t}$ matrix, for the relevant *metering interval*:

i. it must be operationally constrained greater than or equal to its *minimum loading point* by the *pre-dispatch calculation engine;*

ii. it must not have *offered* in the *real-time market* in *single cycle mode*; and

iii. the associated combustion turbine must have received a *real-time schedule* greater than or equal to its *minimum loading point*.

b. $RT_CMT_ST_PC_{k,h}^{s,t}$matrix will be modified in the following order:

i. any *price-quantity pairs* with the same price shall have their quantities aggregated into a single *price-quantity pair*;

ii. any *price-quantity pairs* with a zero quantity shall be removed from the $RT_CMT_ST_PC_{k,h}^{s,t}$matrix;

iii. the *price-quantity pairs* shall be sorted by increasing price; and

iv. a new first row will be added and a *price-quantity pair* will be inserted into the first row. The *price-quantity pair* will have a quantity value of zero and its price value will be equal to the price value of the *price-quantity pair* in the new row 2.

c. m1 is the number of rows in $RT\_ST\_PC_{k,h}^{p,t}$ from PSU1.

d. m2 is the number of rows in $RT\_ST\_PC_{k,h}^{p,t}$ from PSU2.

e. m3 is the number of rows in $RT\_ST\_PC_{k,h}^{p,t}$ from PSU3.

f. m4 is the number of rows in $RT\_ST\_PC_{k,h}^{p,t}$ from PSU4.

DIPC

1.5.1.12 $RT\_DIPC_{k,h}^{s,t}$ = the *real-time market energy* price curve for a *non-quick start resource*, represented as an N-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at steam turbine *delivery point* 's' in *metering interval* 't' of *settlement hour* 'h', arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2, and is derived as follows:

Price Curve Matrix	=	Price [Row 'i', Column 1]	Quantity [Row 'i', Column 2]
$RT\_DIPC_{k,h}^{s,t}$	Row i	$RT\_CMT\_ST\_PC[i,1]_{k,h}^{s,t}$	$\sum_{j=1}^{i} RT\_CMT\_ST\_PC[j,2]_{k,h}^{s,t}$

1.5.1.13 $RT\_CMT\_DIPC_{k,h}^{s,t}$ = the *real-time market energy* price curve of a *non-quick start resource*, represented as an N-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at steam turbine *delivery point* 's' in *metering interval* 't' of *settlement hour* 'h', arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2, and is derived as follows:

Price Curve Matrix	=	Price [Row 'i', Column 1]	Quantity [Row 'i', Column 2]
$RT\_CMT\_DIPC_{k,h}^{s,t}$	Row i	$RT\_CMT\_ST\_PC[i,1]_{k,h}^{s,t}$	$\sum_{j=1}^{i} RT\_CMT\_ST\_PC[j,2]_{k,h}^{s,t}$

1.5.1.14 $RT\_DIPC_{k,h}^{c,t}$ = the *real-time market energy* price curve for a *non-quick start resource*, represented as an N-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at combustion turbine *delivery point* 'c' in *metering interval* 't' of *settlement hour* 'h', arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities 'Q' are in column 2, and is derived as follows:

Derived Interval Price Curve Matrix	=	Price [Row 'i', Column 1]	Quantity [Row 'i', Column 2]
$RT\_DIPC_{k,h}^{c,t}$	Row i	$BE[i,1]_{k,h}^{p}$	$Min\left(BE[i,2]_{k,h}^{p}, RT\_DRRQ_{k,h}^{p,t}\right)$ $-\left[Min\left(RT\_MRRQ_{k,h}^{p,t}, BE[i,2]_{k,h}^{p}\right)\right.$ $\times RT\_ST\_Portion_{k,h,d1}^{p,t}$ $+ Max\left(0, Min\left(RT\_DRRQ_{k,h}^{p,t}, BE[i,2]_{k,h}^{p}\right)\right.$ $\left.- RT\_MRRQ_{k,h}^{p,t}\right) \times RT\_ST\_Portion_{k,h,d2}^{p,t}\Big]$

Where:

a. any *price-quantity pairs* in the $RT\_DIPC_{k,h}^{c,t}$ price curve matrix that have the same quantity value as a prior quantity value in the price curve matrix shall have their price component and quantity component set to zero.

DIGQ

1.5.1.15 $RT\_QSI\_DIGQ_{k,h}^{s,t}$ = the portion of the *real-time schedule* quantity of *energy* scheduled for injection for *market participant* 'k' at steam turbine *delivery point* 's' in *metering interval* 't' of *settlement hour* 'h', and is derived as follows:

$$RT\_QSI\_DIGQ_{k,h}^{s,t} = \sum_{p=1}^{N} RT\_STP\_QSI_{k,h}^{s,t}$$

Where:

a. 'N' is the set of all *pseudo-units* associated with steam turbine *delivery point* 's' that for the relevant *metering interval* 't' of *settlement hour* 'h':

i. are operating in combined cycle mode; and

ii. whose associated combustion turbine has a *real-time schedule* greater than or equal to its *minimum loading point.*

1.5.1.16 $RT\_CMT\_DIGQ_{k,h}^{s,t}$= the portion of the *real-time schedule* quantity of *energy* scheduled for injection that is eligible for the real-time *generator offer* guarantee *settlement amount* for *market participant* 'k' at steam turbine *delivery point* 's' in *metering interval* 't' of *settlement hour* 'h', and is derived as follows:

$$RT\_CMT\_DIGQ_{k,h}^{s,t} = \sum_{p=1}^{N} RT\_STP\_QSI_{k,h}^{s,t}$$

Where:

a. 'N' is the set of all *pseudo-units* associated with steam turbine *delivery point* 's' that for the relevant *metering interval* 't' of *settlement hour* 'h':

i. are operating in combined cycle mode;

ii. were operationally constrained greater than or equal to its *minimum loading point* by the *pre-dispatch calculation engine;* and

iii. whose associated combustion turbine must have received a *real-time schedule* greater than or equal to its *minimum loading point*.

1.5.1.17 $RT\_LC\_EOP\_DIGQ_{k,h}^{s,t}$ = the portion of the steam turbine's $RT\_LC\_EOP_{k,h}^{p,t}$ that is eligible for the real-time make-whole payment *settlement amount* for *market participant* 'k' at steam turbine *delivery point* 's' in *metering interval* 't' of *settlement hour* 'h', and derived as follows:

$$RT\_LC\_EOP\_DIGQ_{k,h}^{s,t} = \sum_{p=1}^{N} \left[RT\_LC\_EOP_{k,h}^{p,t} - RT\_LC\_EOP_{k,h}^{c,t}\right]$$

Where:

a. 'N' is the set of all *pseudo-units* associated with *steam turbine delivery point* 's' that for the relevant *metering interval*:

i. are operating in combined cycle mode; and

ii. whose associated combustion turbine has received a *real-time schedule* greater than or equal to its *minimum loading point*.

1.5.1.18 $RT\_LOC\_EOP\_DIGQ_{k,h}^{s,t}$ = the portion of the steam turbine's $RT\_LOC\_EOP_{k,h}^{p,t}$ that is eligible for the real-time make-whole payment *settlement amount* for *market participant* 'k' at steam turbine *delivery point* 's' in *metering interval* 't' of *settlement hour* 'h', and derived as follows:

$$RT\_LOC\_EOP\_DIGQ_{k,h}^{s,t} = \sum_{p=1}^{N} \left[RT\_LOC\_EOP_{k,h}^{p,t} - RT\_LOC\_EOP_{k,h}^{c,t} \right]$$

Where:

a. 'N' is the set of all *pseudo-units* associated with *steam turbine delivery point* 's' that for the relevant *metering interval* 't' in *settlement hour* 'h':

   i. are operating in combined cycle mode; and

   ii. whose associated combustion turbine received a *real-time schedule* greater than or equal to its *minimum loading point*.

1.6 Real-Time Market – Operating Reserve

1.6.1 The *IESO* shall determine the following *real-time market* data in accordance with the following, and provide them directly to the *settlement process:*

Intermediate Variables

1.6.1.1 $OR\_RT\_DRRQ_{r,k,h}^{p,t}$ = the *real-time market dispatchable* region range quantity for *operating reserve* (in MW), which is the portion of the greater of the $RT\_QSOR_{r,k,h}^{c,t}$ and $RT\_OR\_LC\_EOP_{r,k,h}^{c,t}$, associated with *pseudo-unit delivery point* 'p' that is in the *dispatchable* operating region 'd2' for *market participant* 'k' during *metering interval* 't' of *settlement hour* 'h', and is derived as follows:

$$OR\_RT\_DRRQ_{r,k,h}^{p,t} = \frac{Max\left(RT\_QSOR_{r,k,h}^{c,t}, RT\_OR\_LC\_EOP_{r,k,h}^{c,t}\right)}{\left(1 - RT\_ST\_Portion_{k,h,d2}^{p,t}\right)}$$

Where:

a. 'c' is the combustion turbine *delivery point* associated with *pseudo-unit delivery point* 'p'

1.6.1.2 $OR\_RT\_DFRRQ_{r,k,h}^{p,t}$ = the *real-time market* duct-firing region range quantity for *operating reserve* (in MW), which is the portion of the greater of the $RT\_QSOR_{r,k,h}^{p,t}$ and $RT\_OR\_LC\_EOP_{r,k,h}^{p,t}$ associated with *pseudo-unit delivery point* 'p', that is in the *dispatchable* operating region 'd2' and duct firing operating region 'd3' for *market participant* 'k' during *metering interval* 't' of *settlement hour* 'h', and is derived as follows:

$$OR\_RT\_DFRRQ_{r,k,h}^{p,t} = Max\left(OR\_RT\_DRRQ_{r,k,h}^{p,t}, Max\left(RT\_QSOR_{r,k,h}^{p,t}, RT\_OR\_LC\_EOP_{r,k,h}^{p,t}\right)\right)$$

1.6.1.3 $RT\_OR\_ST\_Q^{p,t}_{r,k,h}$ = An M-by-1 matrix (where M is M^p_k) of steam turbine quantity values (in MW) calculated from the $BOR^p_{r,k,h}$, $RT\_ST\_Portion^{p,t}_{k,h,d2}$, and $RT\_ST\_Portion^{p,t}_{k,h,d3}$ for *market participant* 'k' at *pseudo-unit delivery point* 'p' during *metering interval* 't' of *settlement hour* 'h', and is derived as follows:

$$
\begin{aligned}
RT\_OR\_ST\_Q^{p,t}_{r,k,h} &= Min\left(RT\_OR\_DRRQ^p_{r,k,h}, BOR[i,2]^p_{r,k,h}\right) \times RT\_ST\_Portion^p_{k,d2} \\
&+ Max\left[0, Min\left(RT\_OR\_DFRRQ^p_{k,r,h}, BOR[i,2]^p_{r,k,h}\right)\right. \\
&\left. - RT\_OR\_DRRQ^p_{r,k,h}\right] \times RT\_ST\_Portion^p_{k,d3}
\end{aligned}
$$

1.6.1.4 $RT\_OR\_ST\_PC^{p,t}_{r,k,h}$ = An M-by-2 matrix (where M is M^p_k) of *price-quantity pairs*, calculated from the price component of $BOR^p_{r,k,h}$and the quantity component of $RT\_OR\_ST\_Q^{p,t}_{r,k,h}$ for *market participant* 'k' at *pseudo-unit delivery point* 'p' during *metering interval* 't' of *settlement hour* 'h', and is derived as follows:

PQ Pair Matrix	=	Price [Row 'i', Column 1)	Quantity [Row 'i', Column 2]
$RT\_OR\_ST\_PC^{p,t}_{r,k,h}$	Row i = 1	$BOR[i,1]^p_{r,k,h}$	0
	Row i ≥ 2	$BOR[i,1]^p_{r,k,h}$	$RT\_OR\_ST\_Q[i]^{p,t}_{r,k,h} - RT\_OR\_ST\_Q[i-1]^{p,t}_{r,k,h}$

1.6.1.5 $RT\_OR\_ST\_PC^{s,t}_{r,k,h}$ = A Y-by-2 matrix (where $Y \leq \sum_{p=1}^{N} M^p_k$) of *price-quantity pairs*, calculated from the price component and quantity component from all the calculated $RT\_OR\_ST\_PC^{p,t}_{r,k,h}$ for *market participant* 'k' at steam turbine *delivery point* 's' for during *metering interval* 't' of *settlement hour* 'h', and is derived as follows:

PQ Pair Matrix (assuming 4 included *PSUs*)	=	Price [Row 'i', Column 1]	Quantity [Row 'i', Column 2]
$RT\_OR\_ST\_PC^{s,t}_{k,r,h}$	Rows i=1 to m1, j=1 to m1	$RT\_OR\_ST\_PC[j,1]^{p1,t}_{k,r,h}$	$RT\_OR\_ST\_PC[j,2]^{p1,t}_{k,r,h}$
	Rows i=(m1+1) to (m1+m2), j=1 to m2	$RT\_OR\_ST\_PC[j,1]^{p2,t}_{k,r,h}$	$RT\_OR\_ST\_PC[j,2]^{p2,t}_{k,r,h}$
	Rows i=(m2+1) to (m1+m2+m3), j=1 to m3	$RT\_OR\_ST\_PC[j,1]^{p3,t}_{k,r,h}$	$RT\_OR\_ST\_PC[j,2]^{p3,t}_{k,r,h}$
	Rows i=(m3+1) to (m1+m2+m3+m4), j=1 to m4	$RT\_OR\_ST\_PC[j,1]^{p4,t}_{k,r,h}$	$RT\_OR\_ST\_PC[j,2]^{p4,t}_{k,r,h}$

Where:

a. For a *pseudo-unit* to be included in the $RT\_OR\_ST\_PC^{s,t}_{r,k,h}$ matrix, it must have received a *real-time schedule* for *energy* greater than or equal to its *minimum loading point* for the relevant *metering interval.*

b. the *price-quantity pairs* shall be sorted by increasing price;

c. any *price-quantity pairs* with the same price shall have their quantities aggregated into a single *price-quantity pair;*

d. any *price-quantity pairs* with a zero quantity shall be removed from the $RT_OR_ST_PC^{s,t}_{k,h}$matrix;

e. a new first row will be added and a *price-quantity pair* will be inserted into the first row. The *price-quantity pair* will have a quantity value of zero and its price value will be equal to the price value of the *price-quantity pair* in the new row 2;

f. m1 is the number of rows in $RT_OR_ST_PC^{s,t}_{r,k,h}$from PSU1.

g. m2 is the number of rows in $RT_OR_ST_PC^{s,t}_{r,k,h}$from PSU2.

h. m3 is the number of rows in $RT_OR_ST_PC^{s,t}_{r,k,h}$from PSU3.

i. m4 is the number of rows in $RT_OR_ST_PC^{s,t}_{r,k,h}$from PSU4.

1.6.1.6 $RT\_OR\_CMT\_ST\_PC^{s,t}_{r,k,h}$ = A Y-by-2 matrix (where $Y \leq \sum_{p=1}^{N} M_k^p$) of *price-quantity pairs*, calculated from the price component and the quantity component from all calculated $RT\_OR\_ST\_PC^{p,t}_{k,\,r,h}$ for *market participant* 'k' at steam turbine *delivery point* 's' during *metering interval* 't' of *settlement hour* 'h', and is derived as follows:

PQ Pair Matrix (assuming 4 included *PSUs*)	=	Price [Row 'i', Column 1]	Quantity [Row 'i', Column 2]
$RT\_OR\_CMT\_ST\_PC^{s,t}_{r,k,h}$	Rows i=1 to m1, j=1 to m1	$RT\_OR\_CMT\_ST\_PC[j,1]^{p1,t}_{r,k,h}$	$RT\_OR\_CMT\_ST\_PC[j,2]^{p1,t}_{r,k,h}$
	Rows i=(m1+1) to (m1+m2), j=1 to m2	$RT\_OR\_CMT\_ST\_PC[j,1]^{p2,t}_{r,k,h}$	$RT\_OR\_CMT\_ST\_PC[j,2]^{p2,t}_{r,k,h}$
	Rows i=(m2+1) to (m1+m2+m3), j=1 to m3	$RT\_OR\_CMT\_ST\_PC[j,1]^{p3,t}_{r,k,h}$	$RT\_OR\_CMT\_ST\_PC[j,2]^{p3,t}_{r,k,h}$
	Rows i=(m3+1) to (m1+m2+m3+ m4), j=1 to m4	$RT\_OR\_CMT\_ST\_PC[j,1]^{p4,t}_{r,k,h}$	$RT\_OR\_CMT\_ST\_PC[j,2]^{p4,t}_{r,k,h}$

Where:

a. For a *pseudo-unit* to be included in the $RT\_OR\_CMT\_ST\_PC^{s,t}_{r,k,h}$ matrix, for the relevant *metering interval* 't' of *settlement hour* 'h':

   i. it must not have *offered* in the *real-time market* in *single cycle mode*;

   ii. the associated combustion turbine must have received a *real-time schedule* for *energy* greater than or equal to its *minimum loading point;* and

   iii. it must be operationally constrained greater than or equal to its *minimum loading point* by the *pre-dispatch calculation engine*.

b. the *price-quantity pairs* shall be sorted by increasing price;

c. any *price-quantity pairs* with the same price shall have their quantities aggregated into a single *price-quantity pair;*

d. any *price-quantity pairs* with a zero quantity shall be removed from the $RT_OR_CMT_ST_PC^{s,t}_{r,k,h}$matrix;

e. a new first row will be added and a *price-quantity pair* will be inserted into the first row. The *price-quantity pair* will have a quantity value of zero and its price value will be equal to the price value of the *price-quantity pair* in the new row 2;

f. m1 is the number of rows in $RT_OR_CMT_ST_PC^{s,t}_{r,k,h}$from PSU1.

g. m2 is the number of rows in $RT\_OR\_CMT\_ST\_PC^{s,t}_{r,k,h}$ from PSU2.

h. m3 is the number of rows in $RT\_OR\_CMT\_ST\_PC^{s,t}_{r,k,h}$ from PSU3.

i. m4 is the number of rows in $RT\_OR\_CMT\_ST\_PC^{s,t}_{r,k,h}$ from PSU4.

DIPC

1.6.1.7 $RT\_OR\_DIPC^{c,t}_{r,k,h}$ = *real-time market class r reserve* price curve for a *non-quick start resource*, represented as an X-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at combustion turbine *delivery point* 'c' during *metering interval* 't' of *settlement hour* 'h' arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities are in column 2, and is derived as follows:

Derived Interval Price Curve Matrix	=	Price [Row 'i', Column 1]	Quantity [Row i, Column 2]
$RT\_OR\_DIPC^{c,t}_{r,k,h}$	Row i	$BOR[i,1]^{p}_{r,k,h}$	$Min\left(BOR[i,2]^{p}_{r,k,h}, OR\_RT\_DRRQ^{p,t}_{r,k,h}\right) \times \left(1 - RT\_ST\_Portion^{p,t}_{k,h,d2}\right)$

Where:

a. Any *price-quantity pairs* in the $RT\_OR\_DIPC^{c,t}_{r,k,h}$ price curve matrix that have the same quantity value as a prior quantity value in the price curve matrix shall have their price component and quantity component set to zero.

1.6.1.8 $RT\_OR\_DIPC^{s,t}_{r,k,h}$ = the *real-time market class r reserve* price curve for a *non-quick start resource*, represented as an X-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at steam turbine *delivery point* 's' during *metering interval* 't' of *settlement hour* 'h' arranged in ascending order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities are in column 2, and is derived as follows:

Price Curve Matrix	=	Price [Row 'i', Column 1]	Quantity [Row 'i', Column 2]
$RT\_OR\_DIPC^{s,t}_{r,k,h}$	Row i	$RT\_OR\_ST\_PC[i,1]^{s,t}_{r,k,h}$	$\sum_{j=1}^{i} RT\_OR\_ST\_PC[j,2]^{s,t}_{r,k,h}$

1.6.1.9 $RT\_OR\_CMT\_DIPC^{s,t}_{r,k,h}$ = the *real-time market class r reserve* price curves of a *non-quick start resource*, represented as an X-by-2 matrix of *price-quantity pairs* for *market participant* 'k' at steam turbine *delivery point* 's' during *metering interval* 't' of *settlement hour* 'h' arranged in ascending

order by the *offered* price in each *price-quantity pair* where *offered* prices 'P' are in column 1 and *offered* quantities are in column 2, and is derived as follows:

Price Curve Matrix	=	Price [Row 'i', Column 1]	Quantity [Row 'i', Column 2]
$RT\_OR\_CMT\_DIPC_{r,k,h}^{s,t}$	Row i	$RT\_OR\_CMT\_ST\_PC[i,1]_{r,k,h}^{s,t}$	$\sum_{j=1}^{i} RT\_OR\_CMT\_ST\_PC[j,2]_{r,k,h}^{s,t}$

DIGQ

1.6.1.10 $RT\_OR\_CMT\_DIGQ_{r,k,h}^{s,t}$ = the portion of the *real-time schedule* quantity of *class r reserve* scheduled for injection that is eligible for the *real-time generator offer* guarantee *settlement amount* for *market participant* 'k' at steam turbine *delivery point* 's' in *metering interval* 't' of *settlement hour* 'h', and is derived as follows:

$$RT\_OR\_CMT\_DIGQ_{r,k,h}^{s,t} = \sum_{p=1}^{N} RT\_STP\_QSOR_{r,k,h}^{s,t}$$

Where:

a. 'N' is the set of all *pseudo-units* associated with steam turbine *delivery point* 's' that, for the relevant *metering interval* 't' of *settlement hour* 'h':

   i. are operating in combined cycle mode;

   ii. were operationally constrained greater than or equal to its *minimum loading point* by the *pre-dispatch calculation engine;* and

   iii. whose associated combustion turbine must have received a *real-time schedule* greater than or equal to its *minimum loading point*.

Appendix 9.4 – Settlement Mitigation

Note: New Appendix 9.4 has been shown without track changes for ease of review.

1 Introduction

1.1 Interpretation

1.1.1 In this Appendix 9.4:

1.1.1.1 the applicable *thermal state* for a *start-up offer* shall be the *thermal state* assigned to the *resource* at the time of the *start-up notice* in accordance with MR Ch.7 App.7.5A s.8.6.3.8 for the relevant *settlement hour*. Notwithstanding the foregoing, the applicable *thermal state* for all *settlement hours* within a *day-ahead market commitment period* or a *real-time market commitment period*, as the case may be, shall be the *thermal state* of the first *settlement hour* of the *day-ahead market commitment period* or *real-time market commitment period*, as the case may be, as determined at the time of the *start-up notice* in accordance with MR Ch.7 App.7.5A s.8.6.3.8; and

1.1.1.2 notwithstanding sections 2.1 and 3.1, if an as-*offered financial dispatch data parameter* for an *offer* is less than its corresponding *reference level value,* the *reference level value offer* for the relevant variable defined in section 2.1 or 3.1, as the case may be, shall be the value of the as-*offered financial dispatch data parameter*.

2 Day-Ahead Market Mitigation

2.1 Variables

2.1.1 In section 2, the following variables shall have the following meanings:

2.1.1.1 $A_{k,h}^{GTMLP}$ is the as-*offered* set of *offer* laminations for *energy* quantities greater than the *offer* lamination that includes the *minimum loading point* in the *day-ahead market* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h';

2.1.1.2 $A_{k,h}^{LTMLP}$ is the as-*offered* set of *offer* laminations for *energy* quantities up to and including the *offer* lamination that includes the *minimum loading point* in the *day-ahead market* for a *GOG-eligible resource* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h';

2.1.1.3 $A_{r,k,h}^{m}$ is the as-*offered* set of *offer* laminations for *class r reserve* in the *day-ahead market* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h', where r1, r2, and r3 are all applicable;

2.1.1.4 $PGTMLP_{k,h,a}^{m}$ designates the price for the quantity of *energy* in the *day-ahead market* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h' in association with *offer* lamination $a \in A_{k,h}^{GTMLP}$;

2.1.1.5 $PDG_{r,k,h,a}^{m}$ designates the price for the quantity of *class r reserve* in the *day-ahead market* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h' in association with *offer* lamination $a \in A_{r,k,h}^{m}$, where r1, r2, and r3 are all applicable;

2.1.1.6 $SUDG_{k,h}^{m}$ is the as-*offered start-up offer* in the *day-ahead market* for the *thermal state* indicated in the *dispatch data* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h';

2.1.1.7 $SNL_{k,h}^{m}$ is the as-*offered speed no-load offer* in the *day-ahead market* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h';

2.1.1.8 $PLTMLP_{k,h,a}^{m}$ designates the price for the maximum quantity of *energy* up to and including the *minimum loading point* that may be scheduled in the *day-ahead market* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h' in association with *offer* lamination $a \in A_{k,h}^{LTMLP}$;

2.1.1.9 $A'^{GTMLP,m}_{k,h}$ is the set of *reference level value* laminations for *energy* quantities greater than the *offer* lamination that includes the *minimum*

loading point in the *day-ahead market* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h';

2.1.1.10 $A'^{LTMLP,m}_{k,h}$ is the set of *reference level value* laminations for *energy* quantities up to and including the *offer* lamination that includes the *minimum loading point* in the *day-ahead market* for a *GOG-eligible resource* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h';

2.1.1.11 $A'^{m}_{r,k,h}$ is the set of *reference level value* laminations for *class r reserve* in the *day-ahead market* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h', where r1, r2, and r3 are all applicable;

2.1.1.12 $PGTMLPRef^{m}_{k,h,a'}$ designates the *reference level value* for *energy offer* lamination $a' \in A'^{GTMLP,m}_{k,h}$ for *market participant* 'k' at *delivery point* 'm' in *settlement hour* 'h', as may be adjusted by the *IESO* pursuant to MR Ch.9 s.5.2.1.2;

Where:

a. If the relevant *resource* is a *non-committable resource* and is primarily fueled by biomass, natural gas or oil, then for each contiguous period of its *day-ahead market schedule*:

   i. the applicable *reference level value* for the initial *settlement hours* of such contiguous *day-ahead market schedule*, equal to the duration of the *resource's minimum run-time*, will be the *resource's* primary *energy offer reference level value*; and

   ii. the applicable *reference level value* for all other *settlement hours* of such contiguous *day-ahead market schedule* will be the *resource's* secondary *energy offer reference level value*.

2.1.1.13 $PDGRef^{m}_{r,k,h,a'}$ designates the *reference level value* for *class r reserve offer* lamination $a' \in A'^{m}_{r,k,h}$ for *market participant* 'k' at *delivery point* 'm' in *settlement hour* 'h', where r1, r2, and r3 are all applicable;

2.1.1.14 $SUDGRef^{m}_{k,h}$ designates the *reference level value* for the *start-up offer* in the *day-ahead market* for the same *thermal state* as $SUDG^{m}_{k,h'}$ for *market participant* 'k' at *delivery point* 'm' in *settlement hour* 'h', as may be adjusted by the *IESO* pursuant to MR Ch.9 s.5.2.1.2;

2.1.1.15 $SNLRef^{m}_{k,h}$ designates the *reference level value* for the *speed no-load offer* in the *day-ahead market* for *market participant* 'k' at *delivery point* 'm' in *settlement hour* 'h' as may be adjusted by the *IESO* pursuant to MR Ch.9 s.5.2.1.2;

2.1.1.16 $PLTMLPRef^{m}_{k,h,a'}$ designates the *reference level value* for the *energy* up to and including the *minimum loading point reference level* lamination $a' \in A'^{LTMLP,m}_{k,h}$ of the *offer* for *market participant* 'k' at *delivery point* 'm' in *settlement hour* 'h' as may be adjusted by the *IESO* pursuant to MR Ch.9 s.5.2.1.2;

2.2 Constrained Area Conditions

2.2.1 The *IESO* shall apply the conditions set out in this section 2.2 to determine whether and which conduct tests set out in section 2.4 apply.

2.2.2 In regards to *energy*:

Constrained Area Condition Test for a Narrow Constrained Area

2.2.2.1 Where the conditions set out in MR Ch.7 App.7.5 s.10.4.1.1.1 are true, the *IESO* shall apply the *narrow constrained area* conduct test set out in sections 2.4.2 and 2.4.3;

Constrained Area Condition Test for a Dynamic Constrained Area

2.2.2.2 Where the conditions set out in MR Ch.7 App.7.5 s.10.4.1.1.2 are true, the *IESO* shall apply the *dynamic constrained area* conduct test set out in sections 2.4.4 and 2.4.5;

Constrained Area Condition Test for a Broad Constrained Area

2.2.2.3 Where the conditions set out in MR Ch.7 App.7.5 s.10.4.2.1 are true, the *IESO* shall apply the broad constrained area conduct test set out in sections 2.4.6 and 2.4.7;

Constrained Area Condition Test for Global Market Power Mitigation for Energy

2.2.2.4 Where the conditions set out in MR Ch.7 App.7.5 s.10.5.1 are true, the *IESO* shall apply the global market power mitigation process conduct test set out in sections 2.4.8 and 2.4.9; and

Constrained Area Condition Test for Reliability

2.2.2.5 Notwithstanding the foregoing, the *IESO* shall apply the *reliability* conditions conduct test set out in sections 2.4.10 and 2.4.11 where any of the conditions set out in the applicable *market manual* are true.

2.2.3 In regards to operating reserve:

Constrained Area Condition Test for Local Market Power Mitigation for Operating Reserve

2.2.3.1 Where the conditions set out in MR Ch.7 App.7.5 s.10.6.1 are true, the *IESO* shall apply the local market power mitigation process conduct test set out in section 2.4.12; and

Constrained Area Condition Test for Global Market Power Mitigation for Operating Reserve

2.2.3.2 Where the conditions set out in MR Ch.7 App.7.5 s.10.7.1 are true, the *IESO* shall apply the global market power mitigation process conduct test set out in sections 2.4.13.

2.3 Applicable Resources

2.3.1 The *IESO* shall apply the conduct tests described in section 2.4 for transactions scheduled in the *day-ahead market* to the *resources* identified in this section 2.3.

Constrained Area Condition Test for a Narrow Constrained Area

2.3.2 Subject to section 2.3.9, in regards to the conduct test for local market power mitigation process in a *narrow constrained area* in the *energy market* outlined in sections 2.4.2 and 2.4.3, the *IESO* shall apply such conduct tests to the following *resources*:

2.3.2.1 All *resources* that have a *day-ahead schedule* for *energy* and are identified as having met the *narrow constrained area* condition in the Outputs of the Constrained Area Conditions Test produced in accordance with MR Ch.7 App.7.5 s.10.8.1; and

2.3.2.2 Any *GOG-eligible resource* that received a *day-ahead operational commitment,* such *resource* has a *generator* sensitivity factor greater than 0.02 on an active constraint that is a *narrow constrained area* constraint, and such constraint would have been binding or would have been violated but for the *day-ahead operational commitment* received by the *resource*.

Constrained Area Condition Test for a Dynamic Constrained Area

2.3.3 Subject to section 2.3.9, in regards to the conduct test for local market power mitigation process in a *dynamic constrained area* in the *energy market* outlined in sections 2.4.4 and 2.4.5, the *IESO* shall apply such conduct tests to the following *resources*:

2.3.3.1 All *resources* that have a *day-ahead schedule* for *energy* and are identified as having met the *dynamic constrained area* condition in the Outputs of the Constrained Area Conditions Test produced in accordance with MR Ch.7 App.7.5 s.10.8.1; and

2.3.3.2 Any *GOG-eligible resource* that received a *day-ahead operational commitment,* such *resource* has a *generator* sensitivity factor greater than 0.02 on an active constraint that is a *dynamic constrained area* constraint, and such constraint would have been binding or would have been violated but for the *day-ahead operational commitment* received by the *resource*.

Constrained Area Condition Test for a Broad Constrained Area

2.3.4 Subject to section 2.3.9, in regards to the conduct test for local market power mitigation process in a broad constrained area in the *energy market* outlined in sections 2.4.6 and 2.4.7, the *IESO* shall apply such conduct tests to the following *resources*:

2.3.4.1 All *resources* that have a *day-ahead schedule* for *energy* and are identified as having met the broad constrained area condition in the Outputs of the Constrained Area Conditions Test produced in accordance with MR Ch.7 App.7.5 s.10.8.1;

2.3.4.2 Any *GOG-eligible resource* that received a *day-ahead operational commitment* and the congestion component of the applicable *day-ahead market locational marginal price* is greater than $0/MWh on any binding constraint that was not a *narrow constrained area* or a *dynamic constrained area* binding constraint; and

2.3.4.3 Any *GOG-eligible resource* that received a *day-ahead operational commitment,* such *resource* has a *generator* sensitivity factor greater than 0.02 on an active constraint that is not a *narrow constrained area* or a *dynamic constrained area* constraint, and such constraint would have been binding or would have been violated but for the *day-ahead operational commitment* received by the *resource*.

Constrained Area Condition Test for Global Market Power Mitigation for Energy

2.3.5 Subject to section 2.3.9, in regards to the global market power mitigation process in the *energy market* outlined in sections 2.4.8 and 2.4.9, the *IESO* shall apply such conduct tests to the following *resources*:

2.3.5.1 All *resources* that have a *day-ahead schedule* for *energy* and are identified as having met the global market power mitigation conditions for *energy* in the Outputs of the Constrained Area Conditions Test produced in accordance with MR Ch.7 App.7.5 s.10.8.1; and

2.3.5.2 Any *GOG-eligible resource* that received a *day-ahead operational commitment* from Pass 2: Reliability Scheduling and Commitment pass of the *day-ahead market calculation engine.*

Constrained Area Condition Test for Reliability

2.3.6 Subject to section 2.3.9, in regards to the conduct test for local market power mitigation process due to *reliability* constraints in the *energy market* outlined in sections 2.4.10 and 2.4.11, the *IESO* shall apply such conduct tests to any *resource* that was subject to a constraint identified pursuant to section 2.2.2.5.

Constrained Area Condition Test for Local Market Power Mitigation for Operating Reserve

2.3.7 Subject to section 2.3.9, in regards to the local market power mitigation process in the *operating reserve market* outlined in section 2.4.12, the *IESO* shall apply such conduct tests to the following *resources*:

a. all *resources* that have a *day-ahead schedule* for *operating reserve* and are identified as having met the local power mitigation conditions for *operating reserve* in the Outputs of the Constrained Area Conditions Test produced in accordance with MR Ch.7 App.7.5 s.10.8.1; and

b. all *resources* that have a *day-ahead schedule* for *operating reserve* whom are located in a region with a binding maximum constraint.

Constrained Area Condition Test for Global Market Power Mitigation for Operating Reserve

2.3.8 Subject to section 2.3.9, in regards to the global market power mitigation process in the *operating reserve market* outlined in section 2.4.13, the *IESO* shall apply such conduct tests to the following *resources:*

a. all *resources* that have a *day-ahead schedule* for *operating reserve* and are identified as having met the global power mitigation conditions for *operating reserve* in the Outputs of the Constrained Area Conditions Test produced in accordance with MR Ch.7 App.7.5 s.10.8.1; and

b. all *resources* that have a *day-ahead schedule* for *operating reserve* whom are located in a region with a binding maximum constraint.

2.3.9 Notwithstanding the foregoing*, non-committable resources* may only be subject to the conduct tests described in sections 2.4.2, 2.4.4, 2.4.6, 2.4.8, and 2.4.10. For greater certainty, *GOG-eligible resources* may, depending on the outcome of this section 2.3, be subject to any conduct test set out in section 2.4.

2.4 Conduct Test

2.4.1 Subject to section 2.4.14, the *IESO* shall apply the conduct tests as set out in this section 2.4.

Local Market Power Mitigation Process in a Narrow Constrained Area for Energy Offers Greater Than the Offer Lamination That Includes Minimum Loading Point

2.4.2 The *IESO* shall apply the following conduct test in the circumstances outlined in section 2.2.2.1to the *resources* identified in section 2.3.2. For each *settlement hour* 'h' that qualified to be tested under section 2.2.2.1 and for each such *resource* the *IESO* shall:

2.4.2.1 Evaluate *energy offer* laminations that are above the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination 'a':

For all $a \in A_{k,h}^{GTLMP,m}$, if

i. $PGTMLP_{k,h,a}^{m} > 25$; and

ii. $PTMLPG_{k,h,a}^{m} > min((PGTMLPRef_{k,h,a'}^{m} + abs(PGTMLPRef_{k,h,a'}^{m}) \times 0.5), PGTMLPRef_{k,h,a'}^{m} + 25)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_BE_{k,h}^{m}$ shall equal $PLTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{LTMLP,m}$ and $PGTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{GTMLP,m}$;

Local Market Power Mitigation Process in a Narrow Constrained Area for Energy Offers up to and Including the Offer Lamination That Includes Minimum Loading Point

2.4.3 The *IESO* shall apply the following conduct test in the circumstances outlined in section 2.2.2.1 to the *resources* identified in section 2.3.2. For each *settlement hour* 'h' within a *day-ahead market commitment period* that contains a *settlement hour* that qualified to be tested under section 2.2.2.1 and for each such *resource* the *IESO* shall:

2.4.3.1 Evaluate *energy offer* laminations that are up to and including the *energy offer* lamination that includes its *minimum loading point* as follows:

a. *a resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination 'a':

For all a $\in A_{k,h}^{LTMLP,m}$, if

i. $PLTMLP_{k,h,a}^{m} > 25$; and

ii. $PLTMLP_{k,h,a}^{m} > min\left(\left(PLTMLPRef_{k,h,a'}^{m} + abs(PLTMLPRef_{k,h,a'}^{m}) \times 0.5\right), PLTMLPRef_{k,h,a'}^{m} + 25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_BE^{m}_{k,h}$ shall equal $PLTMLPRef^{m}_{k,h,a'}$ for all *offer* laminations $a \in A^{LTMLP,m}_{k,h}$ and $DAM\_BE^{m}_{k,h}$ for all *offer* laminations $a \in A^{GTMLP,m}_{k,h}$;

2.4.3.2 Evaluate *start-up offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if

$$SUDG^{m}_{k,h} > \left(SUDGRef^{m}_{k,h} + abs\left(SUDGRef^{m}_{k,h}\right) \times 0.25\right)$$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_SU^{m}_{k,h}$ shall equal $SUDGRef^{m}_{k,h}$; and

2.4.3.3 Evaluate speed *no-load offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if

$$SNL^{m}_{k,h} > \left(SNLRef^{m}_{k,h} + abs\left(SNLRef^{m}_{k,h}\right) \times 0.25\right)$$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_SNL^{m}_{k,h}$ shall equal $SNLRef^{m}_{k,h}$.

Local Market Power Mitigation Process in a Dynamic Constrained Area for Energy Offers Greater Than the Offer Lamination That Includes Minimum Loading Point

2.4.4 The *IESO* shall apply the following conduct test in the circumstances outlined in section 2.2.2.2 to the *resources* identified in section 2.3.3. For each *settlement hour* 'h ' that qualified to be tested under section 2.2.2.2 and for each such *resource* the *IESO* shall:

2.4.4.1 Evaluate *energy offer* laminations that are above the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination 'a':

For all $a \in A^{GTMLP,m}_{k,h}$, if

i. $PGTMLP^{m}_{k,h,a} > 25$; and

ii. $PGTMLP^{m}_{k,h,a} > min\left(\left(PGTMLPRef^{m}_{k,h,a'} + abs\left(PGTMLPRef^{m}_{k,h,a'}\right) \times 0.5\right), PGTMLPRef^{m}_{k,h,a'} + 25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_BE^{m}_{k,h}$ shall equal $PLTMLPRef^{m}_{k,h,a'}$ for all *offer* laminations $a \in A^{LTMLP,m}_{k,h}$ and $PGTMLPRef^{m}_{k,h,a'}$ for all *offer* laminations $a \in A^{GTMLP,m}_{k,h}$;

Local Market Power Mitigation Process in a Dynamic Constrained Area for Energy Offers up to and Including the Offer Lamination That Includes Minimum Loading Point

2.4.5 The *IESO* shall apply the following conduct test in the circumstances outlined in section 2.2.2.2 to the *resources* identified in section 2.3.3. For each *settlement hour* 'h ' within a *day-ahead market commitment period* that contains a *settlement hour* that qualified to be tested under section 2.2.2.2 and for each such *resource* the *IESO* shall:

2.4.5.1 Evaluate *energy offer* laminations that are up to and including the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A_{k,h}^{LTMLP,m}$, if

i. $PLTMLP_{k,h,a}^{m} > 25$; and

ii. $PLTMLP_{k,h,a}^{m} > min\left(\left(PLTMLPRef_{k,h,a'}^{m} + abs\left(PLTMLPRef_{k,h,a'}^{m}\right) \times 0.5\right), PLTMLPRef_{k,h,a'}^{m} + 25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_BE_{k,h}^{m}$ shall equal $PLTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{LTMLP,m}$ and $DAM\_BE_{k,h}^{m}$ for all *offer* laminations $a \in A_{k,h}^{GTMLP,m}$;

2.4.5.2 Evaluate *start-up offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if $SUDG_{k,h}^{m} > \left(SUDGRef_{k,h}^{m} + abs\left(SUDGRef_{k,h}^{m}\right) \times 0.25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_SU_{k,h}^{m}$ shall equal $SUDGRef_{k,h}^{m}$; and

2.4.5.3 Evaluate speed *no-load offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if $SNL_{h.k}^{m} > (SNLRef_{h.k}^{m} + abs(SNLRef_{h.k}^{m}) \times 0.25)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_SNL_{k,h}^{m}$ shall equal $SNLRef_{k,h}^{m}$.

Local Market Power Mitigation Process in a Broad Constrained Area for Energy Offers Greater Than the Offer Lamination That Includes Minimum Loading Point

2.4.6 The *IESO* shall apply the following conduct test in the circumstances outlined in section 2.2.2.3 to the *resources* identified in section 2.3.4. For each *settlement hour* 'h' that qualified to be tested under section 2.2.2.3 and for each such *resource* the *IESO* shall:

2.4.6.1 Evaluate *energy offer* laminations that are above the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A_{k,h}^{GTMLP,m}$, if

i. $PGTMLP_{k,h,a}^{m} > 25$; and

ii. $PGTMLP_{k,h,a}^{m} > min\left(\left(PGTMLPRef_{k,h,a'}^{m} + abs\left(PGTMLPRef_{k,h,a'}^{m}\right) \times 3\right), PGTMLPRef_{k,h,a'}^{m} + 100\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_BE_{k,h}^{m}$ shall equal $PLTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{LTMLP,m}$ and $PGTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{GTMLP,m}$

Local Market Power Mitigation Process in a Broad Constrained Area for Energy Offers Up to and Including the Offer Lamination That Includes Minimum Loading Point

2.4.7 The *IESO* shall apply the following conduct test in the circumstances outlined in section 2.2.2.3 to the *resources* identified in section 2.3.4. For each *settlement hour* 'h' within a *day-ahead market commitment period* that contains a *settlement hour* that qualified to be tested under section 2.2.2.3 and for each such *resource* the *IESO* shall:

2.4.7.1 Evaluate *energy offer* laminations that are up to and including the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A_{k,h}^{LTMLP,m}$, if

i. $PLTMLP_{k,h,a}^{m} > 25$; and

ii. $PLTMLP_{k,h,a}^{m} > min\left((PLTMLPRef_{k,h,a'}^{m} + abs(PLTMLPRef_{k,h,a'}^{m}) \times 3), PLTMLPRef_{k,h,a'}^{m} + 100\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_BE_{k,h}^{m}$ shall equal $PLTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{LTMLP,m}$ and $DAM\_BE_{k,h}^{m}$ for all *offer* laminations $a \in A_{k,h}^{GTMLP,m}$;

2.4.7.2 Evaluate *start-up offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if

$$SUDG_{k,h}^{m} > \left(SUDGRef_{k,h}^{m} + abs\left(SUDGRef_{k,h}^{m}\right) \times 1\right)$$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_SU_{k,h}^{m}$ shall equal $SUDGRef_{k,h}^{m}$; and

2.4.7.3 Evaluate *speed no-load offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if

$$SNL_{k,h}^{m} > SNLRef_{k,h}^{m} + abs\left(SNLRef_{k,h}^{m}\right) \times 1)$$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_SNL_{k,h}^{m}$ shall equal $SNLRef_{k,h}^{m}$.

Global Market Power Mitigation Process for Energy Offers Greater Than the Offer Lamination That Includes Minimum Loading Point

2.4.8 The *IESO* shall apply the following conduct test in the circumstances outlined in section 2.2.2.4 to the *resources* identified in section 2.3.5. For each *settlement hour* 'h' that qualified to be tested under section 2.2.2.4 and for each such *resource* the *IESO* shall:

2.4.8.1 Evaluate *energy offer* laminations that are above the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A_{k,h}^{GTMLP,m}$, if

i. $PGTMLP_{k,h,a}^{m} > 25$; and

ii. $PGTMLP_{k,h,a}^{m} > min\left(\left(PGTMLPRef_{k,h,a'}^{m} + abs\left(PGTMLPRef_{k,h,a'}^{m}\right) \times 3\right), PGTMLPRef_{k,h,a'}^{m} + 100\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_BE_{k,h}^{m}$ shall equal $PLTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{LTMLP,m}$ and $PGTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{GTMLP,m}$;

Global Market Power Mitigation Process for Energy Offers Up to and Including the Offer Lamination That Includes Minimum Loading Point

2.4.9 The *IESO* shall apply the following conduct test in the circumstances outlined in section 2.2.2.4 to the *resources* identified in section 2.3.5. For each *settlement hour* 'h' within a *day-ahead market commitment period* that contains a *settlement hour* that qualified to be tested under section 2.2.2.4 and for each such *resource* the *IESO* shall:

2.4.9.1 Evaluate *energy offer* laminations that are up to and including the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A_{k,h}^{LTMLP,m}$, if

i. $PLTMLP_{k,h,a}^{m} > 25$; and

ii. $PLTMLP_{k,h,a}^{m} > min\left((PLTMLPRef_{k,h,a'}^{m} + abs(PLTMLPRef_{k,h,a'}^{m}) \times 3), PLTMLPRef_{k,h,a'}^{m} + 100\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_BE_{k,h}^{m}$ shall equal $PLTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{LTMLP,m}$ and $DAM\_BE_{k,h}^{m}$ for all *offer* laminations $a \in A_{k,h}^{GTMLP,m}$;

2.4.9.2 Evaluate *start-up offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if $SUDG_{k,h}^{m} > \left(SUDGRef_{k,h}^{m} + abs\left(SUDGRef_{k,h}^{m}\right) \times 1\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_SU_{k,h}^{m}$ shall equal $SUDGRef_{k,h}^{m}$; and

2.4.9.3 Evaluate *speed no-load offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if $SNL_{k,h}^{m} > SNLRef_{k,h}^{m} + abs\left(SNLRef_{k,h}^{m}\right) \times 1)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_SNL_{k,h}^{m}$ shall equal $SNLRef_{k,h}^{m}$.

Local Market Power Mitigation Process Due to Reliability Constraints for Energy Offers Greater Than the Offer Lamination That Includes Minimum Loading Point

2.4.10 The *IESO* shall apply the following conduct test in the circumstances outlined in section 2.2.2.5 to the *resources* identified in section 2.3.6. For each *settlement hour*

'h' that qualified to be tested under section 2.2.2.5 and for each such *resource* the *IESO* shall:

2.4.10.1 Evaluate *energy offer* laminations that are above the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A_{k,h}^{GTMLP,m}$, if

i. $PGTMLP_{k,h,a}^{m} > 25$; and

ii. $PGTMLP_{k.h.a}^{m} > \min\left(\left(PGTMLPRef_{k,h,a'}^{m} + abs\left(PGTMLPRef_{k,h,a'}^{m}\right) \times 0.1\right), PGTMLPRef_{k,h,a'}^{m} + 25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_BE_{k,h}^{m}$ shall equal $PLTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{LTMLP,m}$ and $PGTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{GTMLP,m}$;

Local Market Power Mitigation Process Due to Reliability Constraints for Energy Offers Up to and Including the Offer Lamination That Includes Minimum Loading Point

2.4.11 The *IESO* shall apply the following conduct test in the circumstances outlined in section 2.2.2.5 to the *resources* identified in section 2.3.6. For each *settlement hour* 'h' within a *day-ahead market commitment period* that contains a *settlement hour* that qualified to be tested under section 2.2.2.5 and for each such *resource* the *IESO* shall:

2.4.11.1 Evaluate *energy offer* laminations that are up to and including the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A_{k,h}^{LTMLP,m}$, if

i. $PLTMLP_{k,h,a}^{m} > 25$; and

ii. $PLTMLP_{k.h.a}^{m} > min\left((PLTMLPRef_{k.h.a'}^{m} + abs(PLTMLPRef_{k,h,a'}^{m}) \times 0.1), PLTMLPRef_{k,h,a'}^{m} + 25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_BE_{k,h}^{m}$ shall equal $PLTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{LTMLP,m}$ and $DAM\_BE_{k,h}^{m}$ for all *offer* laminations $a \in A_{k,h}^{GTMLP,m}$;

2.4.11.2 Evaluate *start-up offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if
$$SNL^{m}_{k,h} > SNLRef^{m}_{k,h} + abs\left(SNLRef^{m}_{k,h}\right) \times 0.1)$$
b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_SU^{m}_{k,h}$ shall equal $SUDGRef^{m}_{k,h}$; and

2.4.11.3 Evaluate *speed no-load offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if
$$SNL^{m}_{h.k} > SNLRef^{m}_{h.k} + abs(SNLRef^{m}_{h.k}) \times 0.1)$$
b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_SNL^{m}_{k,h}$ shall equal $SNLRef^{m}_{h.k}$.

Local Market Power Mitigation Process in the Operating Reserve Market

2.4.12 The *IESO shall* apply the following conduct test in the circumstances outlined in 2.2.3.1 to the *resources* identified in section 2.3.7. For each *settlement hour* 'h' that qualified to be tested under section 2.2.3.1 and for each such *resource* the *IESO* shall:

2.4.12.1 Evaluate *offers* for *operating reserve* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *class r reserve* for any *offer* lamination '*a*':

For all $a \in A^{m}_{r,k,h}$, if

i. $PDG^{m}_{r,k,h,a} > 5$; and

ii. $PDG^{m}_{r,k,h,a} > \min\left(\left(PDGRef^{m}_{r,k,h,a'} + abs\left(PDGRef^{m}_{r,k,h,a'}\right) \times 0.1\right), PDGRef^{m}_{r,k,h,a'} + 25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_BOR^{m}_{r,k,h}$ shall equal $PDGRef^{m}_{r,k,h,a'}$ for all *offer* lamination $a \in A^{m}_{r,k,h}$ for the *class r reserve* for which it failed the test;

2.4.12.2 Evaluate *energy offer* laminations that are up to and including the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A^{LTMLP,m}_{k,h}$, if

i. $PLTMLP^{m}_{k,h,a} > 25$; and

ii. $PLTMLP^{m}_{k.h.a} > min\left((PLTMLPRef^{m}_{k.h.a'} + abs(PLTMLPRef^{m}_{k,h,a'}) \times 0.1\right), PLTMLPRef^{m}_{k,h,a'} + 25)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_BE^{m}_{k,h}$ shall equal $PLTMLPRef^{m}_{k,h,a'}$ for all *offer* laminations $a \in A^{LTMLP,m}_{k,h}$ and $DAM\_BE^{m}_{k,h}$ for all *offer* laminations $a \in A^{GTMLP,m}_{k,h}$;

2.4.12.3 Evaluate *start-up offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if

$$SUDG^{m}_{k,h} > \left(SUDGRef^{m}_{k,h} + abs\left(SUDGRef^{m}_{k,h}\right) \times 0.1\right)$$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_SU^{m}_{k,h}$ shall equal $SUDGRef^{m}_{k,h}$; and

2.4.12.4 Evaluate *speed no-load offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if

$$SNL^{m}_{h.k} > SNLRef^{m}_{h.k} + abs(SNLRef^{m}_{h.k}) \times 0.1)$$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_SNL^{m}_{k,h}$ shall equal $SNLRef^{m}_{k,h}$.

Global Market Power Mitigation Process in the Operating Reserve Market

2.4.13 The *IESO shall* apply the following conduct test in the circumstances outlined in section 2.2.3.2 to the *resources* identified in section 2.3.8. For each *settlement hour* 'h' that qualified to be tested under section 2.2.3.2 and for each such *resource* the *IESO* shall:

2.4.13.1 Evaluate *offers* for *operating reserve* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *class r reserve* for any *offer* lamination '*a*':

For all $a \in A^{m}_{r,k,h}$, if

i. $PDG^{m}_{r,k,h,a} > 5$; and

ii. $PDG^{m}_{r,k,h,a} > \min\left(\left(PDGRef^{m}_{r,k,h,a'} + abs\left(PDGRef^{m}_{r,k,h,a'}\right) \times 0.5\right), PDGRef^{m}_{r,k,h,a'} + 25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_BOR^{m}_{r,k,h}$ shall equal $PDGRef^{m}_{r,k,h,a'}$ for all *offer* lamination $a \in A^{m}_{r,k,h}$ for the *class r reserve* for which it failed the test;

2.4.13.2 Evaluate *energy offer* laminations that are up to and including the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A_{k,h}^{LTMLP,m}$, if

i. $PLTMLP_{k,h,a}^{m} > 25$; and

ii. $PLTMLP_{k,h,a}^{m} > min\left((PLTMLPRef_{k,h,a'}^{m} + abs(PLTMLPRef_{k,h,a'}^{m}) \times 0.5), PLTMLPRef_{k,h,a'}^{m} + 25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_BE_{k,h}^{m}$ shall equal $PLTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{LTMLP,m}$ and $DAM\_BE_{k,h}^{m}$ for all *offer* laminations $a \in A_{k,h}^{GTMLP,m}$;

2.4.13.3 Evaluate *start-up offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if $SUDG_{k,h}^{m} > \left(SUDGRef_{k,h}^{m} + abs\left(SUDGRef_{k,h}^{m}\right) \times 0.25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_SU_{k,h}^{m}$ shall equal $SUDGRef_{k,h}^{m}$; and

2.4.13.4 Evaluate *speed no-load offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if $SNL_{k,h}^{m} > SNLRef_{k,h}^{m} + abs\left(SNLRef_{k,h}^{m}\right) \times 0.25)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_DAM\_SNL_{k,h}^{m}$ shall equal $SNLRef_{k,h}^{m}$.

2.4.14 If multiple conduct tests set out in section 2.4 apply in regards to the same *settlement hour*, then the *IESO* shall apply the following:

a. where multiple conduct tests for *energy* greater than *minimum loading point* apply in regards to the same *settlement hour,* the conduct test with the most restrictive threshold, as determined in accordance with the applicable *market manual,* shall apply to such *settlement hour*;

b. where multiple conduct tests for *energy* up to and including *minimum loading point* apply in regards to the same *settlement hour*, the conduct test with the most restrictive threshold, as determined in accordance with the applicable *market manual,* shall apply to all *settlement hours* within the *day-ahead market commitment period* that contains such *settlement hour;*

c. where both a conduct test for *energy* up to and including *minimum loading point* and *energy* greater than *minimum loading point* apply with respect to the same *settlement hour,*

    i. the greater than *minimum loading point* conduct test with the most restrictive threshold, as determined in accordance with the applicable *market manual,* shall apply to such *settlement hour;* and

    ii. if the *resource* does not fail such greater than *minimum loading point* conduct test, the up to and including *minimum loading point* conduct test with the most restrictive threshold, as determined in accordance with the applicable *market manual,* shall apply to such *settlement hour.*

d. where multiple conduct tests for *operating reserve offers* apply in regards to the same *settlement hour,* the conduct test with the most restrictive threshold, as determined in accordance with the applicable *market manual,* shall apply to such *settlement hour*;

e. where multiple conduct tests for *start-up offer* or *speed no-load offers*, as the case may be, apply in regards to the same *settlement hour*, the conduct test with the most restrictive threshold, as determined in accordance with the applicable *market manual,* shall apply to all *settlement hours* within the *day-ahead market commitment period* that contains such *settlement hour.*

3 Real-Time Mitigation

3.1 Variables

3.1.1 In section 3, the following variables shall have the following meanings:

3.1.1.1 $A_{k,h}^{GTMLP,m}$ is the as-*offered* set of *offer* laminations for *energy* quantities greater than the *offer* lamination that includes the *minimum loading point* in the *real-time market* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h';

3.1.1.2 $A_{k,h}^{LTMLP,m}$ is the as-*offered* set of *offer* laminations for *energy* quantities up to and including the *offer* lamination that includes the *minimum loading point* in the *real-time market* for a *GOG-eligible resource* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h';

3.1.1.3 $A_{r,k,h}^{m}$ is the as-*offered* set of *offer* laminations for *class r reserve* in the *real-time market* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h', where r1, r2, and r3 are all applicable;

3.1.1.4 $PGTMLP_{k,h,a}^{m}$ designates the price for the quantity of *energy* in the *real-time market* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h' in association with *offer a* $\in$ $A^{GTMLP,m}_{k,h}$;

3.1.1.5 $PDG_{r,k,h,a}^{m}$ designates the price for the quantity of *class r reserve* in the *real-time market* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h' in association with *offer* lamination $a \in A_{r,k,h}^{m}$, where r1, r2, and r3 are all applicable;

3.1.1.6 $PLTMLP_{k,h,a}^{m}$ designates the price for the maximum quantity of *energy* up to and including the *minimum loading point* that may be scheduled in the *real-time market* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h' in association with *offer* lamination $a \in A^{LTMLP,m}_{k,h}$;

3.1.1.7 $SUDG_{k,h}^{m}$ is the as-*offered start-up offer* in the *real-time market* for the *thermal state* determined in accordance with section 1.1.1 for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h';

3.1.1.8 $SNL_{k,h}^{m}$ is the as-*offered speed no-load offer* in the *real-time market* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h';

3.1.1.9 $A'^{GTMLP,m}_{k,h}$ is the set of *reference level value* laminations for *energy* quantities greater than the *offer* lamination that includes the *minimum*

loading point in the *real-time market* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h';

3.1.1.10 $A'^{LTMLP,m}_{k,h}$ is the set of *reference level value* laminations for *energy* quantities up to and including the *offer* lamination that includes the *minimum loading point in the real-time market* for a *GOG-eligible resource* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h';

3.1.1.11 $A'^{m}_{r,k,h}$ is the set of *reference level value* laminations for *class r reserve* in the *real-time market* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h', where r1, r2, and r3 are all applicable;

3.1.1.12 $PGTMLPRef^{m}_{k,h,a'}$ designates the *reference level value* for *energy offer* lamination a' $\in A'^{GTMLP,m}_{k,h}$ for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h' as may be adjusted by the *IESO* pursuant to MR Ch.9 s.5.3.1.2;

Where:

a. if the relevant *resource* is a *non-committable resource* and is primarily fueled by biomass, natural gas or oil, then for each contiguous period of its *real-time market schedule*:

   i. the applicable *reference level value* for the initial *settlement hours* of such contiguous *real-time schedule*, equal to the duration of the *resource's minimum run-time*, will be the *resource's* primary *energy offer reference level value*; and

   ii. the applicable *reference level value* for all other *settlement hours* of such contiguous *real-time schedule* will be the *resource's* secondary *energy offer reference level value*.

3.1.1.13 $PDGRef^{m}_{r,k,h,a'}$ designates the *reference level value* for *class r reserve offer* lamination $a' \in A'^{m}_{r,k,h}$ for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h', where r1, r2, and r3 are all applicable;

3.1.1.14 $SUDGRef^{m}_{k,h}$ designates the *reference level value* for the *start-up offer* in the *real-time market* for the same *thermal state* as $SUDG^{m}_{k,h'}$ for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h' as may be adjusted by the *IESO* pursuant to MR Ch.9 s.5.3.1.2;

3.1.1.15 $SNLRef^{m}_{k,h}$ designates the *reference level value* for the *speed no-load offer* in the *real-time market* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h' as may be adjusted by the *IESO* pursuant to MR Ch.9 s.5.3.1.2;

3.1.1.16 $PLTMLPRef^{m}_{k,h,a'}$ designates the *reference level value* for the *energy* up to and including the *minimum loading point reference level* lamination $a' \in A'^{LTMLP,m}_{k,h}$ of the *offer* for *market participant* 'k' at *delivery point* 'm' for *settlement hour* 'h' as may be adjusted by the *IESO* pursuant to MR Ch.9 s.5.3.1.2.

3.2 Constrained Area Conditions

3.2.1 The *IESO* shall apply the conditions set out in this section 3.2 to determine whether and which conducts tests set out in section 3.4 apply:

3.2.2 In regards to *energy*,

Constrained Area Condition Test for a Narrow Constrained Area

3.2.2.1 The *IESO* shall apply:

a. the *narrow constrained area* conduct test set out in section 3.4.2 when at least one transmission constraint for a *narrow constrained area* is binding in the 'pd1' pre-dispatch run; and

b. the *narrow constrained area* conduct test set out in section 3.4.3 when at least one transmission constraint for a *narrow constrained area* is binding in the 'pdi' pre-dispatch run.

Constrained Area Condition Test for a Dynamic Constrained Area

3.2.2.2 The *IESO* shall apply:

a. the *dynamic constrained area* conduct test set out in section 3.4.4, when at least one transmission constraint for a *dynamic constrained area* is binding in the 'pd1' pre-dispatch run; and

b. the *dynamic constrained area* conduct test set out in section 3.4.5, when at least one transmission constraint for a *dynamic constrained area* is binding in the 'pdi' pre-dispatch run.

Constrained Area Condition Test for a Broad Constrained Area

3.2.2.3 The *IESO* shall apply:

a. the broad constrained area conduct test set out in section 3.4.6 when the congestion component of the *locational marginal price* of a *resource* is greater than $25/MWh in the 'pd1' pre-dispatch run; and

b. the broad constrained area conduct test set out in section 3.4.7 when the congestion component of the *locational marginal price* of a *resource* is greater than $25/MWh in the 'pdi' pre-dispatch run.

Constrained Area Condition Test for Global Market Power Mitigation for Energy

3.2.2.4 The *IESO* shall apply:

a. the global market power mitigation conduct test set out in section 3.4.8 when the following circumstances are true in the 'pd1' pre-dispatch run, as applicable:

   i. the the *intertie border prices* at the *global market power reference intertie zones* are greater than $100/MWh for the relevant *settlement hour*; and
   ii. at least one of the following conditions is met:

      a) import congestion component of the *locational marginal price* from the relevant pre-dispatch run is less than zero on all of the *global market power reference intertie zones* for both of the two *settlement hours* immediately following the relevant *settlement hour*; or

      b) the net *interchange schedule* limit is binding for imports, represented by a negative backward net *interchange schedule* limit shadow price for incremental imports for both of the two *settlement hours* immediately following the relevant *settlement hour.*

b. the global market power mitigation conduct test set out in section 3.4.9 when the following circumstance are true within two hours of the 'pdi' pre-dispatch run, as applicable:

   i. the the *intertie border prices* at the *global market power reference intertie zones* are greater than $100/MWh for the relevant *settlement hour*; and
   ii. at least one of the following conditions is met:

      a) import congestion component of the *locational marginal price* from the relevant pre-dispatch run is less than zero on all of the *global market power reference intertie zones* for both of the two *settlement hours* immediately following the relevant *settlement hour*; or

      b) the net interchange schedule limit is binding for imports, represented by a negative backward net interchange schedule limit shadow price for incremental imports for both of the two *settlement hours* immediately following the relevant *settlement hour.*

c. the global market power mitigation conduct test set out in section 3.4.9 when the following circumstance is true more than two hours prior to the 'pdi' pre-dispatch run:

i. the *intertie border prices* at the *global market power reference intertie zones* are greater than $100/MWh for the relevant *settlement hour.*

Constrained Area Condition Test for Reliability

3.2.2.5 Notwithstanding the foregoing, the *IESO* shall apply the *reliability* conditions conduct tests set out in section 3.4.10 and 3.4.11 where any of the conditions set out in the applicable *market manual* are true.

3.2.3 In regards to operating reserve:

Constrained Area Condition Test for Local Market Power Mitigation for Operating Reserve

3.2.3.1 The *IESO* shall apply the local market power mitigation process conduct test set out in section 3.4.12 if a reserve area has a non-zero minimum requirement in the 'pd1' pre-dispatch run or the 'pdi' pre-dispatch run; and

Constrained Area Condition Test for Global Market Power Mitigation for Operating Reserve

3.2.3.2 The *IESO* shall apply the global market power mitigation process conduct test set out in section 3.4.13 when a *locational marginal price* for any class of *operating reserve* is greater than $15/MW in the 'pd1' pre-dispatch run or the 'pdi' pre-dispatch run.

3.3 Applicable Resources

3.3.1 The *IESO* shall apply the conduct tests described in section 3.4 for transactions scheduled in the *real time market* to the *resources* identified in this section 3.3.

Constrained Area Condition Test for a Narrow Constrained Area

3.3.2 Subject to section 3.3.9, in regards to the conduct test for local market power mitigation process in a *narrow constrained area* in the *energy market* outlined in sections 3.4.2 and 3.4.3, the *IESO* shall apply the conduct tests to the following *resources*:

3.3 2.1 Any *non-committable resources* located in the *narrow constrained area* that had at least one binding constraint in the 'pd1' pre-dispatch run;

3.3 2.2. Any *GOG-eligible resources* located in the *narrow constrained area* that had at least one binding constraint in the 'pdi' pre-dispatch run;

3.3.2.3 Any *GOG-eligible resource* that received a *pre-dispatch operational commitment* in the 'pdi' pre-dispatch run and the congestion component

of the applicable *locational marginal price* is greater than $0/MWh on any *narrow constrained area* binding constraint; and

3.3.2.4 Any *GOG-eligible resource* that received a *pre-dispatch operational commitment* in the 'pdi' pre-dispatch run*,* such *resource* has a generator sensitivity factor greater than 0.02 on an active constraint that is a *narrow constrained area*, and the following condition is true:

$$RT\_QSI_{k,h}^{m} > (Max\_ACL^{c} - Act\_ACL^{c}) / GSF_{k}^{m,c}$$

Where:

a. Max_ACL^{c} is the maximum acceptable quantity of *energy* that can be injected on constraint 'c' in *settlement hour* 'h';

b. Act_ACL^{c} is the actual quantity of *energy* injected on constraint 'c' in *settlement hour* 'h'; and

c. $GSF_{k}^{m,c}$ is the generator sensitivity factor for the *resource* for *market participant* 'k' at *delivery point* 'm' on constraint 'c'.

Constrained Area Condition Test for a Dynamic Constrained Area

3.3.3 Subject to section 3.3.9, in regards to the conduct test for local market power mitigation process in a *dynamic constrained area* in the *energy market* outlined in sections 3.4.4 and 3.4.5 the *IESO* shall apply the conduct tests to the following *resources:*

3.3.3.1 Any *non-committable resources* located in the *dynamic constrained area* that had at least one binding constraint in the 'pd1' pre-dispatch run;

3.3.3.2 Any *GOG-eligible resources* located in the *dynamic constrained area* that had at least one binding constraint in the 'pdi' pre-dispatch run;

3.3.3.3 Any *GOG-eligible resource* that received a *pre-dispatch operational commitment* and the congestion component of the applicable *locational marginal price* is greater than $0/MWh on any *dynamic constrained area* binding constraint; and

3.3.3.4 Any *GOG-eligible resource* that received a *pre-dispatch operational commitment,* such *resource* has a generator sensitivity factor greater than 0.02 on an active constraint that is a *dynamic constrained area*, and such constraint would have been binding or would have been violated but for the *pre-dispatch operational commitment* received by the *resource*.

Constrained Area Condition Test for a Broad Constrained Area

3.3.4 Subject to section 3.3.9, in regards to the conduct test for local market power mitigation process in a broad constrained area in the *energy market* outlined in

section 3.4.6 and 3.4.7, the *IESO* shall apply such conduct tests to the following *resources*:

3.3.4.1 All *resources* that have a *real time market schedule* for *energy* and are identified as having met the broad constrained area condition in the Outputs of the Constrained Area Conditions Test produced in accordance with MR Ch.7 App.7.5A s.10.8.1;

3.3.4.2 Any *GOG-eligible resource* that received a *pre-dispatch operational commitment* in the 'pdi' pre-dispatch run and congestion component of the applicable *locational marginal price* is greater than $0/MWh on any binding constraint that was not a *narrow constrained area* or a *dynamic constrained area* binding constraint; and

3.3.4.3 Any *GOG-eligible resource* that received a *pre-dispatch operational commitment* in the 'pdi' pre-dispatch run*,* such *resource* has a generator sensitivity factor greater than 0.02 on an active constraint that is not a *narrow constrained area* or a *dynamic constrained area* constraint, and such constraint would have been binding or would have been violated but for the *pre-dispatch operational commitment* received by the *resource*.

Constrained Area Condition Test for Global Market Power Mitigation for Energy

3.3.5 Subject to section 3.3.9, in regards to the global market power mitigation process in the *energy market* outlined in section 3.4.8 and 3.4.9, the *IESO* shall apply such conduct tests to the following *resources*:

3.3.5.1 All *resources* that have a *real- time market* s*chedule* for *energy* and are identified as having met the global market power mitigation condition for *energy* in the Outputs of the Constrained Area Conditions Test produced in accordance with MR Ch.7 App.7.5A s.10.8.1;

3.3.5.2 any *GOG-eligible resource* that received a *pre-dispatch operational commitment* for *energy*; and

3.3.5.3 any *GOG-eligible resource* that, either as permitted in accordance with MR Ch.7 ss.3.3.4B, 3.3.8, 3.3.9.2, 3.3.11 and 21.6 or as approved by the *IESO* in accordance with MR Ch.7 s.3.3.6, a new *energy offer* within the *real-time market mandatory window;*

Constrained Area Condition Test for Reliability

3.3.6 Subject to section 3.3.9, in regards to the conduct test for local market power mitigation process due to *reliability* constraints in the *energy market* outlined in section 3.4.10 and 3.4.11, the *IESO* shall apply such conduct tests to any *resource* that was subject to a constraint identified pursuant to section 3.2.2.5.

Constrained Area Condition Test for Local Market Power Mitigation for Operating Reserve

3.3.7 Subject to section 3.3.9, in regards to the local market power mitigation process in the *operating reserve market* outlined in section 3.4.12, the *IESO* shall apply such conduct tests to the following *resources:*

a. all *resources* that have a *real-time market schedule* for *operating reserve* and are identified as having met the local market power mitigation condition for *operating reserve* in the Outputs of the Constrained Area Conditions Test produced in accordance with MR Ch.7 App.7.5A s.10.8.1; and

b. all *resources* that have a *real-time market schedule* for *operating reserve* whom are located in a region with a binding maximum constraint.

Constrained Area Condition Test for Global Market Power Mitigation for Operating Reserve

3.3.8 Subject to section 3.3.9, in regards to the global market power mitigation process in the *operating reserve market* outlined in section 3.4.13, the *IESO* shall apply such conduct tests to the following *resources*:

3.3.8.1 All *resources* that have a *real-time market schedule* for *operating reserve* and are identified as having met the global market power mitigation condition for *operating reserve* in the Outputs of the Constrained Area Conditions Test produced in accordance with MR Ch.7 App.7.5A s.10.8.1;

3.3.8.2 Any *GOG-eligible resource* that has a *real-time schedule* for *operating reserve*;

3.3.8.3 all *resources* that have a *real-time market schedule* for *operating reserve* whom are located in a region with a binding maximum constraint; and

3.3.8.4 Any *resource* that, either as permitted in accordance with MR Ch.7 ss.3.3.4B, 3.3.8, 3.3.9.2, 3.3.11 and 21.6 or as approved by the *IESO* in accordance with MR Ch.7 s.3.3.6, a new *operating reserve offer* within the *real-time market mandatory window*.

3.3.9 Notwithstanding the foregoing*, non-committable resources* may only be subject to the conduct tests described in sections 3.4.2, 3.4.4, 3.4.6, 3.4.8, and 3.4.10. For greater certainty, *GOG-eligible resources* may, depending on the outcome of this section 3.3, be subject to any conduct test set out in section 3.4.

3.4 Conduct Test

3.4.1 Subject to section 3.4.14, the *IESO* shall apply the conduct tests as set out in this section 3.4.

Local Market Power Mitigation Process in a Narrow Constrained Area for Energy Offers Greater than the Offer Lamination That Includes Minimum Loading Point

3.4.2 The *IESO* shall apply the following conduct test in the circumstances outlined in section 3.2.2.1(a) to the *resources* identified in section 3.3.2. For each *settlement hour* 'h' that qualified to be tested under section 3.2.2.1(a) and for each such *resource* the *IESO* shall:

3.4.2.1 Evaluate *energy offer* laminations that are above the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A_{k,h}^{GTMLP,m}$, if

i. $PGTMLP_{k,h,a}^{m} > 25$; and

ii. $PGTMLP_{k,h,a}^{m} > min((PGTMLPRef_{k,h,a'}^{m} + abs(PGTMLPRef_{k,h,a'}^{m}) \times 0.5), PGTMLPRef_{k,h,a'}^{m} + 25)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_BE_{k,h}^{m}$ shall equal $PLTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{LTMLP,m}$ and $PGTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{GTMLP,m}$;

Local Market Power Mitigation Process in a Narrow Constrained Area for Energy Offers Up to and Including the Offer Lamination That Includes Minimum Loading Point

3.4.3 The *IESO* shall apply the following conduct test in the circumstances outlined in section 3.2.2.1(b) to the *resources* identified in section 3.3.2. For each *settlement hour* 'h' within a *pre-dispatch commitment period* that contains a *settlement hour* that qualified to be tested under section 3.2.2.1(b) and for each such *resource* the *IESO* shall:

3.4.3.1 Evaluate *energy offer* laminations that are up to and including the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A_{k,h}^{LTMLP,m}$, if

i. $PLTMLP_{k,h,a}^{m} > 25$; and

ii. $PLTMLP_{k,h,a}^{m} > min\left(\left(PLTMLPRef_{k,h,a'}^{m} + abs\left(PLTMLPRef_{k,h,a'}^{m}\right) \times 0.5\right), PLTMLPRef_{k,h,a'}^{m} + 25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_BE^{m}_{k,h}$ shall equal $PLTMLPRef^{m}_{k,h,a'}$ for all *offer* laminations $a \in A^{LTMLP,m}_{k,h}$ and $RT\_BE^{m}_{k,h}$ for all *offer* laminations $a \in A^{GTMLP,m}_{k,h}$;

3.4.3.2 Evaluate *start-up offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if

$$SUDG^{m}_{k,h} > \left(SUDGRef^{m}_{k,h} + abs\left(SUDGRef^{m}_{k,h}\right) \times 0.25\right)$$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_SU^{m}_{k,h}$ shall equal $SUDGRef^{m}_{k,h}$; and

3.4.3.3 Evaluate *speed no-load offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if

$$SNL^{m}_{k,h} > \left(SNLRef^{m}_{k,h} + abs\left(SNLRef^{m}_{k,h}\right) \times 0.25\right)$$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_SNL^{m}_{k,h}$ shall equal $SNLRef^{m}_{k,h}$.

Local Market Power Mitigation Process in a Dynamic Constrained Area for Energy Offers Greater Than the Offer Lamination That Includes Minimum Loading Point

3.4.4 the *IESO* shall apply the following conduct test in the circumstances outlined in section 3.2.2.2(a) to the *resources* identified in section 3.3.3. For each *settlement hour* 'h' that qualified to be tested under section 3.2.2.2(a) and for each such *resource* the *IESO* shall:

3.4.4.1 Evaluate *energy offer* laminations that are above the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A^{GTMLP,m}_{k,h}$, if

i. $PGTMLP^{m}_{k,h,a} > 25$; and

ii. $$PGTMLP^{m}_{k,h,a} > min\left(\left(PGTMLPRef^{m}_{k,h,a'} + abs\left(PGTMLPRef^{m}_{k,h,a'}\right) \times 0.5\right), PGTMLPRef^{m}_{k,h,a'} + 25\right)$$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_BE^{m}_{k,h}$ shall equal $PLTMLPRef^{m}_{k,h,a'}$ for all *offer* laminations $a \in A^{LTMLP,m}_{k,h}$ and $PGTMLPRef^{m}_{k,h,a'}$ for all *offer* laminations $a \in A^{GTMLP,m}_{k,h}$;

Local Market Power Mitigation Process in a Dynamic Constrained Area for Energy Offers Up to and Including the Offer Lamination That Includes Minimum Loading Point

3.4.5 the *IESO* shall apply the following conduct test in the circumstances outlined in section 3.2.2.2(b) to the *resources* identified in section 3.3.3. For each *settlement hour* 'h' within a *pre-dispatch commitment period* that contains a *settlement hour* that qualified to be tested under section 3.2.2.2(b) and for each such *resource* the *IESO* shall:

3.4.5.1 Evaluate *energy offer* laminations that are up to and including the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A_{k,h}^{LTMLP,m}$, if

i. $PLTMLP_{k,h,a}^{m} > 25$; and

ii. $PLTMLP_{k,h,a}^{m} > min\left(\left(PLTMLPRef_{k,h,a'}^{m} + abs\left(PLTMLPRef_{k,h,a'}^{m}\right) \times 0.5\right), PLTMLPRef_{k,h,a'}^{m} + 25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_BE_{k,h}^{m}$ shall equal $PLTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{LTMLP,m}$ and $RT\_BE_{k,h}^{m}$ for all *offer* laminations $a \in A_{k,h}^{GTMLP,m}$;

3.4.5.2 Evaluate *start-up offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if $SUDG_{k,h}^{m} > \left(SUDGRef_{k,h}^{m} + abs\left(SUDGRef_{k,h}^{m}\right) \times 0.25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_SU_{k,h}^{m}$ shall equal $SUDGRef_{k,h}^{m}$; and

3.4.5.3 Evaluate *speed no-load offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if $SNL_{k,h}^{m} > SNLRef_{k,h}^{m} + abs\left(SNLRef_{k,h}^{m}\right) \times 0.25)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_SNL_{k,h}^{m}$ shall equal $SNLRef_{k,h}^{m}$.

Local Market Power Mitigation Process in a Broad Constrained Area for Energy Offers Greater Than the Offer Lamination That Includes Minimum Loading Point

3.4.6 The *IESO* shall apply the following conduct test in the circumstances outlined in section 3.2.2.3(a) to the *resources* identified in section 3.3.4. For each *settlement*

hour 'h' that qualified to be tested under section 3.2.2.3(a) and for each such *resource* the *IESO* shall:

3.4.6.1 Evaluate *energy offer* laminations that are above the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A_{k,h}^{GTMLP,m}$, if

i. $PGTMLP_{k,h,a}^{m} > 25$; and

ii. $PGTMLP_{k,h,a}^{m} > min\left(\left(PGTMLPRef_{k,h,a'}^{m} + abs\left(PGTMLPRef_{k,h,a'}^{m}\right) \times 3\right), PGTMLPRef_{k,h,a'}^{m} + 25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_BE_{k,h}^{m}$ shall equal $PLTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{LTMLP,m}$ and $PGTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{GTMLP,m}$;

Local Market Power Mitigation Process in a Broad Constrained Area for Energy Offers up to and Including the Offer Lamination That Includes Minimum Loading Point

3.4.7 The *IESO* shall apply the following conduct test in the circumstances outlined in section 3.2.2.3(b) to the *resources* identified in section 3.3.4. For each *settlement hour* 'h' within a *pre-dispatch commitment period* that contains a *settlement hour* that qualified to be tested under section 3.2.2.3(b) and for each such *resource* the *IESO* shall:

3.4.7.1 Evaluate *energy offer* laminations that are up to and including the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A_{k,h}^{LTMLP,m}$, if

i. $PLTMLP_{k,h,a}^{m} > 25$; and

ii. $PLTMLP_{k,h,a}^{m} > min\left(\left(PLTMLPRef_{k,h,a'}^{m} + abs(PLTMLPRef_{k,h,a'}^{m}) \times 3\right), PLTMLPRef_{k,h,a'}^{m} + 25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_BE_{k,h}^{m}$ shall equal $PLTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{LTMLP,m}$ and $RT\_BE_{k,h}^{m}$ for all *offer* laminations $a \in A_{k,h}^{GTMLP,m}$;

3.4.7.2 Evaluate *start-up offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if
$$SUDG_{k,h}^{m} > \left(SUDGRef_{k,h}^{m} + abs\left(SUDGRef_{k,h}^{m}\right) \times 1\right)$$
b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_SU_{k,h}^{m}$ shall equal $SUDGRef_{k,h}^{m}$; and

3.4.7.3 Evaluate *speed no-load offers* as follows:

c. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if
$$SNL_{k,h}^{m} > \left(SNLRef_{k,h}^{m} + abs\left(SNLRef_{k,h}^{m}\right) \times 1\right)$$
d. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_SNL_{k,h}^{m}$ shall equal $SNLRef_{k,h}^{m}$.

Global Market Power Mitigation Process for Energy Offers Greater Than the Offer Lamination That Includes Minimum Loading Point

3.4.8 The *IESO* shall apply the following conduct test in the circumstances outlined in section 3.2.2.4(a) to the *resources* identified in section 3.3.5. For each *settlement hour* 'h' that qualified to be tested under section 3.2.2.4(a) and for each such *resource* the *IESO* shall:

3.4.8.1 Evaluate *energy offer* laminations that are above the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A_{k,h}^{GTMLP,m}$, if

i. $PGTMLP_{k,h,a}^{m} > 25$; and

ii. $PGTMLP_{k,h,a}^{m} > min\left(\left(PGTMLPRef_{k,h,a'}^{m} + abs\left(PGTMLPRef_{k,h,a'}^{m}\right) \times 3\right), PGTMLPRef_{k,h,a'}^{m} + 100\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_BE_{k,h}^{m}$ shall equal $PLTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{LTMLP,m}$ and $PGTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{GTMLP,m}$;

Global Market Power Mitigation Process for Energy Offers Up to and Including the Offer Lamination That Includes Minimum Loading Point

3.4.9 The *IESO* shall apply the following conduct test in the circumstances outlined in section 3.2.2.4(b) or 3.2.2.4(c) to the *resources* identified in section 3.3.5. For each *settlement hour* 'h' within a *pre-dispatch commitment period* that contains a

settlement hour that qualified to be tested under section 3.2.2.4(b) or 3.2.2.4(c) and for each such *resource* the *IESO* shall:

3.4.9.1 Evaluate *energy offer* laminations that are up to and including the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A_{k,h}^{LTMLP,m}$, if

i. $PLTMLP_{k,h,a}^{m} > 25$; and

ii. $PLTMLP_{k,h,a}^{m} > min\left((PLTMLPRef_{k,h,a'}^{m} + abs(PLTMLPRef_{k,h,a'}^{m}) \times 3), PLTMLPRef_{k,h,a'}^{m} + 100\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_BE_{k,h}^{m}$ shall equal $PLTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{LTMLP,m}$ and $RT\_BE_{k,h}^{m}$ for all *offer* laminations $a \in A_{k,h}^{GTMLP,m}$;

3.4.9.2 Evaluate *start-up offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if $SUDG_{k,h}^{m} > \left(SUDGRef_{k,h}^{m} + abs\left(SUDGRef_{k,h}^{m}\right) \times 1\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_SU_{k,h}^{m}$ shall equal $SUDGRef_{k,h}^{m}$; and

3.4.9.3 Evaluate *speed no-load offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if $SNL_{k,h}^{m} > SNLRef_{k,h}^{m} + abs\left(SNLRef_{k,h}^{m}\right) \times 1)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_SNL_{k,h}^{m}$ shall equal $SNLRef_{k,h}^{m}$.

Local Market Power Mitigation Process due to Reliability Constraints for Energy Offers Greater than the Offer Lamination That Includes Minimum Loading Point

3.4.10 The *IESO* shall apply the following conduct test in the circumstances outlined in section 3.2.2.5 to the *resources* identified in section 3.3.6. For each *settlement hour* 'h' that qualified to be tested under section 3.2.2.5 and for each such *resource* the *IESO* shall:

3.4.10.1 Evaluate *energy offer* laminations that are above the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A_{k,h}^{GTMLP,m}$, if

i. $PGTMLP_{k,h,a}^{m} > 25$; and

ii. $PGTMLP_{k,h,a}^{m} > min\left(\left(PGTMLPRef_{k,h,a'}^{m} + abs\left(PGTMLPRef_{k,h,a'}^{m}\right) \times 0.1\right), PGTMLPRef_{k,h,a'}^{m} + 25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_BE_{k,h}^{m}$ shall equal $PLTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{LTMLP,m}$ and $PGTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{GTMLP,m}$;

Local Market Power Mitigation Process Due to Reliability Constraints for Energy Offers Up to and Including the Offer Lamination That Includes Minimum Loading Point

3.4.11 The *IESO* shall apply the following conduct test in the circumstances outlined in section 3.2.2.5 to the *resources* identified in section 3.3.6. For each *settlement hour* 'h' within a *pre-dispatch commitment period* that contains a *settlement hour* that qualified to be tested under section 3.2.2.5 and for each such *resource* the *IESO* shall:

3.4.11.1 Evaluate *energy offer* laminations that are up to and including the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A_{k,h}^{LTMLP,m}$, if

i. $PLTMLP_{k,h,a}^{m} > 25$; and

ii. $PLTMLP_{k,h,a}^{m} > min\left((PLTMLPRef_{k,h,a'}^{m} + abs(PLTMLPRef_{k,h,a'}^{m}) \times 0.1), PLTMLPRef_{k,h,a'}^{m} + 25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_BE_{k,h}^{m}$ shall equal $PLTMLPRef_{k,h,a'}^{m}$ for all *offer* laminations $a \in A_{k,h}^{LTMLP,m}$ and $RT\_BE_{k,h}^{m}$ for all *offer* laminations $a \in A_{k,h}^{GTMLP,m}$;

3.4.11.2 Evaluate *start-up offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if $SUDG_{k,h}^{m} > \left(SUDGRef_{k,h}^{m} + abs\left(SUDGRef_{k,h}^{m}\right) \times 0.1\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_SU_{k,h}^{m}$ m shall equal $SUDGRef_{k,h}^{m}$; and

3.4.11.3 Evaluate *speed no-load offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if
$$SNL^{m}_{k,h} > SNLRef^{m}_{k,h} + abs\left(SNLRef^{m}_{k,h}\right) \times 0.1)$$
b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_SNL^{m}_{k,h}$ shall equal $SNLRef^{m}_{k,h}$.

Local Market Power Mitigation Process in the Operating Reserve Market

3.4.12 The *IESO shall* apply the following conduct test in the circumstances outlined in section 3.2.3.1 to the *resources* identified in section 3.3.7. For each *settlement hour* 'h' that qualified to be tested under section 3.2.3.1 and for each such *resource* the *IESO* shall:

3.4.12.1 Evaluate *offers* for *operating reserve* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *class r reserve* for any *offer* lamination '*a*':

For all $a \in A^{m}_{r,k,h}$, if

i. $PDG^{m}_{r,k,h,a} > 5$; and

ii. $PDG^{m}_{r,k,h,a} > \min\left(\left(PDGRef^{m}_{r,k,h,a'} + abs\left(PDGRef^{m}_{r,k,h,a'}\right) \times 0.1\right), PDGRef^{m}_{r,k,h,a'} + 25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_BOR^{m}_{r,k,h}$ shall equal $PDGRef^{m}_{r,k,h,a'}$ for all *offer* lamination $a \in A^{m}_{r,k,h}$ for the *class r reserve* for which it failed the test;

3.4.12.2 Evaluate *energy offer* laminations that are up to and including the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A^{LTMLP,m}_{k,h}$, if

i. $PLTMLP^{m}_{k,h,a} > 25$; and

ii. $PLTMLP^{m}_{k,h,a} > min\left((PLTMLPRef^{m}_{k,h,a'} + abs(PLTMLPRef^{m}_{k,h,a'}) \times 0.1), PLTMLPRef^{m}_{k,h,a'} + 25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_BE^{m}_{k,h}$ shall equal $PLTMLPRef^{m}_{k,h,a'}$ for all *offer* laminations $a \in A^{LTMLP,m}_{k,h}$ and $RT\_BE^{m}_{k,h}$ for all *offer* laminations $a \in A^{GTMLP,m}_{k,h}$;

3.4.12.3 Evaluate *start-up offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if

$$SUDG_{k,h}^{m} > \left(SUDGRef_{k,h}^{m} + abs\left(SUDGRef_{k,h}^{m}\right) \times 0.1\right)$$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_SU_{k,h}^{m}$ shall equal $SUDGRef_{k,h}^{m}$; and

3.4.12.4 Evaluate *speed no-load offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if

$$SNL_{k,h}^{m} > SNLRef_{k,h}^{m} + abs\left(SNLRef_{k,h}^{m}\right) \times 0.1)$$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_SNL_{k,h}^{m}$ shall equal $SNLRef_{k,h}^{m}$.

Global Market Power Mitigation Process in the Operating Reserve Market

3.4.13 The *IESO shall* apply the following conduct test in the circumstances outlined in section 3.2.3.2 to the *resources* identified in section 3.3.8. For each *settlement hour* 'h' that qualified to be tested under section 3.2.3.2 and for each such *resource* the *IESO* shall:

3.4.13.1 Evaluate *offers* for *operating reserve* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *class r reserve* for any *offer* lamination '*a*':

For all $a \in A_{r,k,h}^{m}$, if

i. $PDG_{r,k,h,a}^{m} > 5$; and

ii. $PDG_{r,k,h,a}^{m} > \min\left(\left(PDGRef_{r,k,h,a'}^{m} + abs\left(PDGRef_{r,k,h,a'}^{m}\right) \times 0.5\right), PDGRef_{r,k,h,a'}^{m} + 25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_BOR_{r,k,h}^{m}$ shall equal $PDGRef_{r,k,h,a'}^{m}$ for all *offer* lamination $a \in A_{r,k,h}^{m}$ for the *class r reserve* for which it failed the test;

3.4.13.2 Evaluate *energy offer* laminations that are up to and including the *energy offer* lamination that includes its *minimum loading point* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if the following is true for any *offer* lamination '*a*':

For all $a \in A_{k,h}^{LTMLP,m}$, if

i. $PLTMLP_{k,h,a}^{m} > 25$; and

ii. $PLTMLP_{k,h,a}^{m} > min\left((PLTMLPRef_{k,h,a'}^{m} + abs(PLTMLPRef_{k,h,a'}^{m}) \times 0.5), PLTMLPRef_{k,h,a'}^{m} + 25\right)$

b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_BE^{m}_{k,h}$ shall equal $PLTMLPRef^{m}_{k,h,a'}$ for all *offer* laminations $a \in A^{LTMLP,m}_{k,h}$ and $RT\_BE^{m}_{k,h}$ for all *offer* laminations $a \in A^{GTMLP,m}_{k,h}$;

3.4.13.3 Evaluate *start-up offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if
$$SUDG^{m}_{k,h} > \left(SUDGRef^{m}_{k,h} + abs\left(SUDGRef^{m}_{k,h}\right) \times 0.25\right)$$
b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_SU^{m}_{k,h}$ shall equal $SUDGRef^{m}_{k,h}$; and

3.4.13.4 Evaluate *speed no-load offers* as follows:

a. a *resource* at *delivery point* 'm' fails the conduct test for *settlement hour* 'h' if
$$SNL^{m}_{k,h} > SNLRef^{m}_{k,h} + abs\left(SNLRef^{m}_{k,h}\right) \times 0.25)$$
b. where such *resource* fails the conduct test and for the *settlement hour* that failed the conduct test, $EMFC\_RT\_SNL^{m}_{k,h}$ shall equal $SNLRef^{m}_{k,h}$.

3.4.14 If multiple conduct tests set out in section 3.4 apply in regards to the same *settlement hour*, then the *IESO* shall apply the following:

a. where multiple conduct tests for *energy* greater than *minimum loading point* apply in regards to the same *settlement hour,* the conduct test with the most restrictive threshold, as determined in accordance with the applicable *market manual,* shall apply to such *settlement hour*;

b. where multiple conduct tests for *energy* up to and including *minimum loading point* apply in regards to the same *settlement hour*, the conduct test with the most restrictive threshold, as determined in accordance with the applicable *market manual,* shall apply to all *settlement hours* within the *pre-dispatch commitment period* that contains such *settlement hour;*

c. where both a conduct test for *energy* up to and including *minimum loading point* and *energy* greater than *minimum loading point* apply with respect to the same *settlement hour,*

i. the greater than *minimum loading point* conduct test with the most restrictive threshold, as determined in accordance with the applicable *market manual,* shall apply to such *settlement hour;* and

ii. if the *resource* does not fail such greater than *minimum loading point* conduct test, the up to and including *minimum loading point* conduct test with the most restrictive threshold,

as determined in accordance with the applicable *market manual,* shall apply to such *settlement hour.*

d. where multiple conduct tests for *operating reserve offers* apply in regards to the same *settlement hour,* the conduct test with the most restrictive threshold, as determined in accordance with the applicable *market manual,* shall apply to such *settlement hour*;

e. where multiple conduct tests for *start-up offer* or *speed no-load offers*, as the case may be, apply in regards to the same *settlement hour*, the conduct test with the most restrictive threshold, as determined in accordance with the applicable *market manual,* shall apply to all *settlement hours* within the *pre-dispatch commitment period* that contains such *settlement hour.*