

Market Rules

Chapter 9

Settlements and Billing - Appendices

Library Record No. MDP_RUL_0002_07

Document Name Market Rules for the Ontario Electricity Market; MRP Consolidated Draft

MRA's included;

- Market Entry and Prudentials:
 - o MR.461.R00
 - o MR.450.R00
 - o MR.451.R00
 - o MR.453.R00
 - o MR.453.R01
 - o MR.453.R02
 - o MR.453.R03
 - o MR.453.R04
- Market Power Mitigation:
 - o MR.461.R01
 - o MR.455.R00 (March 2023 update)
- Calculation Engines:
 - o MR.458.R00
 - o MR. 459.R00
 - o MR. 460.R00
 - o MR. 461.R02
- Interim Alignment:
 - o MR.457.R00
 - o MR.457.R01
 - o MR.457.R02
 - o MR.457.R03
 - o MR.00461.R03
- Settlements:
 - o MR.452.R00
 - o MR.456.R03
 - o MR.456.R02
 - o MR.456.R01
 - o MR.461.R04
 - o MR.456.R00

Publication date: June 8 2023 (includes MR-00474- enabling Hybrid Resources, MR-00475 RSS, MR-00467 Improving Accessibility of Operating Reserve and MR-00471 Updates to Synchrophasor Monitoring Requirements in advance of their inclusion in Baseline).

Document Change History

Issue/Draft	Reason for Issue	Date
Issue 1.0	Baseline 8.0	September 25, 2002
Issue 2.0	Baseline 22.0	September 9, 2009
Issue 3.0	Baseline 28.0	September 12, 2012
Issue 4.0	Baseline 45.0	February 26, 2021

Related Documents

Library Record No.	Document Title	Version
MDP_RUL_0002	Market Rules for the Ontario Electricity Market	48.0



Table of Contents

Appendix 9.1 – VEE Process	1
Appendix 9.2 - Data Inputs and Variables.....	11
1 General/Overview	11
2 Registration and General Data and Information.....	12
3 Day-Ahead Market Variables, Data and Information.....	12
4 Pre-Dispatch Variables, Data and Information.....	19
5 Real-Time Market Variables, Data and Information	22
6 Physical Bilateral Contract Variables, Data and Information	30
7 Transmission Rights Variables, Data and Information	31
8 Allocated Quantities	32
9 Market Power Mitigation.....	32
10 Mathematical Functions	34
Appendix 9.3 - Pseudo-Unit Translation	35
Appendix 9.4 – Settlement Mitigation	64
1 Introduction	64
2 Day-Ahead Market Mitigation.....	65
3 Real-Time Mitigation	83

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]~~

1.1.32 For the purposes of this Appendix, a reference to an interval means:

1.1.32.1 in the case of a *metering installation* that collates *metering data* by *metering intervals*, a *metering interval*; and

1.1.32.2 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]~~

1.3.42 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:

1.3.42.1 *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 sss. 11.1.2.1 and s: 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*,
 - 1.5.1.5 against the standard of accuracy described in ~~sections MR Ch.6 s.11.2.2 of Chapter 6~~;
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]~~
- 1.5.5.32 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 than 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 – [Intentionally left blank]~~

Appendix 9.2 - Data Inputs and Variables

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 $DAM_QSI_{k,h}^i$ = 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 $DAM_QSI_{k,h}^m$ = quantity of *energy* (in MWh) scheduled for injection by *market participant* 'k' at *delivery point* 'm' in *settlement hour* 'h'.
 - 3.1.3 $DAM_QSI_{k,h}^p$ = quantity of *energy* (in MWh) scheduled for injection by *market participant* 'k' at *pseudo-unit delivery point* 'p' in *settlement hour* 'h'.
 - 3.1.4 $DAM_QSI_{k,h}^c$ = 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 $DAM_QSI_{k,h}^s$ = 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 $DAM_QVSI_{k,h}^v$ = quantity of energy (in MWh) scheduled for injection by market participant 'k' at virtual zonal resource 'v' in settlement hour 'h'.
- 3.1.7 $DAM_QSW_{k,h}^m$ = quantity of energy scheduled (in MWh) for withdrawal by market participant 'k' at delivery point 'm' in settlement hour 'h'.
- 3.1.8 $DAM_QSW_{k,h}^i$ = 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 $DAM_HDR_QSW_{k,h}^m$ = 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 $DAM_QVSW_{k,h}^v$ = quantity of energy (in MWh) scheduled for withdrawal by market participant 'k' at virtual zonal resource 'v' in settlement hour 'h'.
- 3.1.11 $DAM_QSW_{k,h}^d$ = 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 $DAM_QSI_{k,h}^{i,p1}$ = 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 $DAM_QSI_{k,h}^{i,p2}$ = 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 $ST_Portion_{k,d}^p$ = 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 $DAM_LMP_h^z$ = 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 $DAM_LMP_h^m$ = the day-ahead market locational marginal price for energy (in \$/MWh) at delivery point 'm' in settlement hour 'h'.
- 3.1.17 $DAM_LMP_h^c$ = the day-ahead market locational marginal price for energy (in \$/MWh) at combustion turbine delivery point 'c' in settlement hour 'h'.

- 3.1.18 $DAM_LMP_h^s$ = 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 $DAM_PROR_{r,h}^m$ = 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 $DAM_PROR_{r,h}^c$ = 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 $DAM_PROR_{r,h}^s$ = 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 $DAM_PROR_{r,h}^i$ = 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 $DAM_BE_{k,h}^m$ = 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 $DAM_BE_{k,h}^i$ = 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 $DAM_BE_{k,h}^p$ = 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 $DAM_BE_SU_{k,h}^m$ = 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 $DAM_BE_SU_{k,h}^p$ = 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 $DAM_BE_SU_{k,f}^m$ = 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 $DAM_BE_SU_{k,f}^p$ = 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 $DAM_BE_SNL_{k,h}^m$ = speed no-load offer submitted in the day-ahead market (in \$/start), subject to pro-rata reduction based on $N_{k,h}^m$, 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:
- $N_{k,h}^m$ = 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 $DAM_BE_SNL_{k,h}^p$ = 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 $DAM_BL_{k,h}^m$ = 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 $DAM_BL_{k,h}^i$ = 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 $DAM_HDR_BL_{k,h}^m$ = 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 $DAM_BOR_{r,k,h}^m$ = 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 $DAM_BOR_{r,k,h}^i$ = 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 $DAM_BOR_{r,k,h}^p$ = 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_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, 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_k^m = minimum loading point (in MW) for a resource at delivery point 'm' for market participant 'k'.
- 3.3.17 MLP_k^c = 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_k^s = 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_k^p = 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 $DAM_EOP_{k,h}^m$ = 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 $DAM_EOP_{k,h}^i$ = 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 $DAM_EOP_{k,h}^p$ = 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 $DAM_EOP_{k,h}^c$ = 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 $DAM_OR_EOP_{r,k,h}^i$ = 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 $DAM_OR_EOP_{r,k,h}^s$ = 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 $DAM_OR_EOP_{r,k,h}^c$ = 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 $DAM_OR_EOP_{r,k,h}^m$ = 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 $DAM_OR_EOP_{r,k,h}^p$ = 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 $DAM_DIPC_{k,h}^c$ = 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 $DAM_DIPC_{k,h}^s$ = 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 $DAM_DIGQ_{k,h}^s$ = 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 $DAM_EOP_DIGQ_{k,h}^s$ = 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 $DAM_OR_DIPC_{r,k,h}^c$ = 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 $DAM_OR_DIPC_{r,k,h}^s$ = 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 $DAM_STP_QSI_{k,h}^p$ = 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 $DAM_QSI_{k,h}^p$ and $DAM_QSI_{k,h}^c$.

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 $PD_QSI_{k,h}^i$ = pre-dispatch quantity of energy scheduled for injection (in MWh) by market participant ‘k’ at inertia metering point ‘i’ in settlement hour ‘h’ by pre-dispatch run ‘pd1’.

- 4.1.2 $PD_QSI_{k,h}^{m,pdm}$ = 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 $PD_QSI_{k,h}^{p,pdm}$ = 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 $PD_BE_SU_{k,h}^m$ = 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 $PD_BE_SU_{k,h}^p$ = 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 $PD_BE_SU_{k,f}^{p,pdm}$ = 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 $PD_BE_SU_{k,f}^{m,pdm}$ = 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 $PD_BE_SNL_{k,h}^m$ = 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 $PD_BE_SNL_{k,h}^p$ = 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 $PD_BE_SNL_{k,h}^{m,pdm}$ = 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 $PD_STP_QSI_{k,h}^{p,pdm}$ = 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 $PD_QSI_{k,h}^{p,pdm}$ and $PD_QSI_{k,h}^{c,pdm}$.

4.3.2 $PD_DIPC_{k,h}^{c,t}$ = 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 $PD_DIPC_{k,h}^{s,t}$ = 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 $RT_QSOR_{r,k,h}^{p,t}$ = 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 $RT_QSOR_{r,k,h}^{i,t}$ = 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 $RT_LC_EOP_{k,h}^{m,t}$ = 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 $RT_LC_EOP_{k,h}^{i,t}$ = 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 $RT_LC_EOP_{k,h}^{p,t}$ = 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 $RT_LC_EOP_{k,h}^{c,t}$ = 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 $RT_LOC_EOP_{k,h}^{m,t}$ = 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 $RT_LOC_EOP_{k,h}^{p,t}$ = 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 $RT_LOC_EOP_{k,h}^{i,t}$ = 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 participants 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 $DAM_BCQ_{s,k,h}^m$ = 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 $DAM_BCQ_{k,b,h}^m$ = 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 $DAM_BCQ_{s,k,h}^i$ = 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 $DAM_BCQ_{k,b,h}^i$ = 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 $BCQ_{s,k,h}^{m,t}$ = 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 $BCQ_{k,b,h}^{m,t}$ = 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 $BCQ_{s,k,h}^{i,t}$ = 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 $BCQ_{k,b,h}^{i,t}$ = 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. If physical quantities are provided only for each metering interval, the IESO shall, if for settlement purposes the IESO is comparing hourly and interval data, determine the hourly amounts defined below by multiplying the interval amounts by twelve:

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:

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

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

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

Where:

- (a) s^* is the highest indexed row of B such that $Q_{s^*} \leq Q \leq Q_{n^*}$; 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

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 20 divided by the number of combustion turbines and rounded down to the nearest whole number; 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:

$$DAM_MRRQ_{k,h}^p = \text{Min} \left(DAM_ORRQ_{k,d1}^p, \text{Max} \left(DAM_QSI_{k,h}^p, DAM_EOP_{k,h}^p \right) \right)$$

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:

$$DAM_DRRQ_{k,h}^p = \text{Min} \left(DAM_CRRQ_k^p, DAM_MRRQ_{k,h}^p, \frac{\text{Max} \left(0, \text{Max} \left(DAM_QSI_{k,h}^c, DAM_EOP_{k,h}^c \right) - MLP_k^c \right)}{\left(1 - ST_Portion_{k,d2}^p \right)} \right)$$

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:

$$\begin{aligned}
DAM_DFRRQ_{k,h}^p &= \text{Min} \left(DAM_ORRQ_{k,d1}^p + DAM_ORRQ_{k,d2}^p \right. \\
&\quad \left. + DAM_ORRQ_{k,d3}^p, \text{Max} \left(\text{Max} \left(DAM_QSI_{k,h}^p, DAM_EOP_{k,h}^p \right) \right. \right. \\
&\quad \left. \left. + DAM_CRRQ_k^p - DAM_DRRQ_{k,h}^p, DAM_CRRQ_k^p \right) \right)
\end{aligned}$$

1.2.1.6 $DAM_ST_Q_{k,h}^p$ = an M-by-1 matrix (where M is M_k^p) of steam turbine quantity values (in MW), calculated from the $DAM_BE_{k,h}^p$ and $ST_Portion_{k,d}^p$ for market participant 'k' at pseudo-unit delivery point 'p' during settlement hour 'h', and is derived as follows:

Scenario	Domain	$DAM_ST_Q_{k,h}^p$
1	0 < $DAM_BE[i, 2]_{k,h}^p$ ≤ $DAM_MRRQ_{k,h}^p$	$DAM_BE[i, 2]_{k,h}^p \times ST_Portion_{k,d1}^p$
2	$DAM_MRRQ_{k,h}^p$ < $DAM_BE[i, 2]_{k,h}^p$ ≤ $DAM_DRRQ_{k,h}^p$	$DAM_MRRQ_{k,h}^p \times ST_Portion_{k,d1}^p$ + $(DAM_BE[i, 2]_{k,h}^p - DAM_MRRQ_{k,h}^p)$ × $ST_Portion_{k,d2}^p$
3	$DAM_DRRQ_{k,h}^p$ < $DAM_BE[i, 2]_{k,h}^p$ ≤ $CRRQ_k^p$	$DAM_MRRQ_{k,h}^p \times ST_Portion_{k,d1}^p$ + $(DAM_DRRQ_{k,h}^p - DAM_MRRQ_{k,h}^p)$ × $ST_Portion_{k,d2}^p$
4	$CRRQ_k^p$ < $DAM_BE[i, 2]_{k,h}^p$ ≤ $DAM_DFRRQ_{k,h}^p$	$DAM_MRRQ_{k,h}^p \times ST_Portion_{k,d1}^p$ + $(DAM_DRRQ_{k,h}^p - DAM_MRRQ_{k,h}^p)$ × $ST_Portion_{k,d2}^p$ + $(DAM_BE[i, 2]_{k,h}^p - CRRQ_k^p)$ × $ST_Portion_{k,d3}^p$
5	$DAM_DFRRQ_{k,h}^p$ < $DAM_BE[i, 2]_{k,h}^p$	$DAM_MRRQ_{k,h}^p \times ST_Portion_{k,d1}^p$ + $(DAM_DRRQ_{k,h}^p - DAM_MRRQ_{k,h}^p)$ × $ST_Portion_{k,d2}^p$ + $(DAM_DFRRQ_{k,h}^p - CRRQ_k^p)$ × $ST_Portion_{k,d3}^p$

or simplified as:

$$\begin{aligned}
DAM_ST_Q[i]_{k,h}^p &= \text{Min} \left(DAM_MRRQ_{k,h}^p, DAM_BE[i, 2]_{k,h}^p \right) \times ST_Portion_{k,d1}^p \\
&\quad + \text{Max} \left(0, \text{Min} \left(DAM_DRRQ_{k,h}^p, DAM_BE[i, 2]_{k,h}^p \right) \right. \\
&\quad \left. - DAM_MRRQ_{k,h}^p \right) \times ST_Portion_{k,d2}^p \\
&\quad + \text{Max} \left(0, \text{Min} \left(DAM_DFRRQ_{k,h}^p, DAM_BE[i, 2]_{k,h}^p \right) - DAM_CRRQ_k^p \right) \\
&\quad \times ST_Portion_{k,d3}^p
\end{aligned}$$

1.2.1.7 $DAM_ST_PC_{k,h}^p$ = 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

$DAM_BE_{k,h}^p$ and the quantity component of $DAM_ST_Q_{k,h}^p$ 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]
$DAM_ST_PC_{k,h}^p$	Row i = 1	$DAM_BE[i, 1]_{k,h}^p$	0
	Row i ≥ 2	$DAM_BE[i, 1]_{k,h}^p$	$DAM_ST_Q[i]_{k,h}^p - DAM_ST_Q[i - 1]_{k,h}^p$

1.2.1.8 $DAM_ST_PC_{k,h}^s$ = 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 the calculated $DAM_ST_PC_{k,h}^p$ 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]
$DAM_ST_PC_{k,h}^s$	Rows i=1 to m1, j=1 to m1	$DAM_ST_PC[j, 1]_{k,h}^{p1}$	$DAM_ST_PC[j, 2]_{k,h}^{p1}$
	Rows i=(m1+1) to (m1+m2), j=1 to m2	$DAM_ST_PC[j, 1]_{k,h}^{p2}$	$DAM_ST_PC[j, 2]_{k,h}^{p2}$
	Rows i=(m2+1) to (m1+m2+m3), j=1 to m3	$DAM_ST_PC[j, 1]_{k,h}^{p3}$	$DAM_ST_PC[j, 2]_{k,h}^{p3}$
	Rows i=(m3+1) to (m1+m2+m3+m4), j=1 to m4	$DAM_ST_PC[j, 1]_{k,h}^{p4}$	$DAM_ST_PC[j, 2]_{k,h}^{p4}$

Where:

a. For a pseudo-unit to be included in the $DAM_ST_PC_{k,h}^s$ 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. $DAM_ST_PC_{k,h}^s$ 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 $DAM_ST_PC_{k,h}^s$ 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 $DAM_ST_PC_{k,h}^P$ from PSU1.
- d. m2 is the number of rows in $DAM_ST_PC_{k,h}^P$ from PSU2.
- e. m3 is the number of rows in $DAM_ST_PC_{k,h}^P$ from PSU3.
- f. m4 is the number of rows in $DAM_ST_PC_{k,h}^P$ from PSU4.

DIPC

1.2.1.9 $DAM_DIPC_{k,h}^s$ = 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]
$DAM_DIPC_{k,h}^s$	Row i	$DAM_ST_PC[i, 1]_{k,h}^s$	$\sum_{j=1}^i DAM_ST_PC[j, 2]_{k,h}^s$

1.2.1.10 $DAM_DIPC_{k,h}^c$ = 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	$0 < DAM_BE[i, 2]_{k,h}^p$ $\leq DAM_MRRQ_{k,h}^p$	$DAM_BE[i, 2]_{k,h}^p \times (1 - ST_Portion_{k,d1}^p)$
2	$DAM_MRRQ_{k,h}^p$ $< DAM_BE[i, 2]_{k,h}^p$ $\leq DAM_DRRQ_{k,h}^p$	$DAM_MRRQ_{k,h}^p \times (1 - ST_Portion_{k,d1}^p)$ $+ (DAM_BE[i, 2]_{k,h}^p$ $- DAM_MRRQ_{k,h}^p)$ $\times (1 - ST_Portion_{k,d2}^p)$
3	$DAM_DRRQ_{k,h}^p$ $< DAM_BE[i, 2]_{k,h}^p$	$DAM_MRRQ_{k,h}^p \times (1 - ST_Portion_{k,d1}^p)$ $+ (DAM_DRRQ_{k,h}^p$ $- DAM_MRRQ_{k,h}^p)$ $\times (1 - ST_Portion_{k,d2}^p)$

or simplified as:

Derived Interval Price Curve Matrix	=	Price [Row 'i', Column 1]	Quantity [Row 'i', Column 2]
$DAM_DIPC_{k,h}^c$	Row i	$DAM_BE[i, 1]_{k,h}^p$	$Min(DAM_BE[i, 2]_{k,h}^p, DAM_DRRQ_{k,h}^p)$ $- [Min(DAM_MRRQ_{k,h}^p, DAM_BE[i, 2]_{k,h}^p)$ $\times ST_Portion_{k,d1}^p$ $+ Max(0, Min(DAM_DRRQ_{k,h}^p, DAM_BE[i, 2]_{k,h}^p)$ $- DAM_MRRQ_{k,h}^p) \times ST_Portion_{k,d2}^p]$

Where:

- a. Any price-quantity pairs in the $DAM_DIPC_{k,h}^c$ 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 $DAM_DIGQ_{k,h}^s$ = 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:

$$DAM_DIGQ_{k,h}^s = \sum_{p=1}^N DAM_STP_QSI_{k,h}$$

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 $DAM_EOP_DIGQ_{k,h}^s$ = 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:

$$DAM_EOP_DIGQ_{k,h}^s = \sum_{p=1}^N [DAM_EOP_{k,h}^p - DAM_EOP_{k,h}^c]$$

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 $OR_DAM_DRRQ_{r,k,h}^p$ = the day-ahead market dispatchable region range quantity for operating reserve (in MW), which is the portion of the greater of the $DAM_QSOR_{r,k,h}^c$ and $DAM_OR_EOP_{r,k,h}^c$ 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:

$$OR_DAM_DRRQ_{r,k,h}^p = \frac{Max(DAM_QSOR_{r,k,h}^c, DAM_OR_EOP_{r,k,h}^c)}{(1 - ST_Portion_{k,d2}^p)}$$

Where:

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

1.3.1.2 $OR_DAM_DFRRQ_{r,k,h}^p$ = the day-ahead market duct-firing region range quantity for operating reserve (in MW), which is the portion of the greater of the $DAM_QSOR_{r,k,h}^p$ and $DAM_OR_EOP_{r,k,h}^p$ 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:

$$OR_DAM_DFRRQ_{r,k,h}^p = \text{Max} \left(OR_DAM_DRRQ_{r,k,h}^p, \text{Max} (DAM_QSOR_{r,k,h}^p, DAM_OR_EOP_{r,k,h}^p) \right)$$

1.3.1.3 $DAM_OR_ST_Q_{r,k,h}^p$ = an M-by-1 matrix (where M is M_k^p) of steam turbine quantity values (in MW) calculated from the $DAM_BOR_{r,k,h}^p$ and the $ST_Portion_{k,d}^p$ for market participant ‘k’ at pseudo-unit delivery point ‘p’ during settlement hour ‘h’, and is derived as follows:

$$DAM_ST_Q_{r,k,h}^p = \text{Min} (OR_DAM_DRRQ_{r,k,h}^p, DAM_BOR[i, 2]_{r,k,h}^p) \times ST_Portion_{k,d2}^p + \text{Max} [0, \text{Min} (OR_DAM_DFRRQ_{r,k,h}^p, DAM_BOR[i, 2]_{r,k,h}^p) - OR_DAM_DRRQ_{r,k,h}^p] \times ST_Portion_{k,d3}^p$$

1.3.1.4 $DAM_OR_ST_PC_{r,k,h}^p$ = an M-by-2 matrix (where M is M_k^p) of price-quantity pairs, calculated from the price component of $DAM_BOR_{r,k,h}^p$ and the quantity component of $DAM_ST_Q_{r,k,h}^p$ 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]
$DAM_OR_ST_PC_{r,k,h}^p$	Row $i = 1$	$DAM_BOR[i, 1]_{r,k,h}^p$	0
	Row $i \geq 2$	$DAM_BOR[i, 1]_{r,k,h}^p$	$DAM_OR_ST_Q[i]_{r,k,h}^p - DAM_ST_Q[i - 1]_{r,k,h}^p$

1.3.1.5 $DAM_OR_ST_PC_{r,k,h}^s$ = 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 the calculated $DAM_OR_ST_PC_{r,k,h}^p$ 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]
$DAM_OR_ST_PC_{r,k,h}^s$	Rows $i=1$ to m_1 , $j=1$ to m_1	$DAM_OR_ST_PC[j, 1]_{r,k,h}^{p1}$	$DAM_OR_ST_PC[j, 2]_{r,k,h}^{p1}$
	Rows $i=(m_1+1)$ to (m_1+m_2) , $j=1$ to m_2	$DAM_OR_ST_PC[j, 1]_{r,k,h}^{p2}$	$DAM_OR_ST_PC[j, 2]_{r,k,h}^{p2}$
	Rows $i=(m_2+1)$ to $(m_1+m_2+m_3)$, $j=1$ to m_3	$DAM_OR_ST_PC[j, 1]_{r,k,h}^{p3}$	$DAM_OR_ST_PC[j, 2]_{r,k,h}^{p3}$
	Rows $i=(m_3+1)$ to $(m_1+m_2+m_3+m_4)$, $j=1$ to m_4	$DAM_OR_ST_PC[j, 1]_{r,k,h}^{p4}$	$DAM_OR_ST_PC[j, 2]_{r,k,h}^{p4}$

Where:

a. For a pseudo-unit to be included in the $DAM_OR_ST_PC_{r,k,h}^s$ 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. $DAM_OR_ST_PC_{r,k,h}^s$ 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 $DAM_OR_ST_PC_{r,k,h}^s$ 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. m_1 is the number of rows in $DAM_OR_ST_PC_{r,k,h}^p$ from PSU1.

e. m_2 is the number of rows in $DAM_OR_ST_PC_{r,k,h}^p$ from PSU2.

f. m_3 is the number of rows in $DAM_OR_ST_PC_{r,k,h}^p$ from PSU3.

g. m4 is the number of rows in $DAM_OR_ST_PC_{r,k,h}^p$ from PSU4.

DIPC

1.3.1.6 $DAM_OR_DIPC_{r,k,h}^s$ = 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]
$DAM_OR_DIPC_{r,k,h}^s$	Row i	$DAM_OR_ST_PC[i, 1]_{r,k,h}^s$	$\sum_{j=1}^i DAM_OR_ST_PC[j, 2]_{r,k,h}^s$

Where:

a. any price-quantity pairs in the $DAM_OR_DIPC_{r,k,h}^s$ 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 $DAM_OR_DIPC_{r,k,h}^c$ = 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]
$DAM_OR_DIPC_{r,k,h}^c$	Row i	$DAM_BOR[i, 1]_{r,k,h}^p$	$Min(DAM_BOR[i, 2]_{r,k,h}^p, OR_DAM_DRRQ_{r,k,h}^p) \times (1 - ST_Portion_{k,d2}^p)$

Where:

a. any price-quantity pairs in the $DAM_OR_DIPC_{r,k,h}^c$ 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 $PD_MRRQ_{k,h}^{p,t}$ is 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:

$$PD_MRRQ_{k,h}^{p,t} = \text{Min}(ORRQ_{k,d1}^p, PD_QSI_{k,h}^{p,pdm})$$

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 $PD_DRRQ_{k,h}^{p,t}$ is 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:

$$PD_DRRQ_{k,h}^{p,t} = \text{Min} \left(CRRQ_k^p, PD_MRRQ_{k,h}^{p,t} + \frac{\text{Max}(PD_QSI_{k,h}^{c,pdm} - MLP_k^c, 0)}{(1 - ST_Portion_{k,d2}^p)} \right)$$

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 $PD_DFRRQ_{k,h}^{p,t}$ is 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:

$$PD_DFRRQ_{k,h}^{p,t} = \text{Min} \left(ORRQ_{k,d1}^p + ORRQ_{k,d2}^p + ORRQ_{k,d3}^p, \text{Max} \left(PD_QSI_{k,h}^{p,pdm} + CRRQ_k^p - PD_DRRQ_{k,h}^{p,t}, CRRQ_k^p \right) \right)$$

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 $PD_ST_Q_{k,h}^{p,t}$ is 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	$PD_MRRQ_{k,h}^{p,t} < PD_BE[i, 2]_{k,h}^{p,pdm} \leq PD_DRRQ_{k,h}^{p,t}$	$PD_MRRQ_{k,h}^{p,t} \times ST_Portion_{k,d1}^p + (PD_BE[i, 2]_{k,h}^{p,pdm} - PD_MRRQ_{k,h}^{p,t}) \times ST_Portion_{k,d2}^p$
3	$PD_DRRQ_{k,h}^{p,t} < PD_BE[i, 2]_{k,h}^{p,pdm} \leq CRRQ_k^p$	$PD_MRRQ_{k,h}^{p,t} \times ST_Portion_{k,d1}^p + (PD_DRRQ_{k,h}^{p,t} - PD_MRRQ_{k,h}^{p,t}) \times ST_Portion_{k,d2}^p$
4	$CRRQ_k^p < PD_BE[i, 2]_{k,h}^{p,pdm} \leq PD_DFRRQ_{k,h}^{p,t}$	$PD_MRRQ_{k,h}^{p,t} \times ST_Portion_{k,d1}^p + (PD_DRRQ_{k,h}^{p,t} - PD_MRRQ_{k,h}^{p,t}) \times ST_Portion_{k,d2}^p + (PD_BE[i, 2]_{k,h}^{p,pdm} - CRRQ_k^p) \times ST_Portion_{k,d3}^p$
5	$PD_DFRRQ_{k,h}^{p,t} < PD_BE[i, 2]_{k,h}^{p,pdm}$	$PD_MRRQ_{k,h}^{p,t} \times ST_Portion_{k,d1}^p + (PD_DRRQ_{k,h}^{p,t} - PD_MRRQ_{k,h}^{p,t}) \times ST_Portion_{k,d2}^p + (PD_DFRRQ_{k,h}^{p,t} - CRRQ_k^p) \times ST_Portion_{k,d3}^p$

or simplified as:

$$\begin{aligned}
 PD_ST_Q_{k,h}^{p,t} = & \text{Min}(PD_MRRQ_{k,h}^{p,t}, PD_BE[i, 2]_{k,h}^{p,pdm}) \times ST_Portion_{k,d1}^p \\
 & + \text{Max}(0, \text{Min}(PD_DRRQ_{k,h}^{p,t}, PD_BE[i, 2]_{k,h}^{p,pdm}) - PD_MRRQ_{k,h}^{p,t}) \\
 & \times ST_Portion_{k,d2}^p \\
 & + \text{Max}(0, \text{Min}(PD_DFRRQ_{k,h}^{p,t}, PD_BE[i, 2]_{k,h}^{p,pdm}) - CRRQ_k^p) \\
 & \times ST_Portion_{k,d3}^p
 \end{aligned}$$

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	$PD_BE[i, 1]_{k,h}^{p,pdm}$	$\begin{aligned} & \text{Min}(PD_BE[i, 2]_{k,h}^{p,pdm}, PD_DRRQ_{k,h}^{p,t}) \\ & - [\text{Min}(PD_MRRQ_{k,h}^{p,t}, PD_BE[i, 2]_{k,h}^{p,pdm}) \\ & \times ST_Portion_{k,d1}^p \\ & + \text{Max}(0, \text{Min}(PD_DRRQ_{k,h}^{p,t}, PD_BE[i, 2]_{k,h}^{p,pdm}) \\ & - PD_MRRQ_{k,h}^{p,t}) \times ST_Portion_{k,d2}^p] \end{aligned}$

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:

$$RT_MRRQ_{k,h}^{p,t} = \text{Min} \left(RT_ORRQ_{k,d1}^{p,t}, \text{Max} \left(RT_LC_EOP_{k,h}^{p,t}, RT_QSI_{k,h}^{p,t} \right) \right)$$

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:

$$RT_DRRQ_{k,h}^{p,t} = \text{Min} \left(RT_CRRQ_k^p, RT_MRRQ_{k,h}^{p,t} + \frac{\text{Max} \left(0, \text{Max} \left(RT_LC_EOP_{k,h}^{c,t}, RT_QSI_{k,h}^{c,t} \right) - MLP_k^c \right)}{\left(1 - RT_ST_Portion_{k,h,d2}^{p,t} \right)} \right)$$

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:

$$RT_DFRRQ_{k,h}^{p,t} = \text{Min} \left(RT_ORRQ_{k,d1}^p + RT_ORRQ_{k,d2}^p + RT_ORRQ_{k,d3}^p, \text{Max} \left(\text{Max} \left(RT_LC_EOP_{k,h}^{p,t}, RT_QSI_{k,h}^{p,t} \right) + RT_CRRQ_k^p - RT_DRRQ_{k,h}^{p,t}, RT_CRRQ_k^p \right) \right)$$

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:

$$RT_LC_EOP_DRRQ_{k,h}^{p,t} = \text{Min} \left(RT_CRRQ_k^p, RT_MRRQ_{k,h}^{p,t} + \frac{\text{Max} \left(0, RT_LC_EOP_{k,h}^{c,t} - MLP_k^c \right)}{\left(1 - RT_ST_Portion_{k,h,d2}^{p,t} \right)} \right)$$

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:

$$RT_LOC_EOP_DRRQ_{k,h}^{p,t} = \text{Min} \left(RT_CRRQ_k^p, RT_MRRQ_{k,h}^{p,t} + \frac{\text{Max} \left(0, RT_LOC_EOP_{k,h}^{c,t} - MLP_k^c \right)}{\left(1 - RT_ST_Portion_{k,h,d2}^{p,t} \right)} \right)$$

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:

$$\begin{aligned}
 RT_ST_Q_{k,h}^{p,t} = & \text{Min}(RT_MRRQ_{k,h}^{p,t}, BE[i, 2]_{k,h}^p) \times RT_ST_Portion_{k,h,d1}^{p,t} \\
 & + \text{Max}(0, \text{Min}(RT_DRRQ_{k,h}^{p,t}, BE[i, 2]_{k,h}^p) - RT_MRRQ_{k,h}^{p,t}) \\
 & \times RT_ST_Portion_{k,h,d2}^{p,t} \\
 & + \text{Max}(0, \text{Min}(RT_DFRRQ_{k,h}^{p,t}, BE[i, 2]_{k,h}^p) - RT_CRRQ_k^p) \\
 & \times RT_ST_Portion_{k,h,d3}^{p,t}
 \end{aligned}$$

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 m_1 , $j=1$ to m_1	$RT_ST_PC[j, 1]_{k,h}^{p1,t}$	$RT_ST_PC[j, 2]_{k,h}^{p1,t}$
	Rows $i=(m_1+1)$ to (m_1+m_2) , $j=1$ to m_2	$RT_ST_PC[j, 1]_{k,h}^{p2,t}$	$RT_ST_PC[j, 2]_{k,h}^{p2,t}$
	Rows $i=(m_2+1)$ to $(m_1+m_2+m_3)$, $j=1$ to m_3	$RT_ST_PC[j, 1]_{k,h}^{p3,t}$	$RT_ST_PC[j, 2]_{k,h}^{p3,t}$
	Rows $i=(m_3+1)$ to $(m_1+m_2+m_3+m_4)$, $j=1$ to m_4	$RT_ST_PC[j, 1]_{k,h}^{p4,t}$	$RT_ST_PC[j, 2]_{k,h}^{p4,t}$

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. m_1 is the number of rows in $RT_ST_PC_{k,h}^{p,t}$ from PSU1.

d. m_2 is the number of rows in $RT_ST_PC_{k,h}^{p,t}$ from PSU2.

e. m_3 is the number of rows in $RT_ST_PC_{k,h}^{p,t}$ from PSU3.

f. m_4 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	$BE[i, 1]_{k,h}^p$	$\begin{aligned} & \text{Min}(BE[i, 2]_{k,h}^p, RT_DRRQ_{k,h}^{p,t}) \\ & - [\text{Min}(RT_MRRQ_{k,h}^{p,t}, BE[i, 2]_{k,h}^p) \\ & \times RT_ST_Portion_{k,h,d1}^{p,t} \\ & + \text{Max}(0, \text{Min}(RT_DRRQ_{k,h}^{p,t}, BE[i, 2]_{k,h}^p) \\ & - RT_MRRQ_{k,h}^{p,t}) \times RT_ST_Portion_{k,h,d2}^{p,t}] \end{aligned}$

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:

$$RT_LC_EOP_DIGQ_{k,h}^{s,t} = \sum_{p=1}^N [RT_LC_EOP_{k,h}^{p,t} - RT_LC_EOP_{k,h}^{c,t}]$$

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:

$$RT_LOC_EOP_DIGQ_{k,h}^{s,t} = \sum_{p=1}^N [RT_LOC_EOP_{k,h}^{p,t} - RT_LOC_EOP_{k,h}^{c,t}]$$

Where:

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

$$OR_RT_DRRQ_{r,k,h}^{p,t} = \frac{\text{Max}(RT_QSOR_{r,k,h}^{c,t}, RT_OR_LC_EOP_{r,k,h}^{c,t})}{(1 - RT_ST_Portion_{k,h,d2}^{p,t})}$$

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:

$$OR_RT_DFRRQ_{r,k,h}^{p,t} = \text{Max} \left(OR_RT_DRRQ_{r,k,h}^{p,t}, \text{Max} (RT_QSOR_{r,k,h}^{p,t}, RT_OR_LC_EOP_{r,k,h}^{p,t}) \right)$$

1.6.1.3 $RT_OR_ST_Q_{r,k,h}^{p,t}$ = An M-by-1 matrix (where M is M_k^p) of steam turbine quantity values (in MW) calculated from the $BOR_{r,k,h}^p$, $RT_ST_Portion_{k,h,d2}^{p,t}$ and $RT_ST_Portion_{k,h,d3}^{p,t}$ for *market participant ‘k’* at *pseudo-unit delivery point ‘p’* during *metering interval ‘t’* of *settlement hour ‘h’*, and is derived as follows:

$$\begin{aligned}
 RT_OR_ST_Q_{r,k,h}^{p,t} &= \text{Min}(RT_OR_DRRQ_{r,k,h}^p, BOR[i, 2]_{r,k,h}^p) \times RT_ST_Portion_{k,d2}^p \\
 &+ \text{Max}[0, \text{Min}(RT_OR_DFRRQ_{k,r,h}^p, BOR[i, 2]_{r,k,h}^p) \\
 &- RT_OR_DRRQ_{r,k,h}^p] \times RT_ST_Portion_{k,d3}^p
 \end{aligned}$$

1.6.1.4 $RT_OR_ST_PC_{r,k,h}^{p,t}$ = An M-by-2 matrix (where M is M_k^p) of price-quantity pairs, calculated from the price component of $BOR_{r,k,h}^p$ and the quantity component of $RT_OR_ST_Q_{r,k,h}^{p,t}$ 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]
$RT_OR_ST_PC_{r,k,h}^{p,t}$	Row i = 1	$BOR[i, 1]_{r,k,h}^p$	0
	Row i ≥ 2	$BOR[i, 1]_{r,k,h}^p$	$RT_OR_ST_Q[i]_{r,k,h}^{p,t} - RT_OR_ST_Q[i - 1]_{r,k,h}^{p,t}$

1.6.1.5 $RT_OR_ST_PC_{r,k,h}^{s,t}$ = 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 quantity component from all the calculated $RT_OR_ST_PC_{r,k,h}^{p,t}$ 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]
$RT_OR_ST_PC_{k,r,h}^{s,t}$	Rows i=1 to m1, j=1 to m1	$RT_OR_ST_PC[j, 1]_{k,r,h}^{p1,t}$	$RT_OR_ST_PC[j, 2]_{k,r,h}^{p1,t}$
	Rows i=(m1+1) to (m1+m2), j=1 to m2	$RT_OR_ST_PC[j, 1]_{k,r,h}^{p2,t}$	$RT_OR_ST_PC[j, 2]_{k,r,h}^{p2,t}$
	Rows i=(m2+1) to (m1+m2+m3), j=1 to m3	$RT_OR_ST_PC[j, 1]_{k,r,h}^{p3,t}$	$RT_OR_ST_PC[j, 2]_{k,r,h}^{p3,t}$
	Rows i=(m3+1) to (m1+m2+m3+m4), j=1 to m4	$RT_OR_ST_PC[j, 1]_{k,r,h}^{p4,t}$	$RT_OR_ST_PC[j, 2]_{k,r,h}^{p4,t}$

Where:

- For a pseudo-unit to be included in the $RT_OR_ST_PC_{r,k,h}^{s,t}$ 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.
- 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 $RT_OR_ST_PC_{r,k,h}^{s,t}$ 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 $RT_OR_ST_PC_{r,k,h}^{s,t}$ from PSU1.
- g. m2 is the number of rows in $RT_OR_ST_PC_{r,k,h}^{s,t}$ from PSU2.
- h. m3 is the number of rows in $RT_OR_ST_PC_{r,k,h}^{s,t}$ from PSU3.
- i. m4 is the number of rows in $RT_OR_ST_PC_{r,k,h}^{s,t}$ from PSU4.

1.6.1.6 $RT_OR_CMT_ST_PC_{r,k,h}^{s,t} = A$ 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 $RT_OR_ST_PC_{k,r,h}^{p,t}$ 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]
$RT_OR_CMT_ST_PC_{r,k,h}^{s,t}$	Rows i=1 to m1, j=1 to m1	$RT_OR_CMT_ST_PC[j, 1]_{r,k,h}^{p1,t}$	$RT_OR_CMT_ST_PC[j, 2]_{r,k,h}^{p1,t}$
	Rows i=(m1+1) to (m1+m2), j=1 to m2	$RT_OR_CMT_ST_PC[j, 1]_{r,k,h}^{p2,t}$	$RT_OR_CMT_ST_PC[j, 2]_{r,k,h}^{p2,t}$
	Rows i=(m2+1) to (m1+m2+m3), j=1 to m3	$RT_OR_CMT_ST_PC[j, 1]_{r,k,h}^{p3,t}$	$RT_OR_CMT_ST_PC[j, 2]_{r,k,h}^{p3,t}$
	Rows i=(m3+1) to (m1+m2+m3+m4), j=1 to m4	$RT_OR_CMT_ST_PC[j, 1]_{r,k,h}^{p4,t}$	$RT_OR_CMT_ST_PC[j, 2]_{r,k,h}^{p4,t}$

Where:

- a. For a pseudo-unit to be included in the $RT_OR_CMT_ST_PC_{r,k,h}^{s,t}$ 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 $RT_OR_CMT_ST_PC_{r,k,h}^{s,t}$ 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 $RT_OR_CMT_ST_PC_{r,k,h}^{s,t}$ from PSU1.
- g. m2 is the number of rows in $RT_OR_CMT_ST_PC_{r,k,h}^{s,t}$ from PSU2.
- h. m3 is the number of rows in $RT_OR_CMT_ST_PC_{r,k,h}^{s,t}$ from PSU3.
- i. m4 is the number of rows in $RT_OR_CMT_ST_PC_{r,k,h}^{s,t}$ from PSU4.

DIPC

- 1.6.1.7 $RT_OR_DIPC_{r,k,h}^{c,t}$ = 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]
$RT_OR_DIPC_{r,k,h}^{c,t}$	Row i	$BOR[i, 1]_{r,k,h}^p$	$Min(BOR[i, 2]_{r,k,h}^p, OR_RT_DRRQ_{r,k,h}^{p,t}) \times (1 - RT_ST_Portion_{k,h,d2}^{p,t})$

Where:

- a. Any price-quantity pairs in the $RT_OR_DIPC_{r,k,h}^{c,t}$ 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.

1.6.1.8 $RT_OR_DIPC_{r,k,h}^{s,t}$ = 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]
$RT_OR_DIPC_{r,k,h}^{s,t}$	Row i	$RT_OR_ST_PC[i, 1]_{r,k,h}^{s,t}$	$\sum_{j=1}^i RT_OR_ST_PC[j, 2]_{r,k,h}^{s,t}$

1.6.1.9 $RT_OR_CMT_DIPC_{r,k,h}^{s,t}$ = 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

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 $A_{k,h}^{LTMPL}$ 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 $a \in A_{k,h}^{LTMPL}$;

- 2.1.1.9 $A_{k,h}^{GTMLP,m}$ 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 $A_{k,h}^{LTMLP,m}$ 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 $A_{r,k,h}^m$ 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 $PGTMLPRef_{k,h,a}^m$ designates the *reference level value for energy offer lamination $a' \in A_{k,h}^{GTMLP,m}$ 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 $PDGRef_{r,k,h,a}^m$ designates the *reference level value for class r reserve offer lamination $a' \in A_{r,k,h}^m$ for market participant ‘k’ at delivery point ‘m’ in settlement hour ‘h’*, where r1, r2, and r3 are all applicable;
- 2.1.1.14 $SUDGRef_{k,h}^m$ designates the *reference level value for the start-up offer in the day-ahead market for the same thermal state as $SUDG_{k,h}^m$ 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 $SNLRef_{k,h}^m$ 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 $PLTMLPRef_{k,h,a}^m$ designates the reference level value for the energy up to and including the minimum loading point reference level lamination $a' \in A_{k,h}^{LTMLP,m}$ 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 2.2.2.1 to 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. $PTMLPG_{k,h,a}^m > \min((PGTMLPRef_{k,h,a}^m + \text{abs}(PGTMLPRef_{k,h,a}^m) \times 0.5), PGTMLPRef_{k,h,a}^m + 25)$

- 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 $a \in A_{k,h}^{LTMPLP,m}$ and $PGTMLPRef_{k,h,a}^m$ for all offer laminations $a \in A_{k,h}^{GTLMP,m}$.

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

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 $PLTMLP_{k,h,a'}^m$ for all offer laminations $a \in A_{k,h}^{LTMLP,m}$ and $DAM_BE_{k,h}^m$ for all offer laminations $a \in A_{k,h}^{GTMLP,m}$;

2.4.3.2 Evaluate *start-up offers* as follows:

c. a resource at delivery point ‘m’ fails the conduct test for settlement hour ‘h’ if

$$SUDG_{k,h}^m > (SUDG_{k,h}^m + \text{abs}(SUDG_{k,h}^m) \times 0.25)$$

d. 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 $SUDG_{k,h}^m$; 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

$$SNL_{k,h}^m > (SNL_{k,h}^m + \text{abs}(SNL_{k,h}^m) \times 0.25)$$

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 $SNL_{k,h}^m$.

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

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

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

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

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 $DAM_BE_{k,h}$ 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

$$SUDG_{k,h}^m > (SUDGRef_{k,h}^m + \text{abs}(SUDGRef_{k,h}^m) \times 0.25)$$

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

$$SNL_{h,k}^m > (SNLRef_{h,k}^m + \text{abs}(SNLRef_{h,k}^m) \times 0.25)$$

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

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

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

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

- 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

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

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

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

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

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

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

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

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

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

- 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

$$SNL_{k,h}^m > SNLRef_{k,h}^m + \text{abs}(SNLRef_{k,h}^m) \times 0.1)$$

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

2.4.11.3 Evaluate speed no-load offers as follows:

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

$$SNL_{h,k}^m > SNLRef_{h,k}^m + \text{abs}(SNLRef_{h,k}^m) \times 0.1)$$

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 $SNLRef_{h,k}^m$.

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 $a \in A_{r,k,h}^m$ if

- i. $PDG_{r,k,h,a}^m > 5$; and
- ii. $PDG_{r,k,h,a}^m > \min\left(\left(PDGRef_{r,k,h,a'}^m + \text{abs}(PDGRef_{r,k,h,a'}^m) \times 0.1\right), PDGRef_{r,k,h,a'}^m + 25\right)$

b. where such resource fails the conduct test and for the settlement hour that failed the conduct test, $EMFC_DAM_BOR_{r,k,h}^m$ 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;

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

- i. $PLTMLP_{k,h,a}^m > 25$; and
- ii. $PLTMLP_{k,h,a}^m > \min((PLTMLPRef_{k,h,a'}^m + \text{abs}(PLTMLPRef_{k,h,a'}^m) \times 0.1), PLTMLPRef_{k,h,a'}^m + 25)$

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 $DAM_BE_{k,h}^m$ for all offer laminations $a \in A_{k,h}^{GTMLP,m}$.

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

$$SUDG_{k,h}^m > (SUDGRef_{k,h}^m + \text{abs}(SUDGRef_{k,h}^m) \times 0.1)$$

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

2.4.12.4 Evaluate speed no-load offers as follows:

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

$$SNL_{h,k}^m > SNLRef_{h,k}^m + \text{abs}(SNLRef_{h,k}^m) \times 0.1)$$

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 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 $a \in A_{r,k,h}^m$ if

- i. $PDG_{r,k,h,a}^m > 5$; and
- ii. $PDG_{r,k,h,a}^m > \min \left((PDGRef_{r,k,h,a'}^m + \text{abs}(PDGRef_{r,k,h,a'}^m) \times 0.5), PDGRef_{r,k,h,a'}^m + 25 \right)$

b. where such resource fails the conduct test and for the settlement hour that failed the conduct test, $EMFC_DAM_BOR_{r,k,h}^m$ 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;

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

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

$$SUDG_{k,h}^m > (SUDGRef_{k,h}^m + \text{abs}(SUDGRef_{k,h}^m) \times 0.25)$$

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

$$SNL_{k,h}^m > SNLRef_{k,h}^m + \text{abs}(SNLRef_{k,h}^m) \times 0.25)$$

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 $SNLRef_{k,h}^m$.

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 $A'_{k,h}{}^{GTMLP,m}$ 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 $A'_{k,h}{}^{LTMLP,m}$ 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 $A'_{r,k,h}{}^m$ 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 $PGTMLPRef_{k,h,a'}^m$ designates the reference level value for energy offer lamination $a' \in A'_{k,h}{}^{GTMLP,m}$ 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 $PDGRef_{r,k,h,a'}^m$ designates the reference level value for class r reserve offer lamination $a' \in A'_{r,k,h}{}^m$ for market participant 'k' at delivery point 'm' for settlement hour 'h', where r1, r2, and r3 are all applicable;
- 3.1.1.14 $SUDGRef_{k,h}^m$ designates the reference level value for the start-up offer in the real-time market for the same thermal state as $SUDG_{k,h}^m$ 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 $SNLRef_{k,h}^m$ 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 $PLTMLPRef_{k,h,a}^m$ designates the reference level value for the energy up to and including the minimum loading point reference level lamination $a' \in A_{k,h}^{LTMLP,m}$ 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~~ 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~~ 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 schedule 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 the initial settlement amount for the real-time generator offer guarantee settlement amount for such pre-dispatch operational commitment, determined in accordance with section 5.2.1 of Chapter 9, is greater than \$15,000; 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* and the ~~initial settlement amount for the real-time make whole payment settlement amount~~ *real-time generator offer guarantee settlement amount* for such ~~pre-dispatch operational commitment, determined in accordance with MR Ch.9 s 5.2.1, is greater than \$15,000;~~ and
- ~~3.3.8.3~~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. $PGTMLP_{k,h,a}^m > \min((PGTMLPRef_{k,h,a'}^m + \text{abs}(PGTMLPRef_{k,h,a'}^m) \times 0.5), PGTMLPRef_{k,h,a'}^m + 25)$

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

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 $RT_BE_{k,h}^m$ for all offer laminations $a \in A_{k,h}^{GTMLP,m}$.

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

$$SUDG_{k,h}^m > (SUDGRef_{k,h}^m + \text{abs}(SUDGRef_{k,h}^m) \times 0.25)$$

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

3.4.3.3 Evaluate speed no-load offers as follows:

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

$$SNL_{k,h}^m > (SNLRef_{k,h}^m + \text{abs}(SNLRef_{k,h}^m) \times 0.25)$$

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

- i. $PGTMLP_{k,h,a}^m > 25$; and
- ii. $PGTMLP_{k,h,a}^m > \min \left((PGTMLPRef_{k,h,a'}^m + \text{abs}(PGTMLPRef_{k,h,a'}^m) \times 0.5), PGTMLPRef_{k,h,a'}^m + 25 \right)$

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

b. where such resource fails the conduct test and for the settlement hour that failed the conduct test, $EMFC_RT_BE_{k,h}^m$ 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

$$SUDG_{k,h}^m > (SUDGRef_{k,h}^m + \text{abs}(SUDGRef_{k,h}^m) \times 0.25)$$

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

$$SNL_{k,h}^m > SNLRef_{k,h}^m + \text{abs}(SNLRef_{k,h}^m) \times 0.25$$

- 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. $PGTMLP_{k,h,a}^m > \min\left(\left(PGTMPLPRef_{k,h,a'}^m + \text{abs}(PGTMPLPRef_{k,h,a'}^m) \times 3\right), PGTMPLPRef_{k,h,a'}^m + 25\right)$

- 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 $PLTMPLPRef_{k,h,a'}^m$ for all offer laminations $a \in A_{k,h}^{LTMLP,m}$ and $PGTMPLPRef_{k,h,a'}^m$ 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. $PLTMLP_{k,h,a}^m > \min((PLTMLPRef_{k,h,a'}^m + \text{abs}(PLTMLPRef_{k,h,a'}^m) \times 3), PLTMLPRef_{k,h,a'}^m + 25)$

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 $RT_BE_{k,h}^m$ 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

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

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:

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

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

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 $SNLRef_{k,h}^m$.

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

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

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

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

- 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

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

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

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

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 $RT_BE_{k,h}^m$ 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

$$SUDG_{k,h}^m > (SUDGRef_{k,h}^m + \text{abs}(SUDGRef_{k,h}^m) \times 0.1)$$

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

3.4.11.3 Evaluate speed no-load offers as follows:

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

$$SNL_{k,h}^m > SNLRef_{k,h}^m + \text{abs}(SNLRef_{k,h}^m) \times 0.1$$

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 $SNLRef_{k,h}^m$.

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 $a \in A_{r,k,h}^m$ if

- i. $PDG_{r,k,h,a}^m > 5$; and
- ii. $PDG_{r,k,h,a}^m > \min((PDGRef_{r,k,h,a'}^m + \text{abs}(PDGRef_{r,k,h,a'}^m) \times 0.1), PDGRef_{r,k,h,a'}^m + 25)$

b. where such resource fails the conduct test and for the settlement hour that failed the conduct test, $EMFC_RT_BOR_{r,k,h}^m$ 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;

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

- i. $PLTMLP_{k,h,a}^m > 25$; and
- ii. $PLTMLP_{k,h,a}^m > \min((PLTMLPRef_{k,h,a'}^m + \text{abs}(PLTMLPRef_{k,h,a'}^m) \times 0.1), PLTMLPRef_{k,h,a'}^m + 25)$

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 $RT_BE_{k,h}^m$ for all offer laminations $a \in A_{k,h}^{GTMLP,m}$.

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

$$SUDG_{k,h}^m > (SUDGRef_{k,h}^m + \text{abs}(SUDGRef_{k,h}^m) \times 0.1)$$

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

$$SNL_{k,h}^m > SNLRef_{k,h}^m + \text{abs}(SNLRef_{k,h}^m) \times 0.1$$

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. $PDG_{r,k,h,a}^m > \min((PDGRef_{r,k,h,a'}^m + \text{abs}(PDGRef_{r,k,h,a'}^m) \times 0.5), PDGRef_{r,k,h,a'}^m + 25)$

b. where such resource fails the conduct test and for the settlement hour that failed the conduct test, $EMFC_RT_BOR_{r,k,h}^m$ 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. $PLTMLP_{k,h,a}^m > \min((PLTMLPRef_{k,h,a'}^m + \text{abs}(PLTMLPRef_{k,h,a'}^m) \times 0.5), PLTMLPRef_{k,h,a'}^m + 25)$

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 $RT_BE_{k,h}^m$ for all offer laminations $a \in A_{k,h}^{GTMLP,m}$.

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 $SUDG_{k,h}^m > (SUDGRef_{k,h}^m + \text{abs}(SUDGRef_{k,h}^m) \times 0.25)$

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

3.4.13.4 Evaluate speed no-load offers as follows:

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

$$SNL_{k,h}^m > SNLRef_{k,h}^m + \text{abs}(SNLRef_{k,h}^m) \times 0.25$$

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 $SNLRef_{k,h}^m$.

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.