OCTOBER 30, 2020

Market Power Mitigation
Reference Levels and Reference Quantities
Dispatchable Loads

ieso
Connecting Today. Powering Tomorrow.

Agenda

1. Introduction
2. Update on Stakeholder Engagement Process
3. Refresher: Reference Levels and Reference Quantities
4. Feedback Received
5. Example Workbooks
6. Next Steps
7. Questions

1. Objectives

- Engage with Dispatchable Loads on the reference level and reference quantity methodologies

  Only reference levels and quantities for operating reserve will be determined for Dispatchable Loads

- Support Dispatchable Loads in their review of the draft written guide and workbooks
- Answer technical questions on the written guide with the IESO's engineering services provider (Hatch)

2. Update on Stakeholder Engagement Process

- Reference level and reference quantity stakeholder engagement kick-off meeting was conducted on August 27, 2020. This meeting provided stakeholders the opportunity to ask clarifying questions on the posted materials – written guide and technology specific workbooks
- Next steps in the reference level engagement:
  - November 2020: Hydro, nuclear, storage and thermal sessions
  - Beginning in 2021: 1-on-1 consultation with market participants to establish resource-specific reference levels and quantities

3. Refresher: Reference Levels and Reference Quantities

- Reference levels and reference quantities play an important role in the Market Power Mitigation framework
- The Market Power Mitigation detailed design documents introduced processes necessary to set, maintain and update reference levels
- Establishing appropriate reference levels is a high priority for both stakeholders and the IESO

3. Refresher: Reference Levels and Reference Quantities

Reference levels are *IESO*-approved values for a resource for what would have been offered by a *market participant* in the *energy* and *operating reserve* markets had they been subject to unrestricted competition. The *IESO* will approve reference levels for financial and non-financial *dispatch data* parameters of each resource

- An example of a financial *dispatch data* parameter is *operating reserve* offers ($/MWh)

Reminder: Only reference levels and quantities for operating reserve will be determined for Dispatchable Loads

3. Refresher: Reference Levels and Reference Quantities

Reference quantities are *IESO*-approved values for the quantity of *energy* and *operating reserve* a *market participant* would be expected to offer had they been subject to unrestricted competition

These reference quantities can be modified by active outages, de-ratings, external factors such as ambient temperature, humidity, water flow conditions and other resource specific considerations

4. Feedback Received for Dispatchable Loads

- No specific comments were received on dispatchable loads
- Generally, stakeholders requested that the IESO insert illustrative information into the workbooks to provide examples of what content was expected
- Examples of dispatchable load workbooks, completed for illustrative purposes, are discussed in the following slides
- These example workbooks are for discussion purposes only. The numbers and content found there are not an indication of expected values

5. Example workbooks

- The IESO has provided two example workbooks per technology type:
  - An example that shows a resource that is requesting a reference level and providing supporting materials
    - This resource may expect to offer positive offer prices into the market and wants to ensure that their reference level will protect their positive offers from mitigation
  - An example that shows a resource that submits a reference level of $0/MWh and thus is not required to provide any supporting materials
    - This resource may expect to offer low prices into the market. As it will be offering below the $5/MW no-look threshold for operating reserve, the resource reduces the administrative burden by requesting a reference level of $0/MW
- We are only presenting the first example as the second example only requires supporting materials for establishing the relevant non-financial reference levels

Dispatchable Load Workbook

Reference Level Cost Components

	Cost Components	I. Units of measurement/ Formula Reference	II. Applicability - Resource Type	III. Time-Based Applicability - Seasonality, On-Peak/Off-Peak Hours	IV. Input	V. Supporting Documentation Reference	VI. Comments
A)	**Operations and Maintenance Costs**						
A.1	Incremental Operating and Maintenance Costs	$/MW	Dispatchable Load	Applicable to all periods. Seasonal or other time-based variability to be defined by the Market Participant.	2	Operating and maintenance records Equipment specifications and efficiency curves Energy cost information related to efficiency losses	E.g. In order to provide additional reserve capacity, a participant operates equipment at an operating point that results in 10% higher operating and maintenance costs. These additional costs amount to $10,000 per year, and allow for the provision of an additional 2MW of capacity for a total of 2500 hours over the year. Input is $10,000/(2MW x 2500 hours) = $2/MW

Dispatchable Load Workbook

Reference Level Cost Components

	Cost Components	I. Units of measurement/Formula Reference	II. Applicability - Resource Type	III. Time-Based Applicability - Seasonality, On-Peak/Off-Peak Hours	IV. Input	V. Supporting Documentation Reference	VI. Comments
B)	**Standby Costs for Behind-The-Meter Generation or Storage**						
B.1	Standby Costs for Behind-The-Meter Generation	$/MW	Dispatchable Load using Behind-The-Meter generation	Applicable to all periods. Seasonal or other time-based variability to be defined by the Market Participant.	2.5	Fuel invoices Maintenance invoices Generator operating records	E.g. Total annual fuel and maintenance cost of $10,000 for standby operation. Total capacity provided by behind-the-meter generation is 1MW, offered over 4000 hours. Input is $10,0000 / (1MW x 4000 hours) = $2.5/MW

Dispatchable Load Workbook

Reference Level Cost Components

	Cost Components	I. Units of measurement/ Formula Reference	II. Applicability - Resource Type	III. Time-Based Applicability - Seasonality, On-Peak/Off-Peak Hours	IV. Input	V. Supporting Documentation Reference	VI. Comments
B)	**Standby Costs for Behind-The-Meter Generation or Storage**						
B.2	Standby Costs for Behind-The-Meter Storage	$/MW	Dispatchable Load using Behind-The-Meter energy storage	Applicable to all periods. Seasonal or other time-based variability to be defined by the Market Participant.	0.5	Electricity bills Energy storage system sub-metering data	E.g. 2MW energy storage system has standby losses of 20kW when online. The average energy cost is $0.05/kWh and the system is available 8000 hours in the year. Input is 20kW x $0.05/kWh / 2MW = $0.5 / MW

Dispatchable Load Workbook

Reference Level Cost Components

	Cost Components	I. Units of measurement /Formula Reference	II. Applicability - Resource Type	III. Time-Based Applicability - Seasonality, On-Peak/Off-Peak Hours	IV. Input	V. Supporting Documentation Reference	VI. Comments
C)	**Cost of Production Flexibility**						
C.1	Cost of Production Flexibility	$/MW	Dispatchable Load	Applicable to all periods. Seasonal or other time-based variability to be defined by the Market Participant.	0.5	Customer agreements and invoices	A facility receives an premium payment for firm delivery of finished product. Due to the requirement to shut down production in the event of dispatch, this premium is foregone for a portion of its delivery which must remain variable. The total annual amount of this premium is $10,000. The facility is able to offer 5MW of dispatchable load over 4000 hours. Input is 10,000 / (5MW x 4000 hours) = $0.5/MW

Dispatchable Load Workbook

Reference Level Cost Components

	Cost Components	I. Units of measurement/Formula Reference	II. Applicability - Resource Type	III. Time-Based Applicability - Seasonality, On-Peak/Off-Peak Hours	IV. Input	VI. Comments
D)	**Total Operating Reserve Costs**					
D.1	**10-minute synchronized (spinning) reserve**	Total OR Costs ($/MW) = A.1 + B.1+ B.2 + C.1	Dispatchable Load	Applicable to all periods. Seasonal or other time-based variability to be defined by the Market Participant.	2+2.5+0.5+0.5 = 5.5	E.g. Using the examples above
D.2	**10-minute non-synchronized (non-spinning) reserve**		Dispatchable Load	Applicable to all periods. Seasonal or other time-based variability to be defined by the Market Participant.		
D.3	**30-minute reserve (non-synchronized)**		Dispatchable Load	Applicable to all periods. Seasonal or other time-based variability to be defined by the Market Participant.		

Dispatchable Load Workbook

Financial Dispatch Data Parameters

#	Parameter	Unit	Description	Reference value/cost curve
1	*Operating Reserve (OR) offer*	$/MW	The operating reserve offer reference level will be used to create an operating reserve cost curve consisting of up to 5 price-quantity pairs that will describe short run marginal costs across the range of providing operating reserve. The operating reserve cost curve will be consistent with operating reserve offer requirements as specified in Market Rules Chapter 7 Section 3.6.2. If a resource has not established an operating reserve reference level, the IESO will use a default reference level of $0.10/MW.	5.5 $/MW

$$Total\ OR\ Cost\ \left(\frac{\$}{MW}\right) = Incremental\ O\&M\ Costs\ \left(\frac{\$}{MW}\right) + Standby\ Costs\ for\ BTM\ Generation\ \left(\frac{\$}{MW}\right) + Standby\ Costs\ for\ BTM\ Storage\ \left(\frac{\$}{MW}\right) + Cost\ of\ Production\ Flexibility\ \left(\frac{\$}{MW}\right)$$

Dispatchable Load Workbook

Supporting Documentation List

Attachment #	Supporting Document Name	Supporting Document Description
Attachment 1	Invoice 1.pdf	Refer to page 10, for cost to support input into the behind the meter standby cost
Attachment 2	Invoice 2.pdf	Refer to page 4, for cost to support input into the behind the meter standby cost
Attachment 3	*[etc. to be filled by Market participant to substantiate all inputs into reference levels]*	*[etc. to be filled by Market participant to substantiate all inputs into reference levels]*

6. Next Steps

- **Feedback:** Stakeholders should submit written feedback on the presented materials to engagement@ieso.ca by **Friday, November 13**
- **December 2020:** IESO will post final written guide and workbooks based on stakeholder feedback received during technology-specific sessions
- **Q1 2021 onwards**: IESO will start 1-on-1 consultation with market participants to establish resource-specific reference levels and quantities

Questions?

Thank You

ieso.ca

1.888.448.7777

customer.relations@ieso.ca

engagement@ieso.ca

@IESO_Tweets

facebook.com/OntarioIESO

linkedin.com/company/IESO

ieso
Connecting Today. Powering Tomorrow.