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Co-located Hybrid Participation Technical Panel Education

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Purpose

- Provide the Technical Panel with information to prepare for review of the market rule amendment proposal to implement co-located hybrid participation in the current IESO-administered markets

Hybrid Participation – Background

- Hybrid participation consists of generation and storage facilities participating at the same connection point to the grid under the same registered market participant (RMP)
- Over the last year, the IESO worked with stakeholders to develop the foundational design for hybrid participation in Ontario
- The market designs for the two (2) hybrid participation options – co-located and integrated – were finalized in early September, providing clarity on participation in the IESO-administered markets under the Market Renewal Program (MRP)

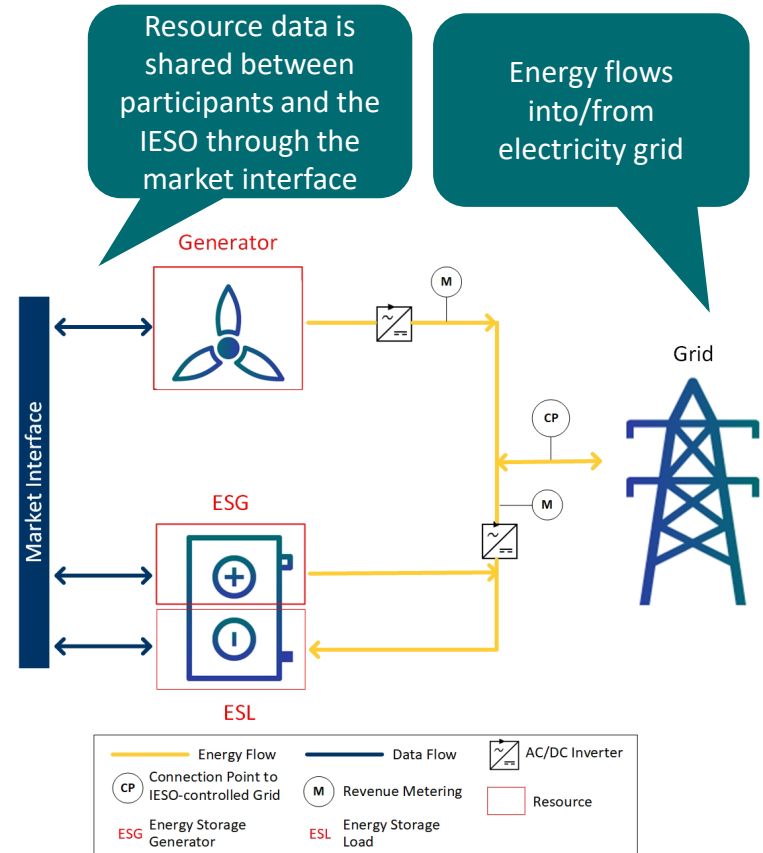
Hybrid Participation – Implementation

- Stakeholders have requested that the IESO enable hybrid participation as soon as possible
- Co-located hybrid participation utilizes existing resource models and, therefore, has limited impacts on governing documents and no tool impacts
- As a result, the IESO is able to implement co-located hybrid participation in the current IESO-administered markets

Note: Integrated hybrid participation has greater complexity/impacts due to the requirement for a new type of resource model combining injections from generation and storage; due to IESO resourcing constraints and impacts to changes underway for MRP, integrated hybrid participation will be implemented as soon as possible following MRP implementation.

Co-Located Hybrid Participation

- Consists of generation and electricity storage facilities, including at least three (3) dispatchable resources:
 1. a generation resource;
 2. a storage injecting/generation resource for discharging storage; and
 3. a storage withdrawing/load resource for charging storage from the grid.
- The facilities and associated resources will be located behind a single connection point to the grid, but the resources will participate separately in capacity, energy and operating reserve (OR) markets, as allowed for the technology type.





Market Rule Amendments

Current Market Rule: Chapter 7, Section 3.5.6

- Chapter 7, Section 3.5.6 ensures that the RMP for an individual facility bids or offers energy considering registration data, participant estimates and the maximum allowed quantity (*MAQ) in section 3.5.6.3.

* The "MAQ" in subsequent slides refers to the maximum allowed injection (for an energy offer) or withdrawal (for an energy bid) through the relevant connection point.

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|---------|--|
| 3.5.6 | The largest quantity in any <i>energy offer</i> or <i>energy bid</i> for any <i>dispatch hour</i> must be at least 1.0 MWh but shall not exceed the lesser of: |
| 3.5.6.1 | the maximum output of <i>energy</i> in an hour indicated in the registration information for the relevant <i>registered facility</i> ; |
| 3.5.6.2 | the maximum quantity of <i>energy</i> that can be supplied (for an <i>energy offer</i>) or taken (for an <i>energy bid</i>) in that <i>dispatch hour</i> by the <i>registered facility</i> , as estimated by the <i>registered market participant</i> for that <i>registered facility</i> ; or |
| 3.5.6.3 | the maximum allowed injection (for an <i>energy offer</i>) or withdrawal (for an <i>energy bid</i>) in that <i>dispatch hour</i> through the relevant <i>connection point</i> , as limited by the lesser of (i) the capacity of any radial line connecting the <i>registered facility</i> to the <i>connection point</i> ; (ii) the maximum injection or withdrawal as specified in the <i>connection agreement</i> applicable to the <i>registered facility</i> ; or (iii) the maximum injection or withdrawal otherwise permitted by the relevant <i>transmitter</i> . |

Market Rule Amendments - Background

- Chapter 7, Section 3.5.6 does not address bids and offers when there are multiple facilities under a RMP at the same connection point and total capability exceeds the MAQ
 - The maximum capability of the facilities co-located at the connection point could exceed the MAQ; variable generation (VG) operates at a lower capacity factor and does not utilize the MAQ when their capability is reduced, so a storage facility could reasonably be co-located to operate during lower VG output periods without the cost of upgrading equipment to increase the MAQ
 - The RMP must utilize their dispatch data to ensure they receive a total or net schedule that is within the MAQ since IESO calculation engines do not include a parameter to consider the MAQ when determining the dispatch schedule

Proposed Market Rule Amendments

- As noted, Chapter 7, Section 3.5.6 does not address multiple facilities under a RMP at the same connection point, where total capability may exceed the MAQ
1. A new market rule is required to allow a RMP to offer or bid a quantity greater than MAQ for one facility along with an offsetting quantity for another facility so that the total net injections and withdrawals remain within MAQ, as long as no facility provides contracted ancillary services or OR (known together as “ancillary services”)
 - Netting to remain within MAQ is not allowed when ancillary services are provided to ensure the IESO can continue to depend on reliability services
 2. Another new market rule is required to specify that when ancillary services are provided, the sum of all energy offers or the sum of all energy bids must be within MAQ

Decision 1 and Scenario

Decision 1: Where none of the facilities are providing ancillary services:

The total net injections & withdrawals for all facilities under an RMP at a connection point must be within the MAQ

Scenario: Generator capability is equal to or greater than the MAQ; storage is added without increasing MAQ. Therefore, the total injection capability is greater than the MAQ.

e.g., Generator capability of 60 MW, storage capability of 10 MW;

Total injecting capability = 70 MW; MAQ for injections is 50 MW and MAQ for withdrawals is 10 MW

The following bid/offer is allowed:

- Generator offers to inject 40 MW; storage offers to inject 10 MW
- Generator offers to inject 50 MW; storage bids to withdraw 10 MW
- Generator offers to inject 60 MW; storage bids to withdraw 10 MW; in this case, the MP must manage bid/offer such that both resources get scheduled, comply with dispatch instructions, and result in total net injection ≤ 50 MW

The amendment disallows the following:

- Generator offers to inject 50 MW and storage offers to inject 10 MW
- Generator offers to inject 60 MW and storage offers to inject 10 MW

Decision 2, Scenario 1

Decision 2: Where one or more of the facilities are providing ancillary services:

The sum of all energy offer or bid quantities for all facilities under an RMP at a connection point must be within the MAQ

Scenario 1: VG capability is equal to or greater than the MAQ; storage is added without increasing MAQ. Therefore, the total injection capability is greater than the MAQ. Storage may provide energy and OR. VG is not eligible to provide OR.

e.g., VG capability of 60 MW, storage capability of 10 MW;

Total injecting capability = 70 MW; MAQ for injections is 50 MW and MAQ for withdrawals is 10 MW

The following bid/offer is allowed under the amendment:

- VG offers to inject 40 MW and storage offers to inject energy/provide OR 10 MW
- VG offers to inject 50 MW and storage bids to withdraw energy & offers to provide OR 10 MW

The amendment disallows the following:

- VG offers to inject 50 MW and storage offers to inject energy/provide OR 10 MW
- VG offers to inject 60 MW; storage bids to withdraw energy/provide OR 10 MW
 - If the storage withdrawing resource is allowed to offer OR and there is an OR activation, storage would need to stop withdrawing and the VG schedule would be over the MAQ at 60 MW

Decision 2, Scenario 2

Decision 2: Where one or more of the facilities are providing ancillary services:

The sum of all energy offer or bid quantities for all facilities under an RMP at a connection point must be within the MAQ

Scenario 2: Generator (non-VG) capability is equal to or greater than the MAQ; storage is added without increasing MAQ. Therefore, the total injection capability is greater than the MAQ. Both generator and storage may provide energy and OR.

e.g., Generator capability of 60 MW, storage capability of 10 MW;

Total injecting capability = 70 MW; MAQ for injections is 50 MW and MAQ for withdrawals is 10 MW

The following bid/offer is allowed:

- Generator offers to inject energy/provide OR 40 MW; storage bids to inject energy/provide OR 10 MW
- Generator offers to inject energy/provide OR 50 MW; storage bids to withdraw energy/provide OR 10 MW

The amendment disallows the following:

- Generator offers to inject energy/provide OR 60 MW; storage bids to withdraw energy/provide OR 10 MW
 - If both resources are scheduled for OR and there is an OR activation, storage would need to stop withdrawing and the generator would need to start injecting, and the schedule would be over the MAQ at 60 MW.
- Generator offers to inject energy/provide OR 60 MW and storage bids to withdraw 10 MW (no storage OR offer)
 - If generator is scheduled for OR, the storage withdrawal is still within MAQ; however, it is possible/likely that storage withdrawals will be cut when OR is activated, and then the gas generator energy schedule will not be within MAQ.

Stakeholder Engagement

- The IESO presented implementation details and draft market rules to stakeholders on October 24
- The information was well-received; stakeholder feedback indicates that the proposed changes to market rules enable co-located hybrid participation appropriately, and there were no contentious issues
- Additional information and materials including IESO responses to all stakeholder feedback received during the design and implementation phases to date, as well as the draft market rules presented to stakeholders can be found at the link:
 - [Hybrid Integration Project](#)

Next Steps

- The IESO will bring draft market rules to the Technical Panel in January 2023, with the target date for the vote to recommend to the IESO Board of Directors in February 2023
- If recommended by the Technical Panel and adopted at the March meeting of the IESO Board, the effective date for implementation of co-located hybrid participation would be April 2023

Thank You

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