

Stakeholder Feedback and IESO Response

Ramp Rates for Battery Energy Storage System Facilities

Following the July 22, Ramp Rates for Battery Energy Storage System (BESS) Facilities webinar, the IESO invited stakeholders to provide comments and feedback on the materials presented.

The presentation materials and stakeholder feedback submissions have been posted on the Ramp Rates engagement webpage for this engagement. Please reference the material for specific feedback as the below information provides excerpts and/or a summary only.

Technical Justification

Stakeholder Feedback	IESO Response
Technical Justification Additional information and technical justification for the selected 100 MW/min ramp rate limitation has been requested.	The IESO understands and acknowledges the request for additional information and technical justification of the 100 MW/min ramp rate limitation. This will be shared in a future engagement session.
Enhancements to ERP SMSR Stakeholders requested IESO to consider alternative solutions to the ramp limit for BESS facilities, specifically enhancements to the Enabling Resource Program's (ERP) Single-Model Storage Resource (SMSR) including enabling more frequent dispatch intervals or ancillary products.	The IESO acknowledges the request to consider more dynamic and market-based solutions for addressing system balancing impacts resulting from fast-ramping behaviour. Alternative solutions for resolving the identified system impacts were considered under ERP but no practicable solutions exist at this time as the scope of the ERP is defined to enable integration within the IESO's existing Dispatch Scheduling Optimization tools. ERP will implement several key enhancements to support unlocking flexibility from BESS including:

	the Single Model Storage Resource (SMSR), improved State of Charge modelling, and enabling regulation service.
Advancing the Enabling of Regulation Service for BESS Stakeholders requested advancing the expansion and enhancement of regulation procurement to enable BESS facilities to provide additional regulation service to meet growing regulation service needs as identified in the IESO Annual Planning Outlook (APO), while also addressing system balancing concerns as described in this engagement presentation.	ERP Phase 2 is planning and designing the changes necessary to enable BESS to provide regulation service. The IESO agrees that the growing BESS fleet represents an important source of regulation capability which can help meet increasing needs. Increasing regulation needs identified in the APO are attributed to anticipated increases in variability and uncertainty in the supply-demand balance that cannot otherwise be reasonably predicted or controlled (e.g. load growth). As described in the engagement presentation, near-instantaneous ramping of BESS resources to meet five-minute energy dispatches has the potential to significantly impact system balance. This type of response should not be allowed to contribute to increased need for regulation service because BESS facilities are capable of controlling their ramping in response to dispatch instructions.
Technology Neutral Approach The proposed ramp rate limitation applies only to BESS facilities. The IESO should consider a technology agnostic approach which addresses fast-ramping capabilities of all Inverter-Based Resources.	The IESO is committed to ensuring that market rules are applied consistently and impartially, supporting the efficient, competitive, and reliable operation of Ontario's electricity market. Concurrently, the IESO must acknowledge the unique operating characteristics of each technology type and their impact on system operations to preserve both equitable market operations and system reliability. New technology types, such as BESS, have unique operating characteristics which may at times require unique market and operations solutions. The July 22nd engagement presentation describes why ramp limitations for inverter-based variable generation resources are not required at this time. The IESO will continue to monitor the

	need for a ramp rate limit for all resource types and implement accordingly.
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Implementation Considerations

Stakeholder Feedback	IESO Response
State of Charge Modelling Under the current two resource model, ramp rate limits are applied through facility level controller settings. Under the future ERP single resource model, ramp rates will be managed via dispatch data submissions. Clarity was requested for how these parameters will interact with State of Charge forecasts, MaxSoC/MinSoC constraints, multi-interval optimization, and EMS behaviour, particularly as facilities transition to the new model.	The IESO does not anticipate material impact on SoC modelling or multi-interval optimization resulting from the proposed ramp rate limitation. More information on SoC modelling under the SMSR can be found on the ERP Storage and Co-located Hybrid Integration Project Engagement Page.
Facility-Level Implementation Facility-level implementation introduces technical and operational complexity, particularly for multi-resource BESS facilities as it applies to the configuration of EMS systems and controllers. More guidance is required for how the facility-level limit should be applied through energy dispatch data submissions for multi-resource BESS facilities including when multiple resources are dispatched together or if a subset of resources at the facility are unavailable.	Facility-level implementation requires that multiple resources making up one facility must respect the 100 MW/min limitation when collectively responding to five-minute dispatch instructions. The IESO is investigating tool upgrades to enable BESS facilities to be modelled, participate in wholesale markets, and be settled as a single resource. This functionality is intended to significantly ease complexity with managing dispatch data for facility-level constraints such as the proposed ramp rate limitation. In the interim, the IESO will require market participants for BESS facilities with multiple resources to manage their dispatch data in alignment with the ramp rate limitation to be outlined in the Market Rules. As such, the IESO is supportive of the need for additional guidance and will aim to clarify these details alongside the draft Market Rule language.

Hybrid/Co-located Facilities Additional guidance may be required for hybrid/co-located facilities to address unique interactions that may arise between variable generation and storage ramp-limits.	Under the enhanced co-located model, the generator and storage resources that share a point of interconnection will generally be modelled, participate in wholesale markets, and be settled separately. The resources will be registered under distinct facilities that share a point of interconnection. As a result, metering will be required to measure each facility to support separate market participation and settlement. Storage resource(s) will participate as a separate facility from co-located generation and will adhere to the SMSR design, including the proposed ramp limitations.
Direct Engagement Stakeholders have requested the IESO place further consideration and provide stronger guidance for implementation including direct engagement with BESS operators to ensure implementation guidance reflects practical facility configurations.	The IESO's System Impact Assessment and Registration processes enable a direct line of communication between BESS operators and IESO representatives to ensure that BESS operators have the requisite information to implement the IESO requirements, including this ramp rate requirement, in considering the individual practical limitations associated with their facilities. The IESO is open to discussing specific practical facility limitations affecting implementation of this ramp rate requirement. Please reach out via IESO Customer Relations at customer.relations@ieso.ca.
Compliance Expectations More detail was requested on compliance expectations specifically clarity on whether any technical standards or certification requirements will be associated with the Market Rule amendment.	Compliance expectations associated with Market Rule amendments will be considered throughout the Market Rules drafting process. Additional detail, including any associated technical standards or certification requirements, will be included alongside the draft Market Rule language.
Review Cycle Stakeholders have requested that the IESO adopt a regular review cycle to update the ramp limitation instruction as market conditions evolve.	The IESO is supportive of the recommendation to adopt a regular review cycle. The cadence and details of this cycle will be contemplated and addressed in a future engagement.

Financial Impact

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The financial impact analysis presented relies on a limited historical dataset and may not reflect future storage penetration levels or high-price market conditions. An updated analysis of the financial impact has been requested.	The IESO acknowledges this stakeholder request and has conducted supplemental analysis for the lost opportunity cost and financial impact up to the end of June 2026. The detailed results of this supplemental analysis will be shared at the next stakeholder engagement session.
Stakeholders requested clarity on why the IESO has not proposed a make-whole payment construct to hold BESS facilities whole to their capability that is being constrained by the ramp limitation.	Make-whole payments are generated when foregone market opportunities result from differences between a dispatch instruction and the economic output of a resource that can be reliably delivered to the grid, i.e. a system feasible market outcome. They are not intended to cover market outcomes that are not system feasible. For example, while a resource may physically be able to inject more MW onto the grid; if a transmission constraint is at its maximum limit, this is reflected via negative congestion prices in the locational marginal price, and no make-whole payments are generated. The IESO views the need for ramp rate restrictions in a similar manner. The system cannot reliably accommodate resources responding to 5-minute dispatch instructions with a near instantaneous ramp. As such, this represents a system constraint that in the IESO's opinion should not generate a make-whole payment.

General Feedback

Stakeholder Feedback	IESO Response
Timing of rule amendments The 100MW/minute limitation has been implemented through the SIA/RAN process for	The IESO acknowledges this feedback and recognizes the importance of transparent processes when implementing operational requirements for market participants. The rapid addition of new

an extended period without initiating an engagement or Market Rule amendment. The IESO should review its approach and commit to initiating the appropriate engagement and/or amendment processes necessary to support future operational changes or restrictions.	BESS presented immediate reliability challenges for the IESO related to maintaining system balance and required immediate action to be taken through the System Impact Assessment/Registration process in anticipation the rapid growth in BESS capacity. This ramp rate engagement and the rule amendments being considered will build upon the existing framework for the reliable integration of BESS resources into the energy market in an open and transparent manner consistent with IESO engagement principles.
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