

Stakeholder Feedback and IESO Response

ERP Storage and Co-located Hybrid Integration Project

Following the May 20, 2026, ERP Storage Project engagement session, the IESO invited participants to provide comments and feedback on the materials presented by June 5, 2026.

The presentation materials and stakeholder feedback submissions have been posted on the ERP's [Storage Project](#) webpage for this engagement.

Please reference the material for specific feedback as the below information provides excerpts and/or a summary only.

If you have any questions or concerns, please contact engagement@ieso.ca.

The following participants submitted feedback that is summarized in the tables below:

- [Power Advisory \(On behalf of the ESR Consortium\)](#)
- [Energy Storage Canada](#)

Optimization

Stakeholder Feedback	IESO Response
State of Charge (SoC) management during uncertain or tight conditions: - Clarify how the optimization engine prioritizes storage dispatch when SoC limits conflict with system needs, especially during tight supply or high volatility. - Also explain how storage is handled during uncertainty (e.g., forecast errors, ramping, reserve scarcity) to avoid undue constraints.	- The IESO does not prioritize assets in the Dispatch Scheduling Optimizer (DSO). The DSO will attempt to maximize the gains from trade for all resources bid and offered in the market while also considering the reliability of the system. Please refer to this document for more details on the DSO's function. Resource bid and offered are considered for the given system conditions over the look-ahead periods and the engine considers how SoC can be optimized to meet system needs. - SoC is managed through intertemporal constraints; meaning charge and discharge schedules are driven by the linkages of operational decisions, resource constraints, and pricing across multiple time intervals. SoC is optimized to ensure reliability during tight supply conditions. Dispatch schedules are produced by a real time multi-interval optimization (RT-MIO) and pricing is produced by a single interval optimization. Uncertainty is not assessed by the DSO as all inputs are fixed based on estimated/calculated inputs as appropriate in managing the market engines. Constraints are used by the DSO to prioritize how to resolve conflicts (i.e., preserving a system limit vs net interchange schedules).
Constraint Violation applicability: More transparency is needed on how violation pricing will be applied when SoC limits are binding, and how frequently the engine is expected to rely on violation relaxation for storage.	The IESO uses cascading Constraint Violation Prices (CVPs) to allow the DSO to solve when it otherwise would not be able to. Due to the relatively high values of the CVPs proposed for Single Model Storage Resources (SMSR), there are many other constraints that would be relaxed prior to exceeding these storage limits. Please refer to the optimization design memo for further details.
SMSR vs DMSR: Seeking confirmation that the transition to a SMSR will not disadvantage storage relative to Dual Model Storage Resource (DMSR).	Please refer to the benefits of the new model in the May 20th engagement presentation. With these benefits, the IESO expects it will improve the participation while also supporting feasible operation. The SMSR is being designed to streamline storage participation, develop new opportunities for SMSRs, and relax the need for

	Market Participants (MPs) to manually manage their SoC.
Voluntary opt-out of SoC management / participation in IAM: Stakeholders request that the IESO establish a voluntary opt-out mechanism for storage participation in the IAM, including specifically SoC management. Unforeseen challenges or outcomes may require storage resources to manage their own SoC to maintain warranty and facility economics.	- All existing dispatchable battery energy storage resources will be required to transition to this SMSR participation model due to challenges with the existing Dual Model Storage Resource participation model and to maintain grid reliability with the large amount of battery storage resources entering the market. Due to the large number of MWs that the IESO is relying on to support grid reliability, the IESO must have the ability to verify feasibility of scheduling and dispatch, which has proven challenging under current limited participation and market participation models. Consideration of a storage resource's state of charge within the optimization engine allows the IESO to verify feasibility of scheduling and dispatch which is necessary to ensure the ongoing reliable operation of the IESO-controlled grid. - In addition, the IESO only schedules resources within the bounds that the MP sets. ERP is providing flexibility to the SMSR participants for their bi-directional offers and submission of dispatch data, including SoC related parameters which will set the bounds for how the IESO schedules the SMSR. This allows participants to manage their State of Charge and scheduling outcomes. - Like any other market change, the IESO will monitor the market outcomes of the new design. Should any issues arise, the IESO will prioritize enhancements or additions accordingly to support an efficient and reliable market outcome for all parties.

Connection and Registration

Stakeholder Feedback	IESO Response
Registration timelines: Registration timelines for key parameters (e.g. Absolute SoC limits, efficiency, bidirectional capability) should reflect commissioning realities, as many values cannot be finalized until late-stage testing.	- Resources will be able to update registration parameters if commissioning highlights changes from what was initially registered. - Resources that have completed commissioning prior to SMSR go-live will not be required to commission again to participate as an SMSR. However, they will still be required to participate in the transition process to SMSR, which will also involve submission of new parameters specific to SMSR.
Internal Service Load (ISL): Clarify how auxiliary load and ISL are accounted for in SoC and settlement, given their variability.	- MPs manage their auxiliary loads/ISL. The IESO will rely on SoC telemetry to verify the existing state of charge of the resource, and this will continually update to see the impacts of parasitic load, but the IESO cannot predict or model such loads into the DSO as it is the MP who determines their requirements. - The IESO will have visibility of this depletion through the resources telemetered SoC snapshot value that is utilized in the pre-dispatch (collected once an hour) and real time (collected every 5 minutes) engine value. MPs must be able to manage their SoC in this circumstance and should be aware of the impact of this parasitic load on potential scheduling with the introduction of the new Minimum State of Charge (MinSoC) parameter. Resources cannot be utilized for injections at MinSoC, unless CVPs are utilized by the DSO. If the resource continues to deplete their SoC beyond MinSoC due to any parasitic load this will trigger a withdrawal dispatch to return the resource to its MinSoC constraint. This withdrawal may not be economic for the resource due to the application of this new constraint. In addition, the MP will not receive a make-whole payment in this circumstance as it is a resource/MP induced action. - There is no change in settlement and EOP design due to ISL as it is being set to 0. Make Whole

	Payment (MWP) calculations assume the schedules and dispatch to resources are feasible.
Updating registration parameters: Streamline registration parameter updates, e.g. Maximum State of Charge (MaxSoC), to avoid MIM validation delays and preserve operational flexibility.	- The IESO is developing a plan to transition existing DMSR resources and facilitate their participation as SMSR. - One goal of the transition plan is to facilitate the transition from DMSR to SMSR for those eligible resources participating in the IAM.

Dispatch Data and Other Inputs

Stakeholder Feedback	IESO Response
Difference between telemetered and submitted SoC: Clarify how the DSO will handle differences between telemetered and submitted SoC limits and their impact on dispatch and provide more detail on real-time application of Cycle Efficiency, especially when telemetered and calculated SoC diverge.	- The IESO utilizes the MP's submitted SoC limits (MaxSoC and MinSoC), to set the constraints in the DSO, and MP telemetered SoC to initialize SoC values in Pre Dispatch (PD) and Real Time (RT). The DSO will not schedule or attempt to set the next dispatch to a point where the SoC will be beyond the max/min limits unless constraints must be bypassed to solve the engine, and in which case high constraint violation prices will be utilized. - The DSO will also apply the cycle efficiency on withdrawals that the MP has submitted to calculate its dispatch and scheduling. - The telemetered SoC values from MPs are expected to be accurate and as per telemetry requirements set by the IESO Market Rules. IESO determines schedules but limits those schedules to MP submitted parameters. Therefore, the MP has the responsibility to ensure that the telemetered value remains between the submitted SoC limits and the IESO will schedule the resource based on these MP provided parameters. The MP must ensure that these telemetered SoC values are accurate and consider outside factors that can impact the SoC, such as temperature, or losses may differ from what was submitted to the IESO. - Please refer to the "day-in-the-life" examples that ERP produced for the May 20th engagement. ERP will be producing additional examples for future engagements.
Initial State of Charge (ISoC) Requirement in Day Ahead Market (DAM): - The requirement to estimate ISoC in DAM for next day carries risks for stakeholders. They may be forced into a financially binding day-ahead schedule which they can't meet without buying in the RTM. - Storage participants already have tools (e.g., Maximum Daily Energy	- Thank you for your feedback. The IESO understands there could be a risk as well as opportunities with using an ISoC value. The IESO has reviewed alternative approaches, such as removing an ISoC, and believe this is the more prudent approach for SMSRs and the overall market. - MPs utilizing the SMSR will have flexibility in their bi-directional offers and dispatch data submission, that can assist them in managing DAM to RT risk. It is up to the MP to determine the level of risk that they are comfortable with in the DAM. The

Limits) to manage discharge, making a required 14-hour ahead SoC forecast of limited value. Actual SoC can change significantly due to real-time conditions and forecasting it so far in advance complicates bidding. Stakeholders recommend making SoC submission optional, adding similar MaxDEL parameter for charging, and considering restating SoC closer to real time.	IESO recognizes stakeholder concerns and notes that the CycleDEL parameter being introduced already serves a similar purpose to Max DEL by limiting discharge and overall cycling. Although applied on the injection side, it implicitly constrains charging, since storage must charge in order to discharge. CycleDEL is also more tightly linked to SoC and storage warranties, ensuring operational feasibility. While SoC forecasting introduces uncertainty, it remains necessary to ensure feasible energy schedules.
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Market Power Mitigation (MPM)

Stakeholder Feedback

IESO Response

Ex-ante mitigation:

- Stakeholders reiterate recommendation ensuring mitigated offers cannot fall below a resource's highest withdrawal bid to avoid these uneconomic and distorted outcomes.
- The MPM design could, through mitigation, force storage resources to switch from charging to injecting energy at a price below their input cost. This reduces state of charge when the resource intended to increase it, potentially preventing it from meeting future market or contractual obligations and forcing additional costly actions to recover.

- The DSO requires the bidirectional offer curve to remain monotonically increasing. The current MPM design enforces this by decreasing charging prices under limited mitigation scenarios, so they are at least \$0.01 below the first injection lamination. The alternate approach, as recommended by market participants, is to increase the lowest priced injection lamination above the highest withdrawal price. This would allow MPs with SMSRs to effectively set their own reference level. This flexibility is not available to other resource types, so therefore the proposal will not be accepted.
- Under the proposed alternative, an MP could submit an extreme charging bid to bypass market power mitigation. When combined with constrained-on dispatch, this could result in excessive make-whole payments.
- The proposed approach introduces gaming risk. A market participant may offer 0.1 MWh at an extreme charging price, inappropriately shifting the energy offer reference level and creating a loophole.
- A resource is mitigated if it meets the conditions to test for market power, it fails the conduct test and fails the price impact test. If offers remain within the reference level and thresholds, mitigation does not occur. As of June 2026, energy storage resources are mitigated less than 1% of the time for energy in ex-ante, making this scenario infrequent and low risk.
- Increasing offer prices during a mitigation event is counter to the purpose of mitigation.
- Through ERP stakeholder outreach, the IESO incorporated feedback from stakeholders to ensure the energy offer reference level reflects discharging costs, including the entire redesign of opportunity costs for SMSRs. This design provides sufficient flexibility for market participants to structure bids for both charging and discharging. Observed bidding behavior and market outcomes indicate that resources can be charged as needed under this framework. In rare, highly constrained

	conditions where reference levels may not reflect system conditions, participants can submit a fuel-cost change request. Contract holders can direct any obligation questions to the IESO's Contract Management group.
Energy Financial Reference Level (FRL): The energy FRL must reflect real world cycling economics rather than theoretical arbitrage assumptions.	- The IESO updated the SMSR energy FRL design to better reflect the costs incurred by an energy storage resource. The IESO incorporated the following stakeholder-informed considerations: - Charging costs are dynamically calculated using the charging prices from the past 7 days. - Additional price escalations are applied on charging costs. - Charging costs account for the market participant's submitted cycle efficiency. - If the resource did not charge for 7 days, last known charging cost will continue to be used. - Opportunity costs will be used in calculating energy offer FRL using historical and future looking Locational Marginal Pricing (LMPs). - Automatic use of IESO advisory price indicators into the calculations. - Apply a historical look-back approach to estimate prices. - Use a maximum of multiple price forecast methodologies for opportunity cost calculation. - Introduce opportunity costs into Day Ahead (DA) reference levels. - Averaging or ranking top LMP hours matched to available storage hours.
Operating Reserve (OR) FRL: Operating reserve FRLs should explicitly incorporate auxiliary load and inverter efficiency impacts to ensure accurate cost representation.	The IESO is amenable to incorporating the inverter efficiency impacts to the auxiliary load cost design. The IESO will implement this change.
Physical Withholding: IESO proposing to extend the physical withholding requirement for storage from full capacity for one hour to full capacity, i.e., Reference Quantity (RQ), for each	The overnight exemption sets the energy injection reference quantity for the exemption hours between 23:00 and 07:00 EST to zero. An energy RQ of zero means that the resource will not fail the physical withholding conduct test regardless of the injection offers submitted for the DA or RT

hour of the dispatch day. The IESO has suggested an overnight exemption, but it is not clear how this applies. The IESO has awarded 640 MW of 8-hour storage contracts recently, where the overnight exemption does not help. • The physical withholding requirements are difficult for a resource that must bid for energy to charge and already has day-ahead must offer requirements based on IESO contracts. The storage facility should be permitted to withhold discharge during non-business hours (e.g. daytime weekend hours) where must-offer obligations could result in significant equipment damage / costs. • The physical withholding requirements increase the risks storage must take on with the mandatory submission of a SoC for each DAM window. By forcing energy offers, flexibility is restricted to manage SoC to be aligned with the start of the next day schedule. Explanation why storage requires all hours of dispatch day physical withholding is required. • Recommendation to set the RQ based on a full cycle over a day (i.e., energy between MinSoC and MaxSoC), representing that the storage facility must offer a full cycle each day to avoid physical withholding.	timeframe. This applies only to the injection range. Resources may submit charging quantities without risk of being flagged for physical withholding. For operating reserve, the OR RQs apply to the charging capability for the overnight exemption hours so the injection capability and associated outages will be set to zero. • The IESO does not dictate bid/offer strategy for the MPs. MPs have full control over bid/offer submissions. Long duration storage resources will have the flexibility to also charge in any hour outside the 23:00 and 07:00 EST period. Any contractual compliance risks that arise due to market design should be raised to the IESO's Contract Management group. • Hourly RQs for SMSRs are established to ensure consistent application of RQs and conduct testing across all other technology types. All other types of resources are expected to offer their capability in each hour. Physical withholding remains a discretionary assessment conducted by the IESO MACD division. Should such an assessment be initiated, the MP will be provided an opportunity to submit relevant information for physical withholding assessment. The IESO would like to re-emphasize the point that physical withholding is not an automated charge. • Other resource types are subject to hourly physical withholding requirements and are expected to manage the two-settlement risks associated with participating in the DAM and RTM. • IESO expects SMSRs to always make their entire injection capacities available to the market. The DSO calculation engines take into account economics and SoC feasibility when determining energy injection schedules. Market participants do not need to manage MW quantities in each hour, except for in derate/outage situations.
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General Feedback

Stakeholder Feedback	IESO Response
Request for testing environment or pilot: Stakeholders encourage clear, operator-focused guidance and training to support a smooth ERP transition, along with a testing environment to validate systems and reduce uncertainty ahead of go-live, potentially including a pilot with a single proponent.	Thank you for your feedback. ERP will support readiness by providing day-in-the-life examples for storage market participation and conducting market trials with market participants.