

Feedback Form

Enabling Resources Program (ERP) - Storage and Co-located Hybrid Integration Project

Meeting Date: October 16, 2025

Feedback Provided by:

Name: Heather Sears

Title: VP, Market Services

Organization: Workbench Energy

Email: [REDACTED]

Date: November 3, 2025

Following the **October 16, 2025**, engagement webinar, the Independent Electricity System Operator (IESO) is seeking feedback on the items discussed during the webinar. The presentation and recording can be accessed from the engagement web page.

Please submit feedback to engagement@ieso.ca by October 30, 2025. If you wish to provide confidential feedback, please submit it as a separate document, marked "**Confidential**." Otherwise, to promote transparency, feedback that is not marked "Confidential" will be posted on the engagement webpage.

Storage/Hybrid Project Feedback:

Topic	Feedback
<i>October 16th Presentation Material:</i> Do participants have any questions or comments based on the presentation material?	Comments below
<i>Optimization Design Memo:</i> Are there any significant concerns with the information included in the Optimization Design Memo?	Comments below

General Comments/Feedback

Workbench Energy is a leading market services provider in the Ontario electricity sector, providing advanced commercial market operations and intelligence to market participants, including IESO-registered dispatchable electricity storage resources connected at both transmission and distribution levels. In addition to electricity storage, our continued market services work with generators, large loads, and distributed energy resources ensures a detailed and cohesive understanding of IESO market rules and processes.

We are uniquely positioned to provide feedback to IESO on the ERP design, as our work with IESO market participant electricity storage resources covers registration, market operations (optimization, dispatch data, scheduling and dispatch), market power mitigation, settlements and contract compliance. It is from this operational and commercial perspective that we provide this feedback.

October 16th Presentation Material:

Do participants have any questions or comments based on the presentation material?

Stakeholders appreciate the complexity of the undertaking here, and appreciate the resourcing IESO is applying to making the storage / hybrid participation model more efficient. The challenges with the current two-resource model are clear, and will only be exacerbated as more storage resources are operationalized.

Engagement Process and Timeline

The batched approach is reasonable, though it is important that IESO consider some specific feedback here:

1. As with MRP, the impact of one batch of design elements on a batch that was previously assessed needs to be considered, and prior batches re-aligned as the scope expands. Ensuring an alignment batch of design documents, rules and manuals, with blacklines to prior versions will ensure that neither IESO nor stakeholders lose track of small details that will be impactful to operations.
2. IESO has agreed to connect internally between market ops and contract management to put forward a position on contract impacts. IESO presented a preliminary position that no contractual impacts are expected. We encourage IESO to include stakeholders in these conversations, as the competitive procurements have secured equipment on a basis that may change. There are several areas of concern here that the BESS counterparties and operators will have better insight into than IESO will on its own.
3. We appreciate IESO's optimistic timeline for implementation, though we must caution that IESO consider a few areas:
 - a. Testing. The new framework will require comprehensive testing in each of the affected areas in the sandbox, with real market conditions. This proved to be challenging in MRP, and the lessons learned through the MRP process and end-to-end testing must be incorporated into this significant design change.
 - b. Active Market Activities. BESS facilities with E-LT1 and LT1 contracts will be actively moving through registering technical values, reference levels, operating philosophies, settlements tools, resource details, etc. across this Q4 2025 – Q4 2026 engagement timeline. The benefit here is that there will be more active stakeholders to participate in the design and testing process, though the challenge is that there will be significant redundancy and effort on the part of IESO and participants to move through the current and future frameworks in parallel. This will increase resource demands both at IESO and with BESS facilities which needs to be considered in the timeline. The registration and commercial operations target dates for contracted assets **cannot be slowed down** by the design and implementation of ERP.

Optimization Design Memo:

Are there any significant concerns with the information included in the Optimization Design Memo

Single Resource Model

A single resource with continuous offer curve, swinging from (-) generator (charge) to (+) generator (discharge) makes sense and should align with a single delivery point recording separate channels for

import and exported power. On slide 20, IESO has identified that this resource will be considered “quick start”¹. IESO’s definition of quick start is clear: connect and respond within 5 minutes.

IESO must ensure that distribution-connected electricity storage resources that may be ramp-constrained as a result of distributor-imposed constraints are not excluded from the single resource model, or, if they must be, that there continues to exist a participation model that will enable their continued operation.

Additionally, when designing the enduring storage model, the IESO should consider that not all energy storage technologies are capable of a 5-minute response time. With the long-lead procurement underway and continued evolution in energy storage technologies, we recommend the IESO include a participation path for storage resources which are unable to respond within the 5-minute window.

MP Data Submission

The IESO’s proposed approach of up to 20 p,q pairs crossing 0 MW is reasonable, and using the 0 MW lamination as the “reset” lamination between “resource will pay up to” for charge and “resource will operate for no less than” for discharge conceptually functions.

Operating Reserve

There may be challenges in limiting the number of p,q pairs to 5 for OR. Stakeholders need to consider whether the cost of a MW of OR is equivalent across the bidirectional resource. To understand the implication, we need to understand the duration of the OR obligation and the specific capabilities of the engine, with examples.

Ramp Rates

While we understand the IESO’s concern around system impact of fast ramp, stakeholders need to be satisfied that IESO has performed a technical analysis in justification of a particular ramp limit.

The IESO’s qualitative justification for implementing a uniform ramp limit needs enhancement.

There are commercial impacts of ramp limitations, and as such, every MW has value. For example, a 500 MW resource that is constrained by IESO to 100 MW/min will, over a 5-minute interval, produce $250 \text{ MWh}/12 = \sim 21 \text{ MWh}$. On a \$200/MW price in that interval, the facility will earn \$4,200. If enabled to ramp at 200 MW/minute, that facility averages 375 MWh over 5 minutes, or $\sim 31 \text{ MWh}$, earning \$6,250. The revenue impact of that ramp constraint is \$2,050 over 5 minutes. If the ramp limit has commercial impact, the IESO make-whole payment settlement must compensate the resource.

New/Updated Registration Parameters for Storage

We appreciate the IESO’s acknowledgement of the battery registration parameters, the inaccessible energy that is preserved for facility lifecycle and degradation management, and the internal service load parameters.

¹ IESO Market Rules 0.11-39, Issue 1.0 November 11, 2024, “quick start resource means a generation resource or an electricity storage resource whose electrical energy output can be provided to the IESO-controlled grid within five minutes of the IESO’s request when its equipment is not synchronized to the IESO-controlled grid;”

These parameters are sensitive to ambient conditions, as well as to the equipment condition. It will be important that IESO design for MPM, ramp, settlement and dispatch clearly align with the lower energy limit and upper energy limit, and not move beyond these ranges.

The conditions and cost at which IESO may access incremental energy up to absolute max and min must be very clearly defined and understood before these registration parameters are implemented. Exceeding useable energy ranges will have contract implications and equipment impact.

New Daily Dispatch Parameters for Storage

Initial SoC:

Under the current proposal, market participants must submit an Initial SoC value by 10:00 a.m. on the day-ahead, which will be used by the IESO to produce financially binding schedules in the Day-Ahead Market (DAM). However, the actual SoC that the resource will have at the start of real-time operation at midnight cannot be known or controlled at the time of submission. The intervening period—between 10:00 a.m. and the start of real-time dispatch—includes a full day of real-time market operation during which the resource must follow IESO dispatch instructions that respond to system conditions. These dispatches, by design, alter the facility's SoC and create unavoidable divergence from the DAM schedule and the submitted estimate. Further, any error in the current's day's Initial SoC estimate will drive further deviations between DAM and RT dispatch and result in a cascading effect on SoC error in the subsequent day.

This variability is inherent to the structure of IESO-administered markets and not the result of any deficiency in operational processes, forecasting, or technology on the part of storage operators. As such, requiring participants to financially settle based on an Initial SoC estimate introduces a material and unmanageable financial risk that cannot reasonably be mitigated by the resource owner or operator.

To address this issue, Workbench Energy recommends that IESO incorporate either:

- 1. **An operational mechanism** that ensures resources will begin the day at their Initial SoC estimate; or*
- 2. **A settlement adjustment mechanism** to remove or neutralize financial exposure associated with deviations between the estimated and actual SoC.*

Finally, the settlement examples presented in the Day-in-the-Life materials assume that the Initial SoC submitted in the DAM is accurate. This assumption is unrealistic under current market conditions and, without an accompanying mitigation measure will leave energy storage resources with an unmanageable financial risk.

Dispatch Engine Utilization of Daily Dispatch Data Parameters:

As the daily dispatch parameters are applicable only in the DAM and PD engines, the value of the ERP implementation to market participants is **severely limited**. Until the Initial State of Charge issue is resolved, any DAM schedules that are published will respect these parameters, but will not reflect actual dispatch capability. Predicating financially binding schedules on hypothetical and unmanageable estimates limits the value of the optimization. Similarly, while these values are proposed to be used by the PD engine, the PD engine does not drive any dispatch, settlement or

activity for storage resources, therefore, there is no value to participants in PD schedules that reflect these technical parameters.

Real time dispatch must reflect State of Charge for this new design to function and address the many of the key limitations of the current participation model.

Market Power Mitigation

It is premature to discuss the MPM framework changes to align with optimization engine changes at this time. Presumably, the financial reference levels are unaffected unless or until new dispatch optimization affects the underlying costs or assumptions to provide energy or OR. The non-financial reference levels and bid validation mitigations cannot be properly designed until the underlying issues with registration and dispatch data are resolved.

Day in the Life

The effort and detail that IESO put into the day-in-the life section of the design memo is appreciated. The examples are clear, understandable, and represent very well the complex interplay of DAM and RTM, and of Energy and OR.

However, the significant issue with the design is that each of the day-in-the-life examples is predicated on the ISoC value which as outlined above will not be an accurate value under the current proposed design. The DAM will produce financially binding schedules for energy and OR in consideration of the new registered and daily dispatch data, however, these schedules will be predicated on a state of charge at 00:00 on the dispatch day that has been, under this design, estimated by the resource with no commitments or reliable forecast to the dispatch activity for the balance of the current day. To enable participants to accurately understand a 'Day in the Life' under the current design, we encourage the IESO to develop scenarios which begin the day with an Initial SOC value that differs from the actual SOC.