Feedback Form

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

Meeting Date: November 20, 2024

Feedback Provided by:

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Following the November 20, 2024, 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 **December 9, 2024**. 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.

General ERP Feedback:

Topic	Feedback
Engagement approach to use Design Memos for each Project along with Presentations to inform feedback and ensure information on design elements and concepts is clearly communicated	We encourage the use of Design Memos, as presentations are not always the most suitable format for conveying lengthy or text-intensive information.

Storage/Hybrid Project Feedback Questions:

Topic	Feedback
Additional design considerations for future modules or elements?	Neoen would like to highlight a few considerations related to Module 3 – Grid and Market Operations: • Battery storage systems have demonstrated their ability to provide multiple grid services concurrently, with a high degree of flexibility and accuracy. Enabling storage resources to provide these services without overly restrictive constraints is key to enabling these systems to provide as much value as possible to the network and greatly contribute to system security. For instance, the ability of storage resources to provide OR and Regulation services on both the generation and the load side should be explored. • State of Charge modelling by the IESO will become an integral part of the market optimisation. As such, special care should be taken to ensure this modelling can reflect as accurately as possible the physical capabilities of the storage resources in real-time. • The potential impact of Local Marginal Price on the State of Charge modelling, and how Participants might manage this uncertainty, does not yet appear clear.

Should the IESO explore bid/offer tied to State of Charge or other options?	Neoen acknowledges that the mandatory window poses an operational challenge to storage resources, as there might be a high level of uncertainty on a State of Charge estimation 2 hours ahead. In Neoen experience, such a mandatory window usually leads storage resource operators to factor in additional buffers to manage the uncertainty. This leads to under-utilisation of installed resources (for instance, reducing the depth of discharge), which in turn leads to a higher cost for consumers (as more resources need to be built to deliver a similar service, and operators require higher prices to recover their costs). Neoen believes that adding flexibility to storage resources, in the form of IESO's proposal of SoC-tied bids, would partially mitigate this risk. Neoen suggests exploring the following design elements: • Variable SoC ranges. To get as much value as possible from SoC-tied bids, the SoC ranges themselves should be part of the bids, or at least customizable by the participants. Participants have different operational constraints and might elect to select ranges based on these constraints. For instance, extreme ranges (close to 0% or 100%) will be treated differently by various participants. A blanket range [100%-75%] is arbitrarily large and might not help reduce a participant's operational buffers. • Number of P/Q pairs. A limitation to 20 P/Q pairs is likely to be restrictive, as bids need to cover generation and load across several SoC ranges. Placing capacity in multiple pairs is an efficient way for storage to deal with the price and SoC uncertainty within the mandatory window. Neoen acknowledges that these elements might bring additional complexity to market design and implementation; however, there are long-term benefits that might have a substantial impact on future investment decisions for storage assets. Market designs have a significant influence on storage resources business cases, and geographies with the

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	most flexible designs are reaping the benefits by enabling large scale investment in flexible technologies.
What considerations should the IESO have for day-ahead market (DAM) in relation to SoC estimation? How can the IESO support a SoC that will accurately reflect an accurate SoC value that could be present at the start of the next day?	Neoen acknowledges that State of Charge (SoC) estimation becomes increasingly accurate as the delivery hour approaches. BESS operations are heavily influenced by market conditions, which can be highly unpredictable due to factors such as unexpected oversupply, large shortfalls caused by incidents, or surges in demand driven by sudden weather changes or other events. These inherent market uncertainties make day-ahead SoC estimations particularly challenging. Given this background and the Day-Ahead process timeline, any SoC estimate at the DAM Engine Start will carry a high level of uncertainty. One possible method would be to use the output of the latest Pre-Dispatch run performed before the DAM Engine Start. This is likely to be the most accurate information available at the DAM Engine Start. Alternatively, IESO could require participants to submit their SoC estimate with their day-Ahead offers, but it is likely to be less accurate or fair. However, the IESO should consider that a high level of uncertainty will be carried by these estimates.

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Are there other resource operating characteristics needed to properly automate the operation of the resource to avoid changes in the mandatory window?	Given SoC modelling by the IESO will be an integral part of the storage resources dispatch, Neoen believes it is important for the participants to be able to communicate efficiently the actual physical capabilities of the site, in order to avoid being over-constrained or under-constrained by the dispatch engine. The main characteristics (max/min energy reserve, max/min power, state of charge, round-trip efficiency) are captured within the IESO's memo. One further element to consider is the ability for participants to over-ride static values from their registration. For instance, a partial outage might be planned over a defined period, restricting the resource energy reserve and power. A solution implemented in other markets is to allow participants to submit values to over-ride the static accreditation in their bids, for a more conservative value, reflective of the anticipated site capability over that period. This might be different from the current telemetered values coming from the site, if the outage has not yet started.

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Any other reasons why changes could be needed in the mandatory window?	It is understood that the mandatory window is the period starting less than two hours before the dispatch hour and closing at least 10 minutes before its commencement. During this window, dispatch data submissions are not automatically accepted; they require explicit approval from the IESO. As outlined in "Market Manual 4: Market Operations," Section 4.2, the requirement for IESO approval to revise dispatch data is intended to prevent acceptance of revisions motivated by economic considerations. As discussed on previous topics, this requirement has significant impacts on storage operations, as price and State of Charge uncertainty during the mandatory window need to be managed. Neoen suggests that aiming at reducing the duration of the mandatory window would improve the efficiency of storage resource operations and bring significant system benefits as a result. This might not be achievable in the short term but could be a long-term system design objective. Additionally, electricity storage participants revising dispatch data during the mandatory window for state-of-charge reasons are restricted to submitting reductions in quantity. Neoen recommends that the IESO also permits market participants to submit increases in quantity, as additional load could, in certain scenarios, provide significant system benefits. For instance, a resource coming back online earlier than expected after an outage could make its capacity available within the mandatory window and bring additional supply to the market in a shorter timeframe. Such a revision is not made for economic revision, but to accurately reflect the physical capabilities of the resource.

General Comments/Feedback

- The IESO's proposal to exempt storage from uplift charges on energy withdrawn is a significant benefit for BESS. As highlighted by the IESO, imposing uplift costs during charging can result in higher expenses for end-use consumers without delivering any additional value.