

Stakeholder Feedback & IESO Response

Energy Storage Design Project from May 20th Webinar

Following the May 20th public webinar on the Energy Storage Design Project, the Independent Electricity System Operator (IESO) received feedback from participants on whether the design proposals captured within the presentation offer pragmatic solutions for the participation of energy storage in the IESO-Administered Markets in the long-term.

The IESO received feedback from:

- [CanWEA/CanSIA](#)
- [Capital Power](#)
- [EDF Renewables Canada](#)
- [Electricity Distributors Association](#)
- [Energy Storage Canada](#)
- [Evergreen](#)
- [Ontario Power Generation](#)
- [TC Energy](#)

This feedback has been posted on the Energy Storage Advisory Group [webpage](#).

Note on Feedback Summary

The IESO appreciates the feedback received from stakeholders on the design proposal. The feedback has been noted and will be considered as the engagement moves forward. The IESO has provided a summary table below, which outlines specific feedback or questions for which an IESO response was required at this time.

Stakeholder comments and IESO responses

State-of-Change (SoC) Management

The IESO has proposed an SoC Management Lite approach that will provide the same market access as a generator and account for the practical operating realities of a storage facility.

Feedback

Stakeholder feedback on the proposed SoC-Lite model varied, with some stakeholders providing general support, some voicing concerns about a potential lack of fairness, and others requesting additional information before providing an opinion. The following sections provide summaries of the stakeholder feedback against each of these themes.

Generally supportive

Stakeholders who indicated support for the SoC-Lite model provided the following caveats for consideration:

- **Resource flexibility:** “While SoC-Lite provides the bid/offer construct, energy storage facilities’ flexibility will still be subjected to SoC constraints within the Dispatch Scheduling and Optimization (DSO) engine that may restrict the resource’s flexibility in day-ahead, pre-dispatch and real-time. The constraints placed on the resource’s ability to receive energy and operating reserve schedules could unduly restrict the resource’s market participation.”
- **Option for self-management:** “OPG believes the IESO should allow for participants to be entirely Self-SoC managed within the SoC Management Lite approach. This will allow storage facilities that are inherently complex in nature, and are influenced by a variety of external factors to be solely managed by the market participants.”
- **ISO-managed SoC:** “While TCE believes SoC-Management Lite is likely a better option vs. Self-SoC management, TCE continues to support ISO-managed SoC (of necessity likely limited to larger ESRs by virtue of being more computationally intensive) vs SoC-Management Lite for all ESRs until further information and analysis is provided.”

Concerns about fairness

Two stakeholders provided feedback voicing concerns about fairness, and questioned whether an SoC-Lite model would adhere to the principles of competition and efficiency.

- **Unfair advantage to storage:** IESO management of the SoC for large scale ESRs, particularly where the ESR is also compensated through a long-term contract or rate-regulation, will undermine the competitive price signal in the IAM. Without further detail on how all resources will be compensated for capacity (i.e. the solution to the missing money problem) we remain concerned that the IESO’s adoption of SoC Management Lite may result in an inconsistent allocation of risk across participants, thereby undermining the core principle of competition without providing a corollary benefit to efficiency.
- **Unfair disadvantage to storage:** Adopting the SoC-Lite approach grants the IESO a level of control over the storage device; for example, the IESO will be able to adjust the dispatch of

an energy storage facility. This raises a question of why the IESO treats generators and storage devices differently; whereas the IESO is unwilling to cede control of storage devices to the market participant responsible for operating the energy storage, including managing within SoC limits, the IESO doesn't treat generators similarly.

Need more information

A number of stakeholders suggested they require additional information before providing an informed opinion on the SoC-Lite model. Requests for additional information focused on the following areas:

- Further analysis, including: cost-benefit, high-level assessment of costs, and risk analysis.
- Further information on the process and restrictions around the option for self-management within the SoC-Lite model.
- Examples of ESR use-cases under both SoC-Lite and Self-SoC management approaches.
- Commentary on potential drawbacks of a SoC-Lite model.
- Information on implementability.
- Information on any assumptions used with respect to how ESRs and all resources will be compensated for capacity.
- Assessment of alternative processes that the IESO could rely on to manage risks, such as those associated with infeasible schedules.

IESO Response

- **Resource flexibility:** The SoC Lite proposal provides substantial flexibility for storage facilities to manage their own state of charge while also ensuring that schedules and dispatch instructions for storage facilities are feasible. Both the SoC Lite and Self SoC Management approaches afford the same opportunity to clear the electricity market with competitive offers. The key difference is that SoC Lite provides an automatic safeguard for both the electricity market and the electricity storage participant that dispatch instructions from the system operator will be SoC-feasible. At the July SDP engagement meeting, the IESO will explore this topic in more detail and will welcome discussion with stakeholders to ensure the details of the proposal and how it relates to the desire for flexibility are clear.
- **Option for self-management:** Through the SDP the IESO has focused on "avoiding design by exception" and "reducing complexity" where possible in order to maximize the chances of timely implementation of the enduring storage design. As a result, the IESO is focused on developing an enduring vision that provides consistent treatment for a broad range of stand-alone storage facilities. However, if there are compelling reasons why the design may not be appropriate for a uniquely complex facility, the IESO remains open to future discussions on how best to apply the design to such facilities.
- **ISO-managed SoC:** Beginning with its March 26, 2020 SDP presentation, the IESO has been clear that any SoC management framework introduced in Ontario will be based on competitive offers. The IESO will not manage a storage resource's fuel/fuel costs as the IESO believes this approach would be contrary to the fundamental market design principle of

competition and the role of the IESO as a neutral facilitator of the electricity market. This position is consistent with the IESO's approach to other resources. For example, in relation to comments received on hydro modelling through the Market Renewal – Energy program, the IESO clearly articulated this position, stating:

“The IESO, through its tools and processes, will optimize schedules and dispatch instructions for all resources based on their bids and offers into the market... the IESO will not implement an optimization solution... based solely on a supplier's production costs. It is up to the supplier to submit marginal costs, which can include production costs, opportunity cost, and other considerations reflecting how they value the resource's available energy in each hour. This is a fundamental concept underpinning today's electricity market and the future market.”¹

- **Unfair advantage to storage:** The SoC Lite proposal will result in the IESO modelling state-of-charge, similar to how the IESO models numerous physical characteristics for other resources including, but not limited to, daily energy limits for hydroelectric resources and pseudo units for combined cycle plants. As described in the *ISO-managed SoC* response above, the SoC Lite proposal will be based on competitive bids and offers and will provide fair and consistent treatment relative to the way that the IESO models the physical characteristics of other resource types. Neither SoC Lite nor Self SoC Management increase or decrease the chances that a storage facility's offers will clear the electricity market. The difference is who has responsibility to ensure that the resulting dispatch schedule is viable, given the facility's SoC constraints. SoC Lite provides mutual assurance to both the system operator and the market participant that the resulting schedule will be viable.
- **Unfair disadvantage to storage:** The topic of IESO control over different resource types will be addressed in detail at the July SDP meeting. As will be discussed at that meeting, the SoC Lite proposal is based on the same underlying concept of control that applies to all resources participating in the market and will result in fair and consistent treatment for storage relative to other resources. Ultimately, market participants retain physical control over their facilities at all times, though they are obligated to follow dispatch instructions formulated from their offers into the electricity market. The dispatch algorithm that formulates those dispatch instructions is governed by the IESO Market Rules, subject to external audit, and is binding upon both the IESO and all market participants wishing to participate in the Ontario electricity market.
- **Need for more information:** The IESO appreciates the requests for additional information on why it has proposed the SoC Lite approach and for further clarification on the details of the proposal. These topics will be the core focus of the July SDP meeting and more information and detail will be included in the materials for that meeting.

The IESO does not intend to undertake a cost-benefit analysis of the various SoC management options. Given the absence of real-world data to draw upon, the IESO believes that this would be a

¹ Excerpt from the IESO response to feedback submitted by Ontario Power Generation in relation to the November 14, 2019 Market Renewal – Energy program Detailed Design Engagement meeting on Hydroelectric dispatch, available here: <http://www.ieso.ca/en/Market-Renewal/Stakeholder-Engagements/Energy-Detailed-Design-Engagement>.

time consuming and costly effort that would be unlikely to provide clear direction on the relative benefits of the various SoC management options.

The IESO notes that the Electric Power Research Institute has previously undertaken this type of analysis to aid system operators in assessing the various SoC options. Through the EPRI study, outcomes were inconclusive in terms of which approach to SoC management would provide the greatest efficiency benefits.

The IESO has engaged with ABB, the software vendor selected through the Market Renewal – Energy program, to understand its storage solutions and to assess the implementability of the various SoC management options. While the long-term design proposals will be subject to further testing and validation in the future, the IESO believes that the SoC Lite proposal it has brought forward provides a practical vision for the future with high potential for timely and cost-effective implementation.

The IESO notes that no assumptions were made in relation to how capacity will be secured in the future.

Market and Facility Registration

Storage facilities may either register as a dispatchable facility or, if less than 10 MW, a self-scheduling facility.

Storage facilities will be modelled as a single resource with the capability to inject, store and withdraw energy.

Feedback

The majority of stakeholders provided support for the proposed registration models. Stakeholders recommended the IESO monitor the self-scheduling threshold and consider making adjustments if it causes significant barriers for storage resources.

Some stakeholders suggested the self-scheduling storage model be eliminated, allowing only for dispatchable resources:

- TCE recommends that the IESO investigate a requirement that all ESRs registered in the IESO market be dispatchable, which would be a unique treatment compared to other participation types.
- The IESO should revisit their decision and provide to stakeholders specific benefits and costs of a unique energy storage participation treatment for dispatchability.
- No self-scheduling should be allowed for ESRs with an installed capacity greater than 1 MW. The IESO could simply require that any Energy Storage Facility be dispatchable above 1 MW and this decision would not impact other market participants.

A stakeholder commented that it was unclear on how the load and generator resources comprising a storage facility would be treated in the long-term design. The stakeholder noted this may result in conflicts and provided the example of a self-scheduling facility being exposed to an Ontario zonal price for its load resource and a locational marginal price for its generator resource.

IESO Response

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Offer Curve

Energy storage offer curves will be continuous over the charging and discharging range.

Feedback

Stakeholder feedback indicated general support for the offer curve proposal.

Two stakeholders recommended the proposal be adopted during the interim design period as well. It was recommended the IESO explore if continuous offer curves could be implemented effectively in the interim design period, or if a tool change could be made to prevent storage facilities from submitting overlapping or infeasible bids and offers.

IESO Response

For the interim period being addressed through the SDP, the IESO has focused on a design that minimizes tool changes in order to reduce costs and complexity. As a result, the IESO will not introduce a continuous offer curve for the interim period. Draft rule and manual changes for the interim period have, however, provided clarity on how storage resources must structure their bids and offers to ensure they do not receive infeasible schedules.

Price Setting

Dispatchable electricity storage resources should be able to set the market clearing prices for energy and operating reserve.

Feedback

Stakeholder feedback indicated general support for the price setting proposal.

One stakeholder requested additional detail on how market power mitigation will apply to storage facilities.

IESO Response

The IESO agrees that work is required on how the market power mitigation framework being implemented through the Market Renewal – Energy program will be applied to storage resources. This is an area of design work that will need to be addressed as the interim design developed through the storage design project is adapted in the future for the post-Market Renewal timeframe. Market power mitigation for the enduring vision will also need to be explored through more detailed design efforts in the future. Parties interested in this subject, are encouraged to read the Market Renewal – Energy program detailed design document, “*Market Power Mitigation Detailed Design*” which describes the market power mitigation framework that would govern resources, including storage resources.

Regulation Service

Similar to generators, storage resources will be enabled to provide multiple services including regulation, energy and operating reserve.

Feedback

Stakeholder feedback indicated general support for the regulation service proposal.

While supporting the regulation service proposal, several stakeholders suggested further benefits could be realized if the IESO pursued a tri-optimization/regulation market.

Additionally, two stakeholders requested more detailed analysis, including cost-benefit, as well as the timeline for these changes to come into effect.

IESO Response

While a competitive regulation market is out of scope for the SDP, over the long-term and where appropriate, the IESO would like to shift ancillary services from procurement based to market based approaches. In the future, this evolution of ancillary services may include increasing competition for regulation service. These topics were a focus of conversation at the January, 2020 Market Development Advisory Group meeting (presentation available [here](#)). Engagement on the future of increasing competition in Ancillary Services is currently on hold, however, as the IESO reassesses its supply and demand forecasts and due to a shift in focus resulting from COVID-19.

As discussed previously through the SDP, changes are being made to integrate storage into the IESO’s Automatic Generation Control tool through the IESO’s SCADA EMS Upgrade project that is currently underway. The IESO is exploring the additional tool changes beyond the scope of the SCADA EMS project that will be required to enable this functionality (including the potential cost of these changes) and will share additional details on next steps in relation to storage resources and regulation service in the near future.

Market Renewal

Feedback

Some stakeholders expressed a continued belief that the enduring energy storage design should be included within the Market Renewal – Energy program.

Two stakeholders provided feedback indicating they do not support the decision to exclude storage from the Market Renewal – Energy program, and noted that the provision of regulation services could be less efficient until DSO changes are made.

A number of stakeholders expressed a desire for more coordination between SDP and the Market Renewal – Energy program. It was suggested each SDP meeting include some amount of Market Renewal commentary and discussion on how the Market Renewal – Energy program could be adapted for storage in advance of the enduring design.

One stakeholder expressed a desire to understand opportunities to integrate storage in the Market Renewal – Energy program, and requested the IESO provide a review for the potential treatment of ESR loads as PRLs, especially during the period post-Market Renewal implementation and prior to the adoption of long-term design.

IESO Response

As communicated at the June 24 SDP meeting, the IESO has made a determination that the enduring storage design will not be implemented within the Market Renewal – Energy program. As a result, the interim design being developed through the SDP will need to be updated prior to Market Renewal go-live to reflect the new markets being introduced. The IESO will launch a new initiative to undertake this work. Design efforts for the new initiative will be closely coordinated with and will reflect the Market Renewal – Energy program design.

Other

Feedback

Several stakeholders expressed a desire for more opportunities for stakeholder participation, to be able to provide input earlier, and for SDP meetings to include more discussion.

One stakeholder recommended the IESO move forward with consideration for hybrids in parallel with discussions about integration of stand-alone storage.

Stakeholders requested further information to understand what the proposed storage design will mean for Non-Wires Alternatives (NWAs).

One stakeholder questioned whether there may be an opportunity to fund long-term storage design differently (e.g. via alternative funding or cost-recovery/cost-sharing measures).

IESO Response

The IESO's stakeholder engagement team is exploring opportunities to encourage and facilitate more discussion during stakeholder meetings. Stakeholders are encouraged to review meeting materials in

advance of meetings and submit any questions for discussion in advance of the meeting, as well, if possible.

Hybrid facilities are outside the scope of the SDP but are a potential area for future market design enhancements. The IESO is beginning to explore near-term opportunities to integrate hybrid facilities through the Expanding Participation in Operating Reserve and Energy initiative.

The IESO is currently exploring NWAs and their relationship to the wholesale market through the [Non-Wires Alternatives Using Energy and Capacity Markets](#) whitepaper and the [IESO York Region NWA Demonstration Project](#). NWAs are outside the scope of the SDP which is focused on how storage facilities can compete to provide wholesale services. The participation models set out through the SDP may, however, provide the foundation for how storage facilities secured as NWAs provide services at the wholesale level in the future.

The IESO does not currently have plans to fund the long-term storage design differently than it funds other market enhancement initiatives.

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