Energy Storage Design Project – Feedback Form

March 26, 2020

Date Submitted: *YYYY/MM/DD*	**Feedback Provided By:** Company Name: TC Energy Contact Name: Charles Conrad Contact Email: [redacted]

Following the March 26, 2020 Energy Storage Advisory Group (ESAG) webinar to discuss the Energy Storage Design Project, the IESO is seeking feedback from participants on the state-of-charge (SoC) management options. The IESO will work to consider feedback and incorporate comments as appropriate and post responses on the engagement webpage.

The referenced presentation and design document can be found under the March 26, 2020 entry on the ESAG webpage.

Please provide feedback by April 16, 2020 to engagement@ieso.ca. Please use subject: *Feedback: Energy Storage Design Project*. To promote transparency, this feedback will be posted on the ESAG webpage unless otherwise requested by the sender.

Thank you for your time.

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What design principles and considerations (as listed in March 26 webinar deck) are most important to you in developing a state-of-charge management framework and why? E.g., efficient market outcomes, the ability for storage to compete on a level playing field, a practical approach that could be implemented on a timely basis, etc.	TCE believes that a path forward that optimizes all of the MRP design principles is appropriate. Priority of principles should not be re-ordered for each design decision, as the objective is to find an appropriate balance. The following comments are primarily directed towards the long term storage design, rather than interim measures. Efficiency - As supported by the Electric Power Research Institute's studies, ISO-managed SoC provides overall system-wide least cost, along with guaranteed feasibility. Large ESRs are a significant system asset that would most efficiently be managed by the IESO to meet power system needs, especially essential reliability services. In addition, the IESO is the contract counter-party for the majority of supply resources in Ontario, therefore using the large ESR to manage contract costs that are passed through to Ontario rate-payers as Global Adjustment (GA) charges is an important benefit. While ideally from a system efficiency standpoint the IESO would manage most ESRs' State of Charge, the increased computational complexity required may limit this ability in practice. As such, one means to focus the IESO's tools' SoC Management computational capacity to where they would provide maximum efficiency gains would be a size threshold. ESRs above the threshold would have IESO-managed SoC in the day-ahead and real-time markets while ESRs below the threshold would have either SoC Management Lite of self-managed SoC. Competition - For large ESRs that are managed by the IESO, adequate computational capability to manage SoC limitations and asset management objectives will be an important design consideration for competitive bids and dispatch. In this case, inherent disparities in information between IESO and asset owners entails that having a central clearinghouse (the IESO) manage SoC to maximize efficiency and promulgate lowest ratepayer cost will result in more

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	competitive pricing and more competitive offers and bids in the system overall vs. all parties individually managing SoC. Assets under ISO-SoC-Management would compete directly on their technical attributes, and on effective asset management enabling maximum availability. To the extent that computational complexity limits the number of ESRs with ISO-managed SoC, the IESO should maximize competition and efficiency by managing the most capacity as is practical via size thresholds (i.e. managing SoC for as many ESRs as practical starting with the largest). Implementability -The IESO is current beginning detailed design of IESO tool changes to meet the MRP. TCE firmly believes that all long-term design changes for ESRs should be included within the MRP design decisions. In other words, the IESO should be prepared to make as many changes as needed for the benefit of the markets while "the patient is open on the operating table", especially now that a tool vendor with experience implementing multiple ESR DSOs has been selected. Many of the ESR design decisions are additive to design decisions of MRP and therefore should work in tandem with the MRP process. Further, most of the MRP design decisions are focused on bringing the IAMs in line with existing market designs in other jursdicitions (e.g., LMP, DAM, etc.) where Ontario has been lagging. Not including ESR long-term design changes now risks Ontario falling behind on the next electricity market design evolution. Certainty -Making design decisions now and moving forward with implementation in tandem with MRP design decisions provides certainty for ESR owner/operators that the IAM will be set up for their fair and equal participation. SoC management decisions should be included in MRP design decisions now to provide certainty for future ESR operators.

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	Transparency -Including long-term SDP design decisions with broader MRP design decisions while the whole process is underway provides transparency to all market participants on the potential impact, opportunities, and risks of the integration of ESRs in the IAM.
Based on the Storage Design Project principles and considerations, what state-of-charge management option(s) do you support and why? E.g., Self-Schedule, Self-SoC-Management, SoC-Management-Lite, ISO-SoC-Management	TCE supports two SoC management options: • For sufficiently large ESRs, SoC should be managed by the IESO (in both day-ahead and real-time markets). As supported by the Electric Power Research Institute's studies, ISO-managed SoC provides overall system-wide least cost, along with guaranteed feasibility. Large ESRs will only operate within the IAMs and can be most effectively deployed to provide services where most valued in the market with IESO management of SoC. As the contract counter-party to a large portion of Ontario's supply resources, the IESO has unique insight into managing different services in the IAM to lower overall costs for rate-payers. It will also have access to SoC telemetry data for multiple storage assets, while individual asset owners will not. The drawback for IESO-SoC-Management is the computational complexity that may be required with large numbers of ESRs under management. Focusing IESO-SoC-Management on the tier of larger ESRs, defined as broadly as practicable, should limit the burden and maximize the value. • As noted above, the computational complexity of the IESO managing all ESR SoC may well not be feasible, and so as a practical matter, ESRs below a yet-to-be-determined threshold size could manage their own state of charge, or if computationally feasible, have SoC-Management-Lite (or

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	perhaps three size-tiers with ISO-managed SoC for the largest, SoC Management Lite for a middle tier, and Self-Managed SoC for the smallest). • Thoughts on Size Thresholds in terms of Efficiency: While we believe it is key that the IESO manage SoC for large ESRs, the threshold for what is defined as large will need to be determined. For a given set of hardware and software tools, there may be a maximum number of ESRs which can be comfortably managed, and this may in part drive the selected size threshold. On the other hand, the system efficiency benefits of ISO-managed SoC may warrant selecting tools which can handle a large number of ESRs. • Thoughts on Size Thresholds in terms of Reliability – Transmission vs. Distribution: Assets connected directly to transmission will have a higher impact on system reliability, while self-managed SoC cannot guarantee feasibility and will therefore provide a lower level of system reliability in terms of capacity. There may therefore be a rationale for differing thresholds for ISO-managed SoC connected to transmission vs. distribution, given the possibility that the IESO's sytems will not be sized to manage all ESRs' SoC. As a merely illustrative example (and without intending to advocate for specific size thresholds), if computational requirements are fairly limiting, transmission-connected ESRs 100MW or larger would have ISO-managed SoC, while distribution-connected ESRs 200MW or larger would have ISO-managed SoC. Or if computational requirements were less limiting, perhaps the IESO could manage SoC for transmission-connected ESRs 10MW and larger, and distribution-connected ESRs 40MW and larger.

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	• An additional benefit of having a higher threshold for distribution-connected ESRs could be that ESRs providing local reliability services to LDCs (e.g. wires deferral) and also energy to the IAMs would likely have to self-manage SoC so the added complexity of specific constraints would not burden tool/system resources, while LDCs would be naturally incented to take the responsibility to manage local impacts in their franchise areas. For those ESRs providing non-wires solutions to a transmitter, the IESO may be better-positioned to internalize and incorporate these assets' requirements and constraints into its DSO.

General Comments/Feedback:

The IESO through the ESAG SDP has correctly identified that integration of ESRs in the IAM must be completed in stages given some barriers can be removed more quickly and directly than others. TCE supports the interim measures and design recommendations that the IESO has identified in the interim stage; however, TCE is concerned that the long term design questions will not be addressed in a timely fashion. Many long-term design questions relate to IESO tools, in particular the Automatic Generation Control (AGC) tool and Dispatch Scheduling and Optimization (DSO) tool, are being revamped extensively in MRP. There is a growing consensus that ESRs are going to play a vital role in future electricity market operations. Since the IESO is overhauling their market design and tools, now is the appropriate to consider the impacts and needs of ESRs to ensure the foundations of the IAM's design includes and optimizes for ESR.