POWER WORKERS' UNION

April 20, 2020

Independent Electricity System Operator
1600-120 Adelaide Street West
Toronto, ON
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Via email to engagement@ieso.ca

Re: Energy Storage Design Project

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The Power Workers' Union ("PWU") represents a large portion of the employees working in Ontario's electricity industry. Attached please find a list of PWU employers.

The PWU appreciates the opportunity to provide input on the Energy Storage Design Project. The PWU is a strong supporter and advocate for the prudent and rational reform of Ontario's electricity sector and recognizes the importance of low-cost energy to the competitiveness of Ontario's economic sectors.

The PWU believes that IESO processes and initiatives should deliver energy at the lowest reasonable cost while stimulating job creation and growing the province's gross domestic product (GDP). We are respectfully submitting our detailed observations and recommendations.

We hope you will find the PWU's comments useful.

Yours very truly,

Jeff Parnell
President

Encl.

List of PWU Employers

Alectra Utilities (formerly PowerStream)
Algoma Power
AMEC Nuclear Safety Solutions
Aptum (formerly Cogeco Peer 1)
Atlantic Power Corporation - Calstock Power Plant
Atlantic Power Corporation - Kapuskasing Power Plant
Atlantic Power Corporation - Nipigon Power Plant
Bracebridge Generation
Brighton Beach Power Limited
Brookfield Power Wind Operations
Brookfield Renewable Power - Mississagi Power Trust
Bruce Power Inc.
Canadian Nuclear Laboratories (AECL Chalk River)
Collus Powerstream
Compass Group
Corporation of the County of Brant
Covanta Durham York Renewable Energy Ltd.
Elexicon (formerly Whitby Hydro)
Enwave Windsor
Erth Power Corporation (formerly Erie Thames Powerlines)
Erth Corporation
Ethos Energy Inc.
Great Lakes Power (Generation)
Greenfield South Power Corporation
Grimsby Power Incorporated
Halton Hills Hydro Inc.
Hydro One Inc.
Hydro One CSO (formerly Vertex)
Hydro One Sault Ste. Marie (formerly Great Lakes Power Transmission)
Independent Electricity System Operator
Inergi LP
InnPower (Innisfil Hydro Distribution Systems Limited)
J-MAR Line Maintenance Inc.
Kenora Hydro Electric Corporation Ltd.
Kinectrics Inc.
Kitchener-Wilmot Hydro Inc.
Lakeland Power Distribution
London Hydro Corporation
Milton Hydro Distribution Inc.
New Horizon System Solutions
Newmarket Tey/Midland Hydro Ltd.
Nuclear Waste Management Organization
Ontario Power Generation Inc.
Orangeville Hydro Limited
Portlands Energy Centre
PUC Services
Quality Tree Service
Rogers Communications (Kincardine Cable TV Ltd.)
Sioux Lookout Hydro Inc.
SouthWestern Energy
Tillsonburg Hydro Inc.
The Electrical Safety Authority
Toronto Hydro
TransAlta Generation Partnership O.H.S.C.
Westario Power

IESO Energy Storage Design Project Submission

The Power Workers' Union (PWU) is pleased to submit comments and recommendations to the Independent Electricity System Operator (IESO) regarding the Energy Storage Design Project (ESDP) being developed by the Energy Storage Advisory Group (ESAG). The PWU is a strong supporter and advocate for the prudent and rational reform of Ontario's electricity sector and recognizes the importance of planning for low-cost energy solutions to enhance the competitiveness of Ontario's economic sectors.

The ESAG is tasked with identifying obstacles and possible solutions for energy storage resources (ESRs) to ensure fair competition. The ESAG contributes to the IESO's work plan and list of priorities regarding storage participation in the IESO administered markets (IAMs), and coordinates discussions on these topics. On March 26th, the ESAG held a webinar in which they discussed the various options for state of charge (SoC) management frameworks. The webinar included a presentation by EPRI regarding the U.S.'s experience in developing such frameworks.

The PWU recommends the IESO undertake the following:

1. Consider a new principle: Design of IAMs should respond to an established need;
2. Perform a cost-benefit analysis on state of charge management options; and
3. Proceed with self-scheduling as the default for the state of charge management framework.

Recommendation 1: The IESO should consider a new principle: the IAM design should respond to an established need.

In the March 26th meeting, the IESO requested feedback on the relative importance of, and rationale for basing a state of charge management framework on design principles. The PWU considers that most of the IESO's proposed design principles are important and provide the following comments. The PWU also suggests that IESO consider an additional principle.

a. The IAM design should respond to an established need. The IESO's accommodation of ESRs in the IAMs is intended to increase competition. However, markets will not effectively engender competition unless participants understand the underlying conditions. For example, when assessing SoC options, is the IESO seeking greater storage in the market to support more reliability services or to encourage energy market arbitrage? The IESO should specify the system requirement being met by storage when competing in the IAMs to minimize unnecessary investments and total system costs.

This criterion is essential for developing a robust business case: establish the anticipated total system cost benefit of having storage shift energy supply from one time to another; and/or establish the cost and performance benefit of having storage available for reliability services.

Comments on other design principles:

b. Efficiency: Efficiency is an important principle for reducing total system costs. Note that total system cost includes, but is not limited to, the costs of particular IT systems used to manage ESRs. Business cases for incorporating ESRs into the IAMs must assess the impact of ESRs on total system costs.

c. **Competition:** Competition is an important principle, however, it is not clear that a market is the most optimal mechanism to enable such competition.[1] Instead, a competitive RFP process may be a better way to engender competition from the perspective of total system cost.

d. **Implementability:** Implementability is contingent on the magnitude or volume of the services being sought. In cases of incremental gains, large investments that only address small needs should not be considered feasible or practical. A business case-based approach should inform whether a given change meets this principle as described earlier in recommendation 1b.

e. **Certainty:** Certainty is an essential characteristic required for enduring market mechanisms, but should not be contrived – i.e., price setting for supply types in energy markets to support physical dispatch. Such contrived market parameters are subject to change and undermine market certainty.

f. **Transparency:** Transparency must extend to the entire system planning process, including all decisions on cost and procurement. This requirement underpins the PWU's request for business cases for the Energy Storage Design Project, and its current request that state of charge management also be subject to a business case.

Recommendation 2: Perform a cost-benefit analysis on state of charge management options.

EPRI's presentation laid out a spectrum of options for SoC management frameworks, ranging from ESR operators managing their own SoC independently (self-scheduling) to the system operator managing ESRs' SoC centrally (ISO management). The IESO has requested stakeholder feedback on the appropriate SoC management framework that should be adopted.

In its submission to the IESO's ESAG on March 3rd, the PWU recommended that the IESO should form a business case for the Energy Storage Design Project, including a cost-benefit analysis.[2] The EPRI presentation at the March 26th webinar underscores the need for such a business case.

a. **Perform a business case on SoC management options on a net incremental benefit basis.** As EPRI noted in their presentation, ISO management of SoC can yield greater efficiency, but tends to increase the amounts of complexity that the ISOs must accommodate.[3] Responding to this complexity will entail upgrades to IT systems, with associated costs. The efficiency benefits unlocked by such IT systems should be measured on an incremental basis in comparison to a reference case self-scheduled framework.

b. **When performing the business case, the magnitude of the DER that SoC management would address should be considered.**

[1] See PWU's submission on the Incremental Capacity Auction High Level Design, June 10, 2019; and the PWU's submission to the IESO on the 20-Year Planning Outlook Stakeholder Engagement Meeting 2, April 12, 2019.
[2] IESO Energy Storage Design Project Submission. March 3rd, 2020.
[3] EPRI presentation at March 26 ESAG webinar.

Determining the system benefits of ISO SoC management depends on the magnitude of ESRs needed by the system. If the magnitude of the storage required by the system is low, the efficiency benefits of an IT system will be minimal and may not justify their cost.

For example, much of the current ESR in Ontario is being installed in response to the Industrial Conservation Initiative (ICI). To estimate the current installed ESR capacity, consider that ICI-related DER shifts $1.6 billion in costs from Class A to Class B consumers every year.[4,5] The OEB has estimated that DER costs the system $0.5 million per MW of DER annually, an estimate consistent with other sources. [6,7] This means that at most 3,200 MW of behind the meter (BTM) storage has been installed in Ontario via the ICI. However, some of this cost shifting is from combined heat and power, natural gas-fuelled DER and is attributable to changes in the rate class of a customer. Further impacts have arisen from customers directly managing their operations and thereby their demand.

Assuming 20% of the ICI solutions are related to ESRs, approximately 640 MW of grid connected ESR may be present in Ontario.[8] This 640 MW of storage would represent about 2% of Ontario's total system capacity of 28,000 MW. The benefit to the system from central management of the SoC would be marginal. The IESO should provide a business case to demonstrate that this marginal capacity improvement is enough to justify IT investments for ISO SoC management.

c. **The IESO should not assume large-scale growth in storage over the long-term to justify proposed investments.** Storage is only growing in Ontario because of the ICI program, and will not be economic otherwise until far past 2030.[9] Storage can only get value through arbitrage on energy markets, capacity on the capacity market, and ancillary services – mainly reliability services. Poor economics means storage will not get sufficient value out of the arbitrage and energy markets, and though reliability services are lucrative, only small amounts are needed by the system. With regard to capacity, the IESO should evaluate the existing storage that is installed, paid for, and providing services similar to demand response that is already purchased by auction. These ICI-based ESRs, however, cannot participate in the capacity auction, since they are already committed to meeting the peak demands of their ICI customers, a benefit that has removed capacity requirements from the auction. These ESRs may be available for demand shifting at non-peak times, but the value to the IESO of managing their SoC is questionable, and the need to provide additional revenue sources is unnecessary considering the aforementioned generous $0.5M/MW terms of the ICI

[4] OEB, Market Surveillance Panel Report "The Industrial Conservation Initiative", 2018
[5] Strapolec Analysis of IESO Power Data and OEB MSP Report "The Industrial Conservation Initiative"
[6] OEB, Market Surveillance Panel Report "The Industrial Conservation Initiative", 2018
[7] Lazard, Levelized Cost of Storage V5, 2019
[8] In 2017, the Liberal Government increased eligibility for the ICI program, by reducing the eligibility cap from 5 MW to 1 MW and 0.5 MW.[8] In 2016, the ICI program was found to transfer $1.0 billion in costs from Class A to Class B customers annually. Since then, this cost shifting has increased 60% to the present $1.6 billion. If all ICI DER added since 2016 was storage, then storage accounts for 40% of the cost shifting currently occurring under the ICI.[8] Furthermore, if 40% of the ICI DER in Ontario is storage, and there is 3,200 MW of ICI DER, then there is 1,280 MW of ICI storage in Ontario. Assuming half of this storage is grid connected, suggests at most 640 MW of grid connected ESR in Ontario.
[9] Lazard, Levelized Cost of Storage V5, 2019

Recommendation 3: The IESO should proceed with self-scheduling as the default state of charge management framework.

The IESO requested that stakeholders provide feedback on the appropriateness of the state of charge management framework options. The PWU recommends that the IESO proceed with the self-schedule option.

a. **Incremental changes are best.** As communicated in its previous recommendations, the PWU suggests that the IESO should proceed with an analysis-based, staged approach to storage integration.[10] Specifically, this means proceeding with the option that requires the least investment by the IESO, until a robust, transparent business case has been undertaken for all of the options. In the case of SoC management, the self-schedule option represents the least amount of investment by the IESO, and is therefore the appropriate approach to take until further investment is proven to be cost-effective and minimizes total system costs.

b. **Self-managed ESRs would provide the desired benefits.** As the PWU has previously suggested, appropriate price signals in the wholesale market that reflect demand requirements will be sufficient for the ESRs to manage their SoC appropriately.[11] For example, self-managed ESRs will choose to charge their batteries during off-peak hours to take advantage of the low price of electricity, and discharge at peak hours when the price is high, thus providing the majority of the benefit desired by the IESO. If the ESR is participating in demand response, they will be responsible for ensuring that their resources are available or suffer penalties for default.

Concluding Remarks:

The PWU has a successful track record of working with others in collaborative partnerships. We look forward to continuing to work with the IESO and other energy stakeholders to advance innovation across Ontario's electricity system. The PWU is committed to the following principles: Create opportunities for sustainable, high-pay, high-skill jobs; ensure reliable, affordable electricity; build economic growth for Ontario's communities; and, promote intelligent reform of Ontario's energy policy.

We believe these recommendations are consistent with, and supportive of the objectives for supplying low-cost and reliable electricity in Ontario. The PWU looks forward to discussing these comments in greater detail at the IESO's convenience.

[10] E.g., PWU submission to the IESO on the October 21st meeting of the ESAG.
[11] PWU submission to the IESO on the October 21st meeting of the ESAG.