

## HYDRO ONE BESS FIRE PROTECTION RISK & RESPONSE ASSESSMENT STANDARD WEBINAR HELD ON JULY 19, 2023: Stakeholder Feedback and Hydro One Response

We wish to thank all those who participated in the Hydro One webinar on the BESS Fire Protection Risk & Response Assessment Standard (the “**Standard**”). The Standard is important from a consistency perspective and while many of the industry requirements are also included, the most important outcomes for Hydro One is the self-attestation that captures the proponent’s due diligence and the setbacks from transmission facilities.

Hydro One is committed to continue to work with proponents and update the necessary materials as industry requirements evolve.

### Hydro One received Feedback from the following participants:

ABO Wind Canada Ltd.	Fluence	Plus Power
Aypa Power	FNX-Innov	RES Group
Boralex	Innergex	s2e Technologies
CanREA	NRSTOR	Tesla Energy
City of Ottawa (Reference only)	OPG	Wind Concerns Ontario

The Table below includes the feedback we received and our response, arranged by topic.

No.	Feedback / Topic	HONI Response
1	Availability of Webinar Presentation and Draft Standard	<p>The presentation and the draft Standard are posted on Hydro One’s website. Please see links below.</p> <p>Presentation: <a href="#">Hydro One Webinar - BESS Risk and Response Assessment Standard Presentation</a>            Draft Standard: <a href="#">Draft Fire Protection Risk and Response Assessment Standard.pdf</a></p>
2	<p>The setback requirements are unsupported by evidence or established practices in other jurisdictions.</p> <p>NFPA 855 provides adequate setback requirements.</p>	<p>The setback requirements have been developed to enable safety, maintain reliability and integrity of transmission systems, and reduce interruptions due to BESS events. They are also to enable maintenance and operating access and provide space for future transmission system expansion and connections. The setback distances have been provided to ensure that BESS events do not result in damage to Hydro One’s transmission facilities assets or the need to take them out of service.</p> <p>Hydro One believes that NFPA 855 setback requirements are not adequate for <u>critical transmission infrastructure</u>. Hydro One requires that irrespective of a BESS event and the shutdown of the BESS facility, the main</p>

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		<p>transmission system continues to operate without interruption.</p> <p>As technology evolves, requirements may change, and the Standard will be updated.</p>
3	<p>What are the standard ROW distances/widths for 230kV and 115kV lines?</p> <p>Are the above ROW setback distances applicable for all circuit configurations (e.g., setbacks for one double circuit 230kV vs two or more double circuit 230kV)?</p>	<p>Typical ROW widths for 115kV and 230kV lines are 35m and 50m respectively. The ROW width will be greater for a corridor that has multiple transmission lines. Please reach out to Hydro One to determine the ROW width at any specific location.</p> <p>The setback distances are applicable for all circuit configurations. The applicable setback distance is determined based on the highest voltage line on the corridor or planned for transmission system expansion purposes to be within the corridor. For example, for a corridor carrying both 500kV and 230kV lines, the 500kV setback distance is to be used.</p> <p>If Hydro One has identified the corridor as one that can be used for a future higher voltage line for transmission expansion purposes, Hydro One will identify to the Proponent the setback that is to be used for that corridor.</p>
4	<p>Is the setback distance for the battery only? - Can the BESS switchyard / main transformer or support buildings be placed within the setback?</p>	<p>The entire BESS facility site needs to respect these distances to allow both Hydro One and the BESS facilities to be operated and maintained independently without interference from each other.</p>
5	<p>Are there other setbacks for other generation types to be considered? i.e., natural gas/green fuels/hydrogen. Each have different explosion, fire, smoke risks which may impact HONI's transmission lines or transmission facility.</p>	<p>These setbacks are for BESS facilities only.</p>
6	<p>Can FR3 type oil reduce setback distances?</p>	<p>No. The setback requirements in the Standard are minimum requirements to enable safety, maintain reliability and integrity of transmission systems, provide access for operating and maintenance and allow for future transmission system expansion and connections.</p>
7	<p>Can smaller setbacks based on fire/heat flux modeling be permitted?</p>	<p>No. The setback requirements in the Standard are minimum requirements to enable safety, maintain reliability and integrity of transmission systems, provide access for operating and</p>

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		<p>maintenance and allow for future transmission system expansion and connections.</p>
8	<p>Standard address a few types of batteries only. Need to be able to be modified to cover other battery types.</p>	<p>The Hydro One requirement applies to existing battery types used in BESS facilities in Ontario. As technology evolves, requirements may change, and the Standard will be updated accordingly.</p> <p>Please note that NFPA 855 specifically mentions each type of ESS that is applicable under the NFPA 855 code in Table 1.3 Threshold Quantities per Each Fire Area or Outdoor Installation under "section 1.3* Application" of NFPA 855.</p>
9	<p>Standard does not address other risks to the transmission system such as weather, storms, tornado etc.</p>	<p>The main objective of the Standard is to introduce the setback distance from transmission facilities to safeguard reliability and integrity of the transmission system from BESS events. These items are out of scope of the Standard.</p>
10	<p>Standard does not properly address firefighter training</p>	<p>The scope and objective of the Standard is to safeguard reliability and integrity of transmission system.</p> <p>As per section 4.3.1 of NFPA 855, for ESS installations that exceed the maximum stored energy limits of Table 9.4.1, emergency planning and training shall be provided by the owner of the ESS or their authorized representative so that ESS facility operations and maintenance personnel and emergency responders can address foreseeable hazards associated with the on-site systems. All subsections of 4.3 apply to proper training and planning and shall be provided by the owner of the ESS.</p>
11	<p>Hydro One consultation process was inadequate. Focuses on BESS only and setback distances are unreasonable conservative.</p>	<p>Hydro One's engagement process was to communicate the setback requirements for BESS facilities proposing to connect to Hydro One's transmission system. It was imperative that requirements to preserve the reliability and integrity of the transmission system be introduced in a timely and transparent manner.</p>
12	<p>Recommend that Hydro One provide the standards required and specify exceptions and general requirements. Hydro One standards are overly prescriptive.</p>	<p>The applicable requirements are identified in the Standard.</p>

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13	Section 5 and Appendix 1 identify assessments that need to be provided to HONI. However, the exact requirements of these documents are not provided in this standard.	<p>The assessments should be undertaken as per industry best practices as outlined in the applicable codes and standards.</p> <p>NFPA 855 identifies resources and sections to reference to illustrate the contents desired and required by Hydro One documentation. Please refer to NFPA 855 and associated standards for specific requirements.</p>
14	Concern that Air/Gas Dispersion Study is required for every project, and it will be expensive.	<p>This is not required by Hydro One for all BESS projects. It is only required by Hydro One for BESS projects locating within 250m of transmission lines or within 400m of a transmission station.</p> <p>This is a common analysis that is performed for the Ministry of Environment in many cases and should be undertaken as per industry best practices outlined in the applicable codes and standards identified in this Standard.</p>
15	Concern that the requirements are outside Hydro One jurisdiction. Does Hydro One believe that it has legal authority to impose its guidelines?	<p>Hydro One has an accountability for safe, secure, and reliable operation of transmission system in accordance with the Transmission System Code (TSC) [See: 3B.1 and 4.1.4, 4.3.3, 4.5]. Hydro One complies with its OEB-approved connection process<sup>1</sup> along with our design standards, guidelines, and good utility practice to ensure that the reliability and integrity of the transmission system will not be impacted by the BESS facility connection.</p> <p>Licensed Transmitters in Ontario have several major obligations engrained in the TSC and its license, including, without limitation, obligations to:</p> <ul style="list-style-type: none"> <li>• Maintain the reliability and integrity of its transmission system and reinforce or expand its transmission system as required to meet load growth.</li> <li>• Ensure that all the facilities connected to its transmission system will not materially reduce or adversely affect the reliability of its transmission system.</li> <li>• Ensure all connections to its transmission system are made by it with due regard for the</li> </ul>

<sup>1</sup> Forms part of our OEB-approved Transmission Connection Procedures available on our website.

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		safety of the transmitter’s employees and the public.
16	The NFPA 855 (2023) definition of “adjacent exposures” does NOT include adjacent BESS enclosures as stated in 9.5.2.6.1 and clarifies that “other exposure hazards” do not include electrical grid infrastructure.	The main objective of the Standard is to introduce the setback distance for transmission facilities to safeguard the reliability and integrity of transmission system.  NFPA 855 does not mention regulations for spacing between BESS and adjacent enclosures. An HMA may be provided and spacing can be determined based on risk analysis and heat flux analysis.
17	Clarify in the list of suggested assessments in Table 8 that Fire Protection Design Documentation, Commissioning Plan, Decommissioning Plan and the Emergency Response Plan be completed after contract award, including possibly well into the commissioning process and/or operation as appropriate.	Hydro One understands that this documentation will not be ready at the time of contract award. The proponents are required to complete the self-attestation prior to the energization of the connection of the BESS facility to Hydro One’s transmission system.
18	Would like the guidelines to not apply to IESO procurement under E-LT1 and LT1 RFP	All BESS facilities connecting to Hydro One’s transmission system are required to comply with the Standard.
19	NFPA 855 contemplates a more general decommissioning plan for any end-of-life scenario. We recommend Hydro One requirements be situated within the context of the existing NFPA 855 (2023) Section 8.1 on Decommissioning.	The decommissioning plan was focused on the safe removal of the BESS modules. However, proponents are expected to follow NFPA 855 with respect to decommissioning and meet all requirements of the AHJ.
20	Code Review of the facilities should be separate from the Hazard Mitigation Analysis.	The document was updated to separate Code Review from HMA.
21	Draft standard requires HMA to be approved by the AHJ. Suggest that this be reviewed only.	It is recommended to provide an HMA as this will provide vital information regarding cell, module, and unit level testing for the BESS. It is recommended that AHJ approve of the HMA, but it’s not required if the ESS falls outside of the prescriptive conditions of §4.4. The HMA is to be signed and sealed by a professional engineer.
22	Remove the Fire Risk Assessment and allow for a qualitative approach rather than a purely quantitative approach, as the likelihoods and probabilities of BESS failures are difficult to quantify.	FRA is a commonly used engineering tool for estimating and evaluating the risks of battery energy storage systems (BESS) to the surrounding community by using internationally recognized process safety management principles and industry accepted good engineering practices.

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		<p>The current BESS safety requirements primarily focus on addressing the risk of thermal runaway propagation, which is when a single battery fire can cause other batteries to catch fire. Although comprehensive, these safety tests do not evaluate the risks to the surrounding community. An FRA is a study that can be done to analyze the risk to the surrounding community from gases that may be released in the case of battery thermal runaway.</p> <p>Where BESS is installed near exposures, FRA is recommended to demonstrate that the impact to the surrounding community is minimized</p>
23	<p>Section 8.1 - We believe the following statement requires wording be changed to: An approved automatic smoke detection system or radiant energy-sensing fire detection system shall be installed for each outdoor unit containing electrochemical BESS.</p>	<p>The Standard has been updated.</p>
24	<p>The LFL should not need to be reported to local Fire Department</p>	<p>The LFL values should be reported as required by the AHJ.</p>
25	<p>Last paragraph of section 8.4.1 states “NFPA 855 allows fire suppression system omission for outdoor remote BESS installations based on large scale testing.” The Standard should allow for omission of fire suppression systems for outdoor, non-enterable enclosures per NFPA 855.</p>	<p>The fire suppression system omission is to be as per NFPA 855 and as approved by AHJ.</p>
26	<p>Section 8.4.2 - Firefighting water supply - This section refers to water supply during the construction phase of a project if combustibles are located on site. Therefore, it is recommended that the Standard provide guidance for tank sizing or water supply duration if a tank is provided or reference NFPA 1142 or utilize a pre-determined minimum amount on site if there is no access to municipal water supply.</p>	<p>As mentioned, adequate water supply is to be provided. It is up to the proponent to determine this as per the directions of the AHJ.</p>
27	<p>Section 9.1 Explosion Protection Systems - For locations with routine ice and snow, the section recommends providing flammable gas ventilation systems as the primary explosion protection system.</p>	<p>Section 9.1 also refers to alternate performance-based design in accordance with NFPA 855.</p> <p>A single explosion protection system is acceptable. The BESS manufacturer must provide explosion protection system analysis</p>

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	<p>Ontario is routinely covered in ice and snow, therefore the NFPA 68 approach is basically not feasible. We recommend only one explosion protection system should be required, for example NFPA 68, NFPA 69, or an alternative approach (e.g., Sparker system) as long as systems are properly designed to a standard and validated.</p>	<p>conducted via computational fluid modeling or laboratory testing for both NFPA 69 and NFPA 68. Hand calculations is generally not sufficient to demonstrate the performance of the explosion protection system.</p> <p>As Ontario is routinely covered in ice and snow, an ongoing maintenance order must be provided by the BESS facility for maintenance staff to inspect and remove snow and/or ice from the explosion protection system. This is to ensure that NFPA 69 ventilation system is not blocked by snow and remove snow and ice from NFPA 68 deflagration panel. A service period of 24 hours should be considered after a weather event or via a live video feed of the BESS facility to monitor the explosion protection system.</p> <p>Explosion control is required as per NFPA 855 §9.6.5.6</p>
28	<p>Section 9.1.2 Flammable Gas Ventilation System (NFPA 69) - This section proposes that a CFD model is provided for evaluation of all BESS enclosures.</p> <p>Proponent recommends using hand-calculations as per the NFPA 69 appendix be allowed as an alternative to CFD models. In addition, allow full-scale validation testing (real life smoke test w/ representative flammable gas) as an approach to validate system effectiveness.</p>	<p>The CFD model or an equivalent assessment is recommended as per NFPA 855 and per direction of AHJ.</p> <p>Full scale laboratory testing for NFPA 68 and NFPA 69 system is desirable but is not required. Hand calculations is generally not sufficient to demonstrate the performance of the explosion protection system.</p>
29	<p>Self-Certification document to be certified by a Professional Engineer</p>	<p>Self-Certification document to be certified by a <i>Professional Engineer in the province of Ontario.</i></p>