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April 4, 2025

Mr. Sam Soja
Tulloch
80 Main Street West
Huntsville, ON P1H 1W9

Subject: Township of Armour BESS Commissioning and Decommissioning Plan Review

Dear Mr. Soja:

Tulloch, on behalf of Township of Armour, provided BBA with SolarBank's 903 Battery Energy Storage System (BESS) Commissioning and Decommissioning Plans and requested our peer view of these documents. This letter summarizes our key findings on the commissioning and decommissioning plans based on the information provided to us (via the Township of Armour website) and our experience with similar projects and documents.

In addition to the BESS commissioning and decommissioning plans, Tulloch, on April 3, 2025, also provided BBA with a link to a document provided by the Township of Armour from the Association of Municipalities of Ontario, "Municipal Energy Procurement Toolkit: Guidance for Municipal Decision -Makers and Staff on Long-Term Energy Procurement Projects"; this version was dated February 3, 2025 (hereafter, "AMO Guide"). BBA has additionally reviewed this document and considered its content in its review of the BESS 903 commissioning and decommissioning plans.

For context, the BESS 903 project is a proposed energy storage project having a nameplate rating of 4.99MW/19.9MWh, which will be comprised of nine identical energy storage containers, five inverters, two transformers, overhead poles to connect to Hydro One 44kV distribution system and other auxiliary electrical equipment. The project is to be located at 219 Peggs Mountain Road in Armour, Ontario. To BBA's understanding, no construction activities for the project have commenced at the site.



Commissioning plan

The commissioning plan contains a high-level description of the commissioning¹ procedure, tailored for a general audience, and with the major focus on the BESS itself and limited focus on Balance of Plant (BOP).² BBA's recommendations for the detailed commissioning plan are as follows:

- The commissioning plan shall include a Responsibility Matrix (RACI table) that defines the roles and responsibilities of stakeholders involved in the commissioning process (developer, contractor(s), OEMs, utility, etc.) to ensure clarity and accountability.
- Prior to onsite testing and commissioning, Factory Acceptance Test (FAT) reports, pictures, and videos of the equipment, including but not limited to the DC BESS blocks and inverter-transformer skids, etc., shall be reviewed and any concerns that arise during the review shall be addressed by manufacturer.
- The parties in charge of commissioning shall indicate what testing and commissioning standard or procedure they are following. If the Original Equipment Manufacturer (OEM) provides testing and commissioning procedures for equipment, they shall be followed. If not, the responsible party shall follow an industry accepted standard such as "ANSI/NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems".
- The detailed commissioning plan shall include Equipment Test Sheet (ETS) for every piece of BOP equipment. A separate ETS shall be provided for each of the following equipment, where applicable: protection relays, low voltage power cables, AC distribution panels, DC distribution panels, E-house, E-house battery and charger, grounding grid, Protection and Control (P&C) panel, medium voltage power cable, auxiliary transformers, Uninterruptable Power Supply, DC and AC busbars, disconnect switches, medium voltage switchgear, Supervisory Control And Data Acquisition (SCADA) and telecommunication devices, and fiber optics.
- Energy Management System (EMS, or SPPC) and Energy Management Panels (EMPs) shall be energized and tested prior to BESS hot commissioning.
- As a part of commissioning, a thorough SCADA point-to-point test shall be conducted to verify the communication and data integrity between site devices and the remote operation and monitoring center. The test shall include alarms, statuses and analogs.

¹ Commissioning is a process that assures a system, including all components and sub-systems, will meet the intent of the designer and the user.

² In a BESS project, BOP typically refers to all components and auxiliary systems outside of the BESS unit, and encompasses cables, foundation, auxiliary transformers, switchgear, and other equipment not provided by the BESS supply contract.



Following completion of BESS Functional Tests listed in Section 3.1.3 of the Plan, a capacity test shall be conducted to prove that the BESS can meet or exceed Beginning of Life (BOL) energy capacity. Typically, a full charge-discharge test shall be conducted to show that:

- The BESS can reach minimum and maximum SOC as per manufacturer's approved limits,
- The BESS can reach nameplate charge/discharge power,
- The BESS can maintain maximum charge/discharge power for the test duration (except the ramp up/ramp down periods).
- The measured Round-Trip Efficiency (RTE) meets or exceeds the manufacturer's nameplate value.
- During the test, all cell and module operating parameters such as voltage, current and temperature shall remain within normal operation range indicated by the OEM and no alarms or faults shall be detected.
- If any of the above cannot be met, a corrective action in consultation with the OEM shall be taken, and the system shall be retested.

Decommissioning plan

BBA reviewed the decommissioning plan provided by SolarBank to the Township of Armour. It is important to note that there are no specific obligations or regulations for BESS decommissioning in Ontario presently; legal obligations may be limited to contractual obligations, such as those that may exist within land use or site lease agreements.

The Township should be aware that the AMO Guide is only applicable to BESS projects in those sections where "BESS" is specifically referenced in the section or paragraph. Notably, the Project Decommissioning section (page 14, AMO Guide) is applicable to energy projects that are subject to the provincial Renewable Energy Approval (REA) process; BESS projects are not presently subject to the REA process.

Overall, the Solarbank Decommissioning Plan appears to describe the major steps of decommissioning but lacks specificity to the project and the site. A detailed, site-specific engineering plan must eventually be developed to operationalize decommissioning obligations. Considering evolving rules, regulations, technological changes surrounding BESS systems and cost escalation, we recommend reviewing the decommissioning plan and cost estimate every 5-10 years.

We make the following comments for consideration in respect of the presented decommissioning plan:



- A timeline for decommissioning activities should be included, such as when (post-operations) decommissioning would begin and the duration of such activities.
- Recommend including the project ESA's Section 2.1 Site Information for more detailed site information.
- The plan should list the specific stakeholders and applicable regulations based on the currently available information.
- Section 5, Decommissioning in Case of an Event:
 - o The decommissioning plan should reference Hydro One's published standards for decommissioning and handling BES components in context with fire risk and protection.
 - o We consider this point to be a safety measure and an important, immediate addition to the plan as the need for a near-term, unexpected decommissioning based on an event could occur prior to the development of a fully detailed decommissioning plan.
 - o We note also that the AMO Guide provides links to other reference documents relevant to fire safety and thermal events which may provide additional useful information for the decommissioning plan.
- Section 6, Cost of Decommissioning:
 - o Basis year of cost estimate should be included, i.e. 2024 dollars.
 - o No basis of estimate or references were provided for the cost estimate.
 - o When compared to other BESS decommissioning estimates available in the public domain, the estimate is \$2500/MWh (Canadian Dollars). Other BESS estimates reviewed by BBA range from USD\$3800/MWh – USD\$7500/MWh; these convert to CAD\$5200/MWh - CAD\$10,000/MWh, representing a 2-4x discrepancy compared to the Solarbank 903 BESS decommissioning estimate.

Conclusions and recommendations

BBA recommends that the project proponent (Solarbank) consider the aforementioned comments and recommendations for implementation within the commissioning and decommissioning plans. These recommendations are to be read in context with the evolving nature of BES requirements in Ontario and are based on present standards and regulations. Ultimately, it is the responsibility of the project proponent to satisfy itself with the content of these plans and their implementation.



Reference documents

BBA referenced the following documents in its review:

InterNational Electrical Testing Association (NETA). (2021). Standard for acceptance testing specifications for electrical power equipment and systems (ANSI/NETA ATS-2021).

Bess Fire Protection Risk & Response Assessment Standard. Hydro One. (2023, November 15). https://www.hydroone.com/businessservices/_generators/Documents/Fire_Protection_Risk_and_Response_Assessment_Standard_Final.pdf, as access March 26, 2025

Preliminary Commissioning Plan. Township of Armour. (n.d.). https://irp.cdn-website.com/20e551fd/files/uploaded/12_Commissioning_Plan.pdf, as accessed February 25, 2025

Decommissioning Plan. Township of Armour. (2024, December 19). https://irp.cdn-website.com/20e551fd/files/uploaded/7_Decommissioning_Plan.pdf, as accessed February 25, 2025

Association of Municipalities of Ontario, *Municipal Energy Procurement Toolkit: Guidance for Municipal Decision-Makers and Staff on Long-Term Energy Procurement Projects* (2025, February 3). amo.on.ca, as accessed April 3, 2025.

Should you require any additional information, do not hesitate to contact the undersigned at your convenience.

Sincerely,

BBA Inc.

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