

Introduction

On Aug. 7, 2019 the AESO held an Energy Storage Roadmap and Flexibility Roadmap information session at the Sheraton Eau Claire Hotel in Calgary, AB. Following the session, the AESO put out a request for information to seek input from stakeholders regarding the *Energy Storage Roadmap*.

The AESO thanks all those who submitted their feedback. Each submission was reviewed in detail and the input received will be considered in further development and implementation of the AESO's *Energy Storage Roadmap*.

Summary of Stakeholder Feedback from Energy Storage Roadmap Comment Matrix

On Aug. 7, 2019 the AESO posted on www.aeso.ca a comment matrix requesting input from stakeholders on the *Energy Storage Roadmap* by Sept. 6, 2019.

A total of 12 submissions were received. Stakeholders were asked to submit their feedback on the following questions:

- After reviewing the *Energy Storage Roadmap*, do you have any comments or feedback? Have you identified specific gaps, and if so what are they?
- If working groups were appropriate, what are the one or two topics they should address?
- Are you aware of any recent energy storage research/resources/information that would provide the AESO more insight on this topic? If yes, please provide or explain.

We received resounding support for the continued development and execution of the *Energy Storage Roadmap*. The AESO summarized the feedback received into the following topics:

1. Tariff Design
2. Regulations and Legislation
3. Transmission Deferral
4. Transmission Facility Owner (TFO) / Distribution Facility Owner (DFO) Interface
5. Additional Comments
6. Suggested Working Group Formation / Membership
7. Suggested Working Group Topics
8. Suggested Energy Storage Resources

1. *Tariff Design*

Majority of stakeholders wanted the AESO to provide further information on or consider the following elements with respect to Tariff design:

- Clarity on the timing and details relative to the filing of the Bulk and Regional Tariff Application in 2020, specifically to energy storage
- Consider transmission connected, distribution connected and Behind the Fence (BTF) in the Tariff design review as it pertains to energy storage configurations

- Some confusion requiring further clarity on the overlap, if any, between ongoing Tariff application, the Tariff Advisory Group, the Alberta Utilities Commission (AUC) Distribution System Inquiry and the *Energy Storage Roadmap*
- Further details on specific deliverables or outcomes for “bridging the gap” activities
- Rate Demand Transmission Service (DTS) is of particular concern to various parties and it is recommended that specific attention is devoted to that topic.

2. Regulations and Legislation

Stakeholders provided many comments on regulation, legislation and the AESO Authoritative Documents (ADs), and these have been summarized and grouped below:

- Clarify if the abandonment of the Capacity Market and the review of the Energy-only Market impacts the energy storage roadmap activities or timing
- All actions need to consider the fair and open competition of the markets
- Clarify if rate-regulated assets are being considered to participate in the Energy-only Market design
- Consider a method to ensure that changes made to the ADs have enough flexibility, where practical, to allow for the evolving nature of energy storage and other technologies to be incorporated into and operated on the Alberta Interconnected Electric System (AIES)
- Clarify how the AUC and Department of Energy (DOE) will be involved with the delivery of the *Energy Storage Roadmap* so as to ensure that there is alignment on the solutions that get proposed and in the short-term while projects get connected under the existing framework
- Integration of energy storage must be technologically neutral and continue to support a fair, efficient, and openly competitive (FEOC) market
- Work with stakeholders to identify policy, legislative or regulation changes required to support the integration of energy storage
- Clarify if energy storage as an option for transmission deferral is within the scope of the long-term *Energy Storage Roadmap*, including ownership, market participation, etc.
- Clarification and / or edit of policy is preferable prior to getting too far along with *the Energy Storage Roadmap*

3. Transmission Deferral

The theme of transmission deferral was supported by a number of stakeholder comments that have been summarized as follows:

- Clarify how a solution for transmission deferral reconciles with the Alberta Transmission Regulation, which has historically been interpreted to support transmission as the only solution to address congestion
- Will these facilities be eligible to participate in both the wires and energy market
- Clarify how this solution will continue to support a FEOC market
- Operational and locational criteria, amongst others, will be required to identify needs / project requirements and qualify eligibility
- Will TFO / DFO participation and input with these potential solutions change at all
- Will this service fall under Ancillary Services
- Clarify if it is planned for rate-regulated energy storage to also participate in wholesale electricity markets

4. TFO / DFO Interface

Stakeholders identified the TFO / DFO interfaces as an important consideration, and these comments were summarized as follows:

- Clarify the process envisaged for improving collaboration with DFOs / TFOs while maintaining a FEOC market
- Is there clarity on timing of the engagement with these parties and how will this be coordinated, within or separately from working group(s)
- Various topics around data requirements, sharing, visibility, etc. between the AESO and TFOs / DFOs were raised

5. Additional Comments

Stakeholders provided additional comments and these are summarized and grouped below:

- Inclusion of a full, detailed consideration of hybrid facilities should form part of the *Energy Storage Roadmap* activities
- AESO's position on grandfathering with respect to energy storage projects
- How is small-scale generation considered in the *Energy Storage Roadmap* for <5MW and small-scale aggregators that could become large enough to impact the grid
- Interdependencies between the *Energy Storage Roadmap* and the *Flexibility Roadmap*

6. Suggested Working Group Formation / Membership

Stakeholder suggestions for working group formation and membership considerations included:

- Feedback ranged from one working group to multiple working groups specifically designed for each topic
- "Working Group" and "Advisory Group" appeared in most feedback and was used somewhat interchangeably
- Recommendations encouraged learning from both the Ontario's Independent Electricity System Operator (IESO) Energy Storage Advisory Group (ESAG) and the AESO's Capacity Market work, with respect to group formation, membership and administration
- Group membership recommendations also ranged from very focused, select membership to open doors for any interested party to participate
- Suggestions for parameters for membership including the mapping of a Terms of Reference (ToR) for the working group to the required skills / experience to fulfill the ToR.

7. Suggested Working Group Topics

Stakeholders submitted the following working group topics in no particular order:

- Tariff
- Generating Unit Owner's Contribution (GUOC)
- Transmission deferral
- Operating Reserve technical requirements
- Define hybrid assets
- Stand-alone energy storage requirements versus various hybrid asset participation requirements
- Scope of studies supporting this list of topics
- Long-term Outlook (LTO) and Long-term Transmission Plan (LTP) modelling methodology
- Energy Management System (EMS) and other software system changes that will be visible to market participants

- Transmission connection requirements versus distribution connection
- Changes needed to existing markets / potential new market products like Fast-Frequency Response
- Ownership requirements / limitations for TFO and DFO
- Metering, settlement interval & billing
- Transmission Regulation impacts on energy storage
- Acceptable Operating Reason (AOR).

8. Suggested Energy Storage Resources

Stakeholders were generally aligned in the view that the AESO should consider credible third-party sources of information; noting that Alberta’s market structure is unique and few jurisdictions are directly comparable. Energy storage integration must support a fair, efficient and openly competitive market in Alberta.

| Suggested resources | Topics |
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| Alberta Innovates | <ul style="list-style-type: none"> • Soon to be released the greenhouse gas implications of energy storage in Alberta paper |
| Australian Energy Market Operator (AEMO) | <ul style="list-style-type: none"> • Successfully integrated energy storage • Leverage best practices regarding market design, technical rule specifications and asset types |
| Alberta Utilities Commission (AUC) | <ul style="list-style-type: none"> • AUC Distribution Inquiry Proceeding 24116 |
| California Independent System Operator (CAISO) | <ul style="list-style-type: none"> • Successfully integrated energy storage • Leverage best practices regarding market design, technical rule specifications and asset types • Example of CAISO energy storage roadmap: http://www.caiso.com/informed/Pages/CleanGrid/EnergyStorageRoadmap.aspx |
| Energy Storage Association (ESA) | <ul style="list-style-type: none"> • Leverage conference, published articles and members |
| Energy Storage Canada (ESC) | <ul style="list-style-type: none"> • Annual conference to learn about latest developments and policy initiatives |
| Federal Energy Regulatory Commission (FERC) | <ul style="list-style-type: none"> • FERC Order 841 – Electric Storage Participation in Markets Operated by Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs) • Leverage roadmaps, compliance plans, proceedings and rulings • Example of CAISO filing to comply with Order No. 841: http://www.caiso.com/Documents/Dec3-2018-Compliance-OrderNo841-ElectricStorageParticipation-ER19-468.pdf |
| Lazard | <ul style="list-style-type: none"> • Publishes annual unsubsidized analysis on levelized cost of storage • Report reviews the cost of different storage technologies, summarizes results of levelized cost of storage analysis, and provides use case examples |

| Suggested resources | Topics |
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| Los Angeles Department of Water and Power (LADWP) | <ul style="list-style-type: none"> • Examples of storage and solar projects beginning to replace gas-fired generators in California |
| National Renewable Energy Laboratory (NREL) | <ul style="list-style-type: none"> • Publishes research on energy storage applications |
| NextEra Energy Resources | <ul style="list-style-type: none"> • Examples of storage and solar project in Florida and storage, solar and wind project in Oregon |
| Pennsylvania, Jersey, Maryland Power Pool (PJM) | <ul style="list-style-type: none"> • Successfully integrated energy storage • Leverage best practices regarding market design, technical rule specifications and asset types |
| Transpower New Zealand | <ul style="list-style-type: none"> • Successfully integrated energy storage • Leverage best practices regarding market design, technical rule specifications and asset types |