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Alberta Electric System Operator announces new energy storage procurement opportunity

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On October 14, 2020, the Alberta Electric System Operator (AESO) announced plans for an upcoming Fast Frequency Response (FFR) Technology Pilot project.[1] The FFR Pilot is currently in its initial design phase and is expected to be implemented in 2021. The announcement presents a unique opportunity for energy storage assets in the province and comes as a welcome boost to energy storage proponents and related technology providers in Alberta, who currently face significant hurdles to develop projects.

This Update includes information about the opportunity, current challenges facing energy storage proponents and related considerations.

What is Fast Frequency Response?

FFR is a fast-acting transmission reliability service that ensures a sufficient amount of energy is injected to the grid to arrest frequency excursions, maintain frequency stability, and allow frequency recovery back to nominal following an imbalance between generation and load.[2] The AESO is particularly concerned with the impacts on the transmission system arising from potential temporary losses of imports from neighbouring grids interconnected to Alberta, which can arise (and has arisen) from outages on the British Columbia or Montana tie lines.[3] FFR is designed to prevent under frequency load shedding in the event of a significant drop in frequency – in other words, to prevent outages for electricity consumers.[4]

The term "fast" is relative to each interconnected system.[5] To constitute FFR, the AESO requires a response from providers within 12 cycles (0.2 seconds) when a system frequency of 59.5 Hz is detected.

FFR service assets

The FFR Pilot procurement opportunity is targeted at any new technology that is capable of meeting the AESO's technical FFR requirements. Proponents must demonstrate and validate technical capability. Examples of power assets that can provide FFR include:

- Fast-responding energy storage, such as:
  - Fast-responding controls from batteries
  - Fast-responding controls from solar photo-voltaic cells
- Synchronous machine inertial response

- Traditional turbine-governor response
- Wind turbine generator controls which extract additional power from the rotational energy[6]

Overview of the FFR Pilot and timeline

The FFR Pilot is seeking between 20-40 megawatts (MW) of FFR capability from one to three service providers procured through an open process. The AESO indicated that the opportunity will be limited to "new technologies," suggesting the emphasis will be on facilities designed specifically to provide grid support and that traditional generation projects will not be eligible. Information gathered throughout the FFR Pilot will be publicly disseminated and will inform the long-term FFR design as well as the AESO's Energy Storage Road Map, which could ultimately lead to further opportunities for FFR service providers.

In addition to providing FFR services, it is anticipated that providers will be able to participate in the energy and operating reserve markets. This will require alignment between the AESO, the service provider and the Market Surveillance Administrator. If permitted, participation in those existing markets could provide material additional revenue streams to FFR service providers in addition to the compensation paid specifically for FFR services, offsetting the costs of FFR services and saving the AESO (and, ultimately, power consumers) costs. This may allow projects that are currently not considered economically viable based on existing market opportunities to become viable with the additional reliable revenue source provided through the FFR Pilot.

While the FFR Pilot is still in its infancy, the AESO anticipates completion of its initial design phase as well as stakeholder and MSA engagement in early 2021. The implementation phase is expected to begin thereafter, likely including procurement through a Request for Information or similar process. Following the execution of commercial agreements between the AESO and the proponent(s), the FFR Pilot is expected to last between 12 and 18 months, commencing in late 2021 or 2022.[7] It is not yet known whether the term of the AESO FFR procurement contract will be longer than 12 to 18 months.

Further details regarding this opportunity are expected early next year.

The rise and stumble of energy storage in Alberta

Utility-scale battery storage and battery-connected generation facilities (such as solar and wind facilities) are likely to be well-suited to the AESO's FFR needs. The Government of Alberta has defined "energy storage" as any technology or process that is capable of using electricity as an input, storing the energy for a period of time and then discharging electricity as an output.[8]

Although growing in popularity and attention, energy storage assets currently face a variety of challenges and risks in the Alberta market, many of which were identified by the AESO in its *Energy Storage Roadmap* released last year. At its core, the issue arises from the fact that energy storage projects are not contemplated by the current legislation, regulations, tariffs or system rules. This has led the AESO to develop the *Energy Storage Roadmap* to facilitate the integration of energy storage technologies into Alberta's electricity market, enable energy storage to participate in a reliable and fair, efficient and openly competitive manner, and to ensure consistency in principles and approach to energy storage across the AESO.[9] Under the current regulatory framework, energy storage facilities are generally treated as power plants or generating units,[10] although they face (and present) unique challenges not faced by

traditional conventional or renewable generation sources.

While there are some technical hurdles, most of the challenges are regulatory and, consequently, financial. Specifically, energy storage has yet to find a sure place within the existing tariff and market structures, often precluding proponents (and financers) from achieving the requisite level of income certainty needed to make significant capital investments. Much of this uncertainty arises from the current treatment of energy storage assets under the AESO's tariff, which dictates the costs energy storage assets must pay to connect to the grid. While the tariff structure is evolving and the AESO has indicated its intention to amend the tariff to accommodate the unique aspects of energy storage (recognizing that it is neither pure load nor pure generation) at some time in the future, in many instances and under the current framework, transmission costs are prohibitive. Uncertainty with respect to if or how this framework will change therefore presents a significant hurdle to the energy storage sector of the industry, and it is unlikely that these issues will be resolved soon.

Moreover, government-run electricity generation procurement programs in Alberta have not provided incentives or attributed value to energy storage to date, and indeed storage assets were expressly excluded from the AESO's Renewable Energy Program.[11] In contrast, energy storage has had success in other Canadian jurisdictions, such as in Ontario, where the system operator in that province has successfully run multiple rounds of energy storage-specific procurements, resulting in the procurement and construction of dozens of megawatts of (mostly battery) energy storage capacity.[12] In addition, in our experience, standalone storage assets have not been the subject of significant bilateral procurement discussions in Alberta, with storage generally only receiving favourable attention in the private power purchase space as part of a "hybrid" wind- or solar-plus-storage arrangement.

While the Alberta government has not run specific procurement programs targeting energy storage, we note it has allocated some funds through Emissions Reduction Alberta for energy storage. TransAlta Renewables announced earlier this month that its 10 MW WindCharger battery storage project began commercial operation as the first utility-scale, lithium-ion energy storage project in Alberta utilizing Tesla Megapack technology, with 50% of the $14.5 million capital cost of such project funded through such government support.

It is thus no surprise that the FFR Pilot – which provides a clear indication of the long-term viability and import of FFR services in Alberta – has been seen as a welcome boost to energy storage proponents and related technology providers in Alberta.

A comment on non-wires solutions

In its consideration of long-term market participation for energy storage facilities, the AESO has acknowledged that energy storage can serve a number of on-grid purposes including energy price arbitrage, congestion relief and the provision of ancillary services.[13] Therefore, in addition to simply storing and supplying electricity, energy storage assets have the potential to act as an alternative to traditional transmission infrastructure. This concept is referred to as "storage as a transmission alternative" or "SATA."

However, the legal footing for the AESO to use and implement transmission alternatives – also referred to as "non-wires solutions" – is, at best, opaque. Under Alberta's *Transmission Regulation*,[14] the AESO is required to design, govern and direct the construction of sufficient transmission facilities so that, under normal operating conditions, all anticipated in-merit electricity can be dispatched "without constraint" – i.e., without transmission congestion getting in the way.

As the Alberta Utilities Commission (AUC) has routinely clarified, a non-wires solution is only permissible under s. 15(3) of the *Transmission Regulation* where there is limited load growth potential or where a non-wires solution is required "for a specified limited period of time" to ensure reliable service due to a shorter lead time.[15] The AESO has expressed the opinion that legislative change to broaden and align the permitted use of non-wires solutions may be appropriate to fully enable the reliability of services and to optimize and defer the need for distribution or transmission infrastructure.[16] In other words, legislative amendments may be required for the full range of uses of energy storage assets and technology to be realized.

While FFR – which is not aimed at reducing congestion, *per se* – may fall outside the restrictions imposed by the *Transmission Regulation*, it is certainly getting closer to the line relative to the use of storage as a generation source. Until the issues presented by this legislative regime are resolved, the potential uses of energy storage as alternatives to conventional wires assets cannot likely be fully realized in the province.

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[1] AESO, *Joint Stakeholder Engagement Session on Energy Storage and Distributed Energy Resources (DER)*, PowerPoint presentation, October 14, 2020 (online) [PDF] [AESO PowerPoint], slide 30-32; AESO, *Joint Stakeholder Engagement Session on Energy Storage and Distributed Energy Resources (DER)*, Audio recording, October 14, 2020 (online), at 0:29:44.

[2] NERC Inverter-Based Resource Performance Task Force, *Fast Frequency Response Concepts and Bulk Power System Reliability Needs*, March 2020 (online) [PDF] [NERC Task Force], at 7-9; AESO PowerPoint, at slide 30.

[3] AESO PowerPoint, at slide 30.

[4] This situation is currently managed through the Load Shed Service for imports (LSSi), which is comprised of load customers that agree to be quickly taken offline following sudden loss of imports. AESO, *Load Shed Service for imports*, AESO website.

[5] NERC Task Force, at 8.

[6] NERC Task Force, at 7.

[7] NERC Task Force, at 7.

[8] AESO, *Energy Storage Roadmap*, August 2019 (online) [PDF], at 6.

[9] *Energy Storage Roadmap*, at 5, 7-8.

[10] *Ibid*.; AESO, *Information Document – Energy Storage Guide ID #2020-013*, June 2020 (online) [PDF], at 2; AUC Decision 25205-D01-2020, *TERIC Power Ltd*, April 6, 2020 (online) [PDF], at paras 21-27, in which a battery facility was determined to be a "power plant" as defined under s. 1(1)(k) the *Hydro and Electric Energy Act*, RSA 2000 c H-16.

[11] AESO, *REP Round 1 FAQ* (online) [PDF], at 3; AESO, REP Rounds 2 and 3 FAQ (online) [PDF], at 3, question 15.

[12] Independent Electric System Operator, *Energy Procurement Programs and Contracts: Energy Storage Procurement at the IESO* (online).

[13] AESO, *Long-Term Energy Storage Market Participation Options Paper*, October, 2020 (online) [PDF], at 10.

[14] *Transmission Regulation*, Alta Reg 86-2007.

[15] Alberta Utilities Commission, Decision 22274-D01-2018, *Alberta Electric System Operator, Provost to Edgerton and Nilrem to Vermilion Transmission System Reinforcement Need Identification Document*, January 12, 2018 (online) [PDF], at para 24; Alberta Utilities Commission, Decision 23393-D01-2019, *Alberta Electric System Operator and AltaLink Management Ltd.*, February 14, 2019 (online), at para 125,

[16] AESO Response in Proceeding 24116, *Distribution System Inquiry*, Exhibit 24116-X0518, at PDF 40