

Minutes from September Session 1

Location: Virtual (Microsoft Teams Meeting hosted by AESO)

Date: Tuesday, September 13, 2022

Time: 9:00 am to 12:15 p.m.

Attendees:

Organizations	
Alberta Innovates	Evolugen
AltaLink	FortisAlberta
ATCO	Greengate Power
ATCO Electric	Heartland Generation Ltd.
Best Consulting Solutions Inc.	Imperial oil
BHE Canada	IPCAA
BluEarth Renewables	J J Power & Energy Inc.
CanREA	Lionstooth Energy
Capital Power	Madstone Energy
Capstone	Market Surveillance Administrator
City of Medicine Hat	METSCO Energy Solutions
Customized Energy Solutions	Neoen Renewables Canada Inc.
DePal Consulting Limited	NRG Curtailment Solutions
Diode Ventures	Power Advisory LLC
EDF Renewables	Solas Energy Consulting ("Solas")
Enel North America	Suncor Energy Inc.
Enerfin	TC Energy
Energy Storage Canada	TransAlta
Enfinite	TransAlta Corporation
ENMAX	URICA Asset Optimization
ENMAX Corporation	Utilities Consumer Advocate
ENMAX Energy Corporation	Voltus Energy Canada, Ltd.
ENMAX Power Corp	Westbridge Energy Corp
EPCOR	Wolf Midstream Inc.
EPCOR Utilities, Inc.	

Agenda:

Topic	Sub-topics
Welcome / Introduction / Housekeeping	<ul style="list-style-type: none"> • N/A
Aggregated Facility	<ul style="list-style-type: none"> • Evolution of ISO Rule Facility Definitions • Recap of Transition from “AGF” to “AF” • What is an Aggregated Facility? • 9 MW Resource Limit • <i>Questions/Group Discussion</i>
Power Measurement Terms	<ul style="list-style-type: none"> • Gross real power • Maximum authorized discharging/charging power • <i>Questions/Group Discussion</i>
Allowable Dispatch Variance	<ul style="list-style-type: none"> • Clarification of “variable energy resource” • <i>Questions/Group Discussion</i> • Implementation example • <i>Questions/Group Discussion</i>

1. Consultation Session Overview, Introductions, and Housekeeping [slides 2 to 14]

1) N/A –No questions or comments received

2. Aggregated Facility: Evolution of ISO Rule Terms [slides 15 to 22]

2) N/A –No questions or comments received

3. Aggregated Facility: Transition from AGF to Aggregated Facility [slides 23 to 28]

- 3) Discussion regarding the 9 MW limit within the definition of “aggregated generating facility” and “aggregated facility”
- a. TransAlta inquired about the relevance of the 9 MW limit. TransAlta cited the possibility for energy storage facilities greater than 9 MW and questioned why the 9 MW limit should be retained if exceptions are available through the AESO’s waivers and variances process.
 - b. The AESO explained that the 9 MW limit was introduced at a time when the AESO did not foresee aggregations consisting of resources greater than 9 MW (per resource), and that this continues to be the AESO’s view today. The AESO clarified that the 9 MW limit applies to the constituent *resources* that, collectively, may be aggregated to form an aggregated *facility*. Unlike the constituent resources, the size of the aggregated *facility* is not limited.
 - c. TransAlta commented that modules can be built bigger than 9 MW.
 - d. The AESO explained that it is not aware of modules greater than 9 MW and reiterated that the size limit applies at the *resource* level and not to the *aggregation* on the common collector bus (*i.e.*, not to the aggregated *facility*). The AESO explained that the original intent was to ensure governor response for aggregations that included individual *resources* greater than 9 MW, and that this requirement continues to be appropriate for aggregated facilities today.

- e. Solas inquired about energy storage resources greater than 9 MW, citing examples in California of enclosures comprising multiple battery cells. Solas questioned whether it is realistic to assume that the “resource” would be the individual battery cell and pointed out that, if the enclosure is viewed as the “resource” instead, then it is likely that the constituent resources could easily exceed 9 MW.
- f. The AESO explained that, with respect to such enclosures, the AESO would be interested in the connection configuration of the enclosures. For example, if the enclosures are connected at a single point, behind a common inverter.
- g. CanREA sought technical clarity regarding the governor requirement for resources greater than 9 MW.
- h. The AESO explained that a resource that is 9 MW or greater has a large enough potential impact on the Alberta interconnected electric system to justify having its own governor. The AESO clarified that governors are also appropriate for resources below 9 MW, but that the AESO is comfortable with monitoring and managing such resources at the group level (*i.e.*, aggregations of resources). In contrast, resources 9 MW and greater need frequency responsiveness managed at the individual level. The AESO also explained that there is a compliance element, whereby the AESO monitors the frequency responsiveness of aggregated resources—where the underlying supply resources are under 9 MW—at the fence line while monitoring larger, individual resources at the terminus of the resource.
- i. ENMAX inquired about reliability from the broader system-level perspective and asked about a potential future state involving sufficient quantities of sub-9 MW resources—without individual governor response—that could start to impact the system as a whole.
- j. The AESO clarified that the AESO doesn’t exempt an aggregated facility, as a whole, from the governor response requirements. The difference is simply that the governor response for an aggregated facility is at the level of the collector bus, rather than at the level of the individual constituent resource. The AESO further explained that it is currently developing its Reliability Requirements Roadmap, which will examine frequency response and related phenomena in the event of the proliferation of small resources, and associated potential system reliability impacts.
- k. BluEarth inquired whether the 9 MW limit would restrict configurations to feeder lines that connect resources to a common collector bus. BluEarth pointed out that are other potential configurations, such as daisy chains.
- l. The AESO clarified that the 9 MW is not defined in relation to the connecting feeders, and that other configurations (such as daisy chains) are also possible.
- m. ENMAX Energy asked the AESO to elaborate on the pros and cons of the two possible approaches (“Option 1” and “Option 2”) to aggregated facilities and so-called “hybrid” configurations.
- n. The AESO explained that both Option 1 and Option 2 are two different means to the same end. Both approaches recognize that co-located facilities consisting of different technologies are not currently captured in the ISO rules. The AESO has examined the North American Electric Reliability Corporation’s (NERC) approach to “hybrid” facilities and has identified concerns stemming from overlap between the concept of an “aggregated facility” and a “hybrid” facility. Option 2 would develop mutually exclusive definitions to avoid any given facility being classified as *both* a “hybrid facility” and “aggregated facility”. Option 1 would create an umbrella term that

captures both “hybrids” and “aggregated facilities”. The AESO reiterated that the pros and cons are summarized in slide 24 of the stakeholder presentation. The AESO further explained that “aggregated facility” is drafted at a higher level, and that it can accommodate future types of aggregations without requiring re-drafting and the use of technology-specific terms. As a result, this term allows the AESO greater latitude with which to establish the relevant ISO rules framework. The AESO explained that the use of “hybrid facility”, per Option 2, would require the AESO to insert that defined term into all relevant ISO rule provisions, which also require the development of technology-specific requirements for hybrid facilities. This in turn increases the potential for red tape. The AESO noted that Stakeholder feedback was predominantly in favour of Option 1.

4. Aggregated Facility: What is an Aggregated Facility? [slides 29 to 38]

- 4) Discussion regarding distinctions between *markets* concepts and *technical* concepts
 - a. TransAlta raised a hypothetical scenario where a facility consisting of energy storage resources and traditional generating units wants to participate in the market as a single *asset*. TransAlta sought confirmation that the concept of “aggregated facility” is intended to address *technical* considerations as opposed to *market-participating* considerations, and that the intent is not to impact such facilities’ participation in the electricity markets.
 - b. The AESO explained that the 200-series rules in the proposed Energy Storage ISO Rule Amendments deliberately avoid mentioning specific technologies, favouring instead the use of “source asset” and “sink asset”, which are broad, technology-agnostic concepts applicable to *market assets*. By contrast, the technical requirements in the ISO rules (*i.e.*, the 500-series and certain 300-series rules) are concerned with the specific configurations and technical details of physical facilities at the *facility-* and *resource* level.

5. Aggregated Facility: 9 MW Resource Limit [slides 39 to 41]

- 5) Discussion regarding the conceptual distinctions between “resources” and “facilities”
 - a. ENMAX sought clarification about the 9 MW limit and the conceptual distinction between “resources” and “facilities” as it pertains to “aggregated facilities”, citing a hypothetical example of 4 x 20 MW collector feeders (total of 80 MW at the collector bus), managed from a single controller.
 - b. The AESO referred back to slide 16 in the stakeholder presentation and reiterated that the AESO would be looking at the constituent *resources* within the facility as opposed to what is connected to the collector bus. The AESO further referred back to slide 37, which shows a high-level diagram (*i.e.*, blocking of resources and omitting detailed elements). In the diagram, a wind turbine would be considered a “resource” and multiple wind turbines could be gathered using feeders on a common collector bus or by potentially connecting them back-to-back (effectively functioning as a collector bus). Energy storage resources such as batteries could be added to the collector bus in this hypothetical configuration. The AESO noted that the battery banks would be constrained, typically by the size of the inverters and the construction footprint. The batteries could be daisy chained or connected by a common point of collection, which would be treated as a “collector bus”. The AESO explained that, in such a scenario, the connected batteries on the DC side—comprising a battery system—and the components connected on the AC side would be considered a collector bus, and overall would be considered an “aggregated facility”. The AESO provided a further example of a hypothetical configuration involving small hydro generators in a hydro plant, all collected together on a bus (*i.e.*, functioning as a collector bus). If

the hydro generating units are in the same proximate location, they would be considered an “aggregated facility”. If the hydro generators are small turbines (*i.e.*, 9 MW or less), they would not necessarily require their own independent governors and could be aggregated as a so-called “governored facility” on the collector bus, both from a voltage and frequency perspective. The AESO explained that resources 9 MW and greater would still be able to connect, but the constituent resources would be required to have separate governors.

- c. ENMAX raised the hypothetical example of a battery energy storage resource using a 10 MW inverter, which, if it goes offline, would cause the batteries to also go offline.
- d. The AESO explained that such a configuration would likely not be considered an “aggregated facility” but would be treated as an “energy storage resource”.
- e. Solas reiterated concerns about the application of the 9 MW limit to energy storage resources involving enclosures of multiple battery cells. Solas asked for clarification about how such configurations would be treated.
- f. The AESO committed to looking into this matter further in order to provide the requested clarity. The AESO also requested clarity from Solas regarding any technical limitations for enclosures 9 MW and greater.
- g. Solas explained that it would need to further investigate but clarified that the configuration in question would be operated as a single entity.
- h. The AESO clarified that, for markets purposes, it would be possible and acceptable for such a configuration to participate in the market; however, from a technical perspective, specific technical rules may apply.
- i. ENMAX raised the hypothetical example of a 10 MW facility using 8 inverters (1.25 MW per inverter) that all connect to one collector bus and pointed out that a 9 MW inverter is currently not cost effective.
- j. The AESO confirmed that the aggregated inverters would, together, constitute an aggregated facility consisting of energy storage resources.
- k. TransAlta confirmed its understanding that there is a delineation between the technical-related and markets-related rules.
- l. The AESO confirmed that the markets-related rules apply at the *asset* level, and that the technical rules apply to *physical* facilities (*i.e.*, at the resource- and facility level). The application of the technical rules does not impact a market participant’s asset configuration for purposes of market participation. Even if the individual on-site resources are greater than the 9 MW resource size limit for aggregated facilities, a single asset for the purposes of energy market participation can be created if the market participant so chooses. From the perspective of market rules compliance monitoring, the AESO is interested in *where* dispatch compliance is to be assessed: at the facility level, or at the individual resource level, as determined by the asset configuration.

6. Power Measurement Terminology [slides 42 to 52]

- 6) Discussion regarding reactive power components
 - a. EPCOR inquired at slide 46 whether references to “gross real power” includes reactive power components.

- b. The AESO confirmed that reactive power components would also have to be considered.

7. Allowable Dispatch Variance [slides 53 to 64]

- 7) Discussion regarding concepts of “controllable” and “non-controllable”
 - a. TransAlta commented that it understood the rationale for including the terms “controllable” and “non-controllable” but pointed out that adding these terms would still require the AESO to perform updates to address new technologies.
 - b. The AESO acknowledged TransAlta’s point and explained that guidance could be provided in the form of an information document.
 - c. TransAlta commented that the use of an information document for these details could be problematic from a compliance perspective given that the information document is non-authoritative.
 - d. The AESO clarified that the classification of the asset (*i.e.*, as “controllable” or “non-controllable”) would be determined in collaboration with the AESO as part of the formal process of setting up the asset for market participation. The AESO agreed that the underlying technology remains a relevant and important consideration, but that the use of “controllable” and “non-controllable” was simply intended to shorten the definition of “allowable dispatch variance”. The AESO acknowledged the concerns raised about compliance and authoritative documents, and explained that it considers whether a concept or term is commonly understood by industry or whether it is sufficiently unique to warrant definition or explanation.
 - e. TransAlta commented that its question had been addressed.
 - f. CanREA encouraged the AESO to engage with market participants on the classification of an asset as “controllable” or “non-controllable” as early as possible in the AESO’s connection process, to avoid surprises.
 - g. The AESO noted CanREA’s comment.
 - h. ENMAX cited the example of large wind and solar facilities whose output can be highly variable over short periods of time. ENMAX sought clarity on how the AESO would define an asset’s potential output, and how the AESO would reconcile its technology-agnostic approach when a “controllable” asset could be penalized for exhibiting the same behaviour as a “non-controllable” asset.
 - i. The AESO clarified that the use of SCADA enables potential output of a wind or solar resource to be measured instantaneously, and that the AESO monitors for compliance with the resource’s potential (within the allowable tolerances) to ensure that output is not being withheld or that the resource is producing in excess of the dispatch. The AESO explained that it would distinguish between “controllable” and “non-controllable” based on an asset’s dependence on meteorological conditions. The AESO reiterated that it is seeking feedback on whether the proposed approach to “allowable dispatch variance” is useful, given that the proposed approach is intended to enhance the readability of the definition.
 - j. ENMAX cited a hypothetical scenario where an energy storage resource’s state of charge is 100% (as opposed to having to charge).

- k. The AESO explained that, in a situation where the solar power—that would otherwise be used to charge an energy storage resource—is being spilled (given that the energy storage resource’s state of charge is 100%), the market participant would be able to restate in order to enable it to offer energy from the energy storage resource. The AESO explained that a state of charge of 100% is considered an acceptable operational reason to restate; similarly, a state of charge of 0% would be considered an acceptable operational reason.
- l. TransAlta sought confirmation that the complexity associated with a configuration consisting of a “controllable” and “non-controllable” asset participating in the market as a single asset stems from the need for the market participant to determine how to comply with the AESO’s dispatches.
- m. The AESO confirmed TransAlta’s understanding.
- n. ENMAX commented that it would need some additional time to consider the proposed approach to “allowable dispatch variance”.
- o. The AESO expressed its view that there is value in further documenting this approach for Stakeholders, and will consider how to present the information in an accessible manner.
- p. TransAlta commented that the approach seems extremely complicated, and makes it complicated to determine how to dispatch assets. TransAlta commented that the approach increases compliance burden and risk.
- q. The AESO explained that wind or solar assets and controllable assets are separate, but that—as a result of Stakeholder consultation—the AESO foresees the possibility of such assets being combined in highly integrated configurations. Accordingly, the AESO has attempted to capture such scenarios.
- r. Solas inquired whether the AESO performed analysis or examined case studies for a hybrid facility that wants to provide multiple services (by means of various energy storage resource applications) to determine whether the AESO’s proposed approach may limit the facility’s ability to provide those services? Solas further inquired whether it is the market participant’s responsibility to investigate other value streams.
- s. The AESO clarified that “other services” could refer to typical ancillary services and other products, such as non-wires solutions. The AESO explained that, when a market participant approaches the AESO, the parties would discuss the type of products and services the market participant would want to provide. The parties would collaboratively determine the most suitable asset configurations for the suite of services to be offered by the market participant’s resources.
- t. CanREA cited the *Long-term Energy Storage Market Participation Draft Recommendation* document, stating that they were under the impression that there would be more flexibility about what is expected from a facility consisting in part of a variable energy resource component (*i.e.*, a hybrid involving a variable energy resource and an energy storage resource). CanREA commented that the “controllable”/“non-controllable” (single hybrid asset) approach increases the difficulty of managing the battery component, and inquired whether these difficulties represent a departure from the AESO’s *Long-term Energy Storage Market Participation Draft Recommendation* document.
- u. The AESO explained that the challenges identified by CanREA are natural implications of implementing the Long-term Energy Storage Market Participation recommendations for single

hybrid assets, and that the slides in the stakeholder presentation materials help to clarify what was intended in that document.

- v. CanREA expressed its appreciation for the AESO's efforts to incorporate the content into the slides, and acknowledged the challenges involved in translating the content into authoritative ISO rules. CanREA commented that it will endeavour to provide meaningful feedback to the AESO.
- w. TransAlta commented that the approach of using a single (hybrid) asset configuration for market participation purposes seems unattractive and complicated, with the energy storage resource being used to "firm out" the variable energy resource.
- x. The AESO explained that it does not view the approach as "firming out" the variable energy resource and sees it instead as using the energy market offer to set the price at which the market participant is willing to charge and discharge its energy storage resource despite the meteorological conditions. The AESO stated that it is the market participant's decision on how and when to use the on-site variable energy resource to charge the local energy storage resource and that indication is formulated within the asset offer and made visible to the system controller.
- y. TransAlta commented that, when pricing offers from the variable energy resource, it would just be price-taking, such that priced blocks would generally represent energy from the energy storage resource.
- z. The AESO explained how, based on such a situation, the offer would be structured according to the illustrative example in slide 58 of the stakeholder presentation.
- aa. ENMAX commented that it agrees with TransAlta that dispatches would be considered from the perspective of the "controllable" energy storage resource. ENMAX questioned whether, in the case of extremely large variable energy resources, the variability of those resources would actually be reduced by introducing an energy storage resource. ENMAX inquired whether such an approach would meaningfully enhance the operation of the Alberta interconnected electric system.
- bb. The AESO explained that the proposed approach would enhance the AESO's ability to operate the Alberta interconnected electric system. The AESO explained that the proposed ADV mechanism for partially controllable assets gives the AESO a much clearer impression of the net-to-grid output of the asset, compared to an approach where the asset is deemed completely non-dispatchable. The AESO explained that its proposed approach mitigates against physical withholding and aligns with the must-offer, must-comply principle. The AESO clarified that the proposed approach would apply equally to other configurations that include a single-asset combination of a controllable and non-controllable resources (such as generating unit and a solar resource).

8. Next Steps and Closing Remarks [slides 65 to 68]

- 8) N/A –No questions or comments received