Summary of stakeholder feedback and AESO response

Introduction

The AESO values stakeholders' feedback as a critical part of the processes we undertake to reach decisions and would like to thank all those who shared their perspectives with us in the Oct. 14, 2020 Long-term Energy Storage Market Participation engagement process.

The AESO has reviewed the responses provided by stakeholders and found the responses centered around four main topics. The topics were identified as follows:

1) Further information on hybrid assets
2) May bid vs Must bid within the full-range options
3) Scope of work for energy storage market participation
4) State of charge (SOC)

The AESO has prepared this document to summarize those topics and provide more information to increase clarity on its view of the issues and the relative options.

1) Further Information on Hybrid assets

Hybrid asset vs co-located technologies

Based on the feedback received from numerous stakeholders, there remains some confusion as to the differences between a hybrid asset and a hybrid facility/site. In order to prevent further confusion, the term "co-located technologies" will be used to describe the nature of the actual physical equipment installed on a customer site. Storage co-located with solar or wind will be defined as co-located VER+ES.

Figure 1: Co-located technologies configured as independent assets (based on the ½ range participation model)

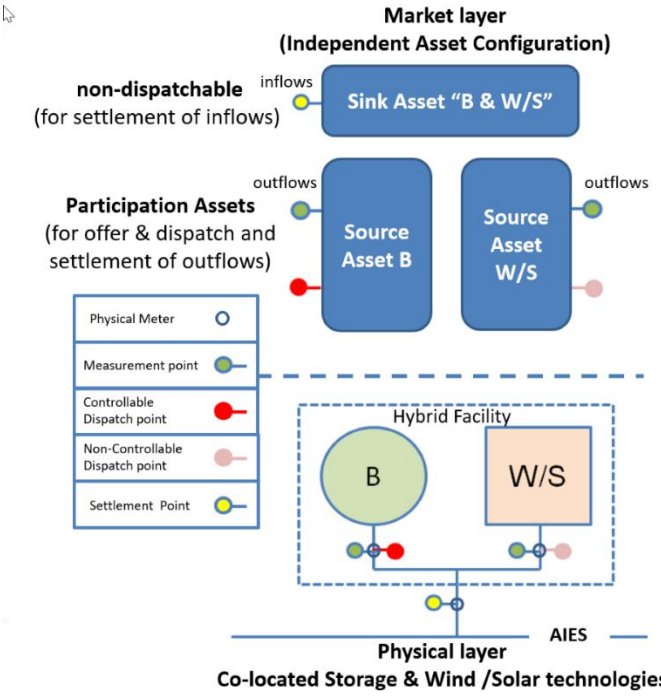

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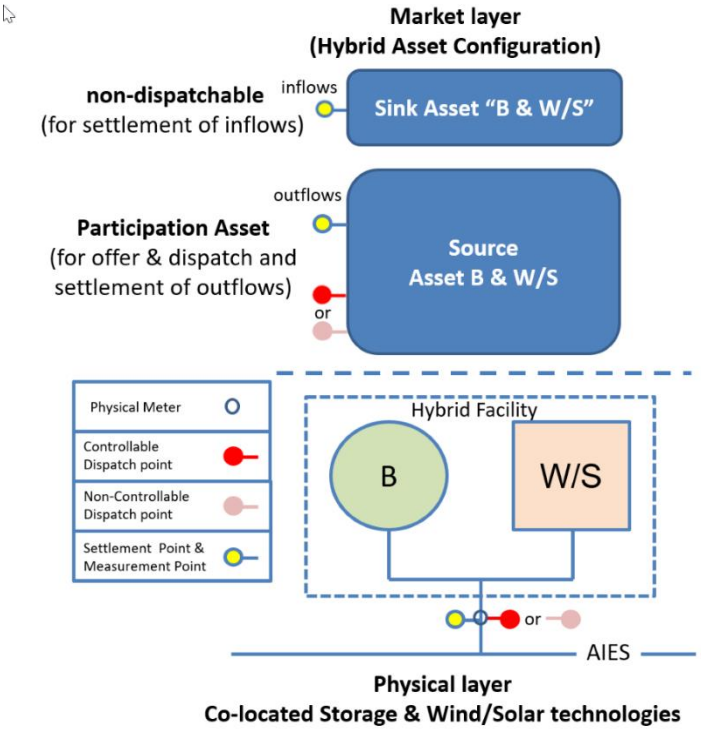
Figure 2 - Co-located technologies configured as hybrid assets (based on the ½ range participation model)



As illustrated in the figures above, co-located technologies are defined as multiple technologies that are located on the same site behind a single point of connection. These co-located technologies may be configured such that each technology is operated as an independent asset in the energy market, as in *Figure 1.* Co-located technologies may also be configured as a single hybrid asset when the pool participant chooses to operate the multiple technologies co-located on the same site as a single entity within the energy market, as shown in *Figure 2.* The choice of market asset configuration (hybrid or independent) depends on what makes the most sense for the operation of the asset. A pool participant should consider the following before choosing the market asset configuration:

1) An asset is not considered a hybrid asset if the storage and variable energy resource offers are made independently on a site with co-located technologies.
2) Metering determines how Demand Transmission Service (DTS) will be assessed, not the asset configuration. An independent asset configuration for co-located technologies, as shown in figure 1, may require additional metering in order to receive the same DTS treatment as the hybrid asset configuration for the same site.
3) The asset configuration decision is made by the Pool Participant provided the configuration is within the boundaries set by ISO rules and standards. Metering and SCADA requirements will differ based on that decision.
4) Pool trading charges are not impacted by the asset configuration decision. Trading charges are assessed at the settlement point located at the point of connection (POC), not at the dispatch point.

5) If the customer chooses independent connections for the resources on the same site it would not be considered co-located technologies, the resources on this site would be considered stand-alone assets.

Please see the more detailed explanation provided in the short-term market implementation requirements for energy storage participation paper published on April 9, 2020.

Reliability concerns caused by Variable Energy Resource (VER) hybrid assets

Real-time energy market dispatches are the primary mechanism for the System Controller to maintain supply/demand balance. The System Controller relies on the must offer-must comply and energy delivery requirements within ISO rules for assurance that the volumes dispatched will be the volumes provided or withdrawn. With the introduction of wind and solar resources, the AESO developed a secondary means to maintain the supply/demand balance by requiring all non-controllable variable energy resources to convert meteorological (MET) data into a power forecast which becomes the expected energy delivery from these resources. This data informs the System Controller of the adjustment they will need to make the real-time dispatch. For a hybrid asset the System Controller cannot rely on the VER power forecast alone, as with the addition of the controllable storage resource, there is greater variation in the possible output from the site. The System Controller requires additional information to understand the behavior of the storage resource behind the hybrid asset to anticipate the output from the co-located technologies. The AESO only has full visibility if the storage is an independently dispatched asset and not a single hybrid asset. The AESO proposed two mechanisms in the Long-term Energy Storage Market Participation Options Paper, the Variable Block Volume and Storage Only Participation, to obtain the required information in cases where storage is co-located with non-controllable wind or solar and configured as a single hybrid asset.

Under current ISO rules, co-located VER and storage technologies configured as a hybrid asset would be considered non-controllable from a dispatch perspective. The term non-controllable is not defined in the current ISO rules but is a simple way to indicate that the asset can be dispatched but the dispatched output is non-controllable. As part of the short-term implementation the AESO classified these new "co-located VER and storage technologies configured as a hybrid asset" as "wind and solar aggregated generating facilities". Wind and solar aggregated generating facilities have large allowable dispatch variances, which consider the potential MW to set the lower end of the dispatch tolerance. The AESO cannot tighten the variances of VER+ES Hybrid assets because the potential MW will not be the minimum dispatch threshold if the underlying storage resource is charging. For example, co-located VER and storage technologies, each 50 MW in size, in a hybrid asset configuration submit a $0/MWh, 100 MW offer. Because it is considered a non-controllable VER+ES hybrid asset, the allowable dispatch variance for this asset is 100 MW as it is not possible to set a lower threshold on the dispatch because the underlying storage resource could be operating anywhere between +50 and -50 MW allowing the output to be anywhere between 0 MW and 100 MW.

Some parties suggested that the System Controller learn the individual behavior of storage within the hybrid VER+ES asset in order to dispatch them. As a hybrid asset, SCADA may only be available on the net of the 2 resources and not individually, limiting visibility to the storage asset's individual behavior. To effectively and sustainably enable the increasing numbers of hybrid VER assets, the AESO has identified the need to address this visibility and dispatch concern to maintain reliability. Additionally, other market participants should have the same level of visibility to be able to predict changes in net demand to support efficient market response. Tools like the current supply demand report or historical trading report would not include this information.

2) May bid vs. Must bid

Based on stakeholder feedback, the AESO recognizes it did not make it clear within the long-term energy market participation options paper, that the full range participation options are independent of the debate as to whether storage should be required submit its full capability into the energy market or allow for optional participation of the charging capacity. These full range options were intended to be improvements for storage resources recognizing that the underlying resource is not a separate load and generator operated independently, but rather it is an integrated system.

Current bid requirements

The current ISO rules provide an ability for pool participants to submit an optional bid. It should be noted that there is no managed relationship or submission validation between the source offer and the sink bid in the current ISO rules unlike the full range options presented in the long-term energy market participation options paper. The two market assets (source and sink) are unrelated and independent. Storage participants may use the sink bid rules as they exist today, but the onus would be on the participant to ensure the offer and bid results in an effective dispatch sequence for the underlying resource. The AESO would like to clarify that if a pool participant chooses to bid, they would be required to follow the current participation rules, and the AESO would designate a dispatchable sink asset for some, or all, of its energy consumption. The pool participant would also be required to submit daily bids. The current "may bid" option is not "may submit a bid whenever the customer chooses", it is a choice to participate in merit order dispatch on a continual basis by reducing consumption based on a System Controller dispatch of the bid and compliance to the instruction.

AESO concerns with supply-side only participation

The long-term energy storage market participation options paper identifies some issues with supply-side only participation for energy storage. Dispatching a block on the merit order should result in a predictable response based on the size of the dispatched block. With energy storage half range participation, this is not always the case. At certain price levels, dispatching up a block may be partnered with a large demand response. For example, block zero of 20 MW at $15/MWh is dispatched up by the System Controller. Because the price was below $15/MWh prior to the dispatch, the storage resource was charging at 30 MW. In order to comply with the dispatch instruction, the storage operator moves the asset from -30 MW to +20 MW resulting in a 50 MW energy delta. Regardless if the System Controller anticipated the delta, the block must be dispatched according to the energy market merit order. The System Controller has now over dispatched because only 20 MW was needed. To rebalance supply and demand, the system controller must dispatch the block off. Should the storage operator resume charging because prices have dropped, it would result in "saw tooth" real-time prices. This outcome is not ideal for system operations, the energy market, or the energy storage operator.

Beyond dispatch variability and reliability considerations, there is a market power driver for full range participation. The must offer/must comply requirement was included as a market design mechanism to prevent physical withholding of dispatchable capacity to uncompetitively steer energy prices. Unlike loads, storage that is part of a portfolio of generation may be able to benefit from physically withholding dispatchable capacity by pricing out of the market and then choosing to charge at high prices to benefit the portfolio of generation. While the MSA can investigate such behavior, full range participation limits the ability for such behavior and prevents the resulting effects of this behavior on other participants.

Limited flexibility

Stakeholder comments were received that the must submit full range requirement would limit the flexibility while charging. As is the case with the short-term implementation, storage resources in a full range participation model would have an acceptable operating reason (AOR) to restate should the state of charge drop to zero. The participant would restate the offers to discharge to zero but is not permitted to recharge until the system marginal price (SMP) is lower than the price of the lowest offer block. The only difference with full range participation is the SMP would drive the recharge rate because the recharge is based on the participants bids. Under a full range participation model, the AESO expects the full range dispatch would reduce net demand variability while providing clear and stable price signals for bidders to guide their consumption.

3) Energy Storage market participation scope of work

What does participate mean?

As further background, all resources connected to the AIES, which includes both transmission and distribution connections, that inject or withdraw power must exchange their energy through the power pool and are settled at pool price. The organizations that own or operate these assets are called pool participants. For a pool participant's asset to actively participate in the market, the asset must be 5 MW in size or greater regardless of their connection voltage. That said, assets less than 5 MW are still settled using the pool price, but do not have participation requirements. The energy market does not distinguish between assets connected at the distribution or transmission system. As such a separate connection-based analysis is not required.

The scope of this effort and the options presented are limited to active energy market participation only.

Need for finalizing tariff treatment first

The AESO understands that tariff treatment may drive behavior in the energy market as there are both energy and wires price signals to consider. The Energy market participation model is designed so that the pool participant can consider all factors in their energy market submission provided the submission indicates what capacity is physically available and at what price that capacity should be dispatched at.

For the reasons stated above regarding DTS treatment, the AESO believes the participation model for storage can be developed independently from the tariff.

Storage as a transmission alternative (SATA) and market participation

The work on SATA and market participation are not directly coupled and can be progressed independently. SATA will be addressed within a separate Energy storage roadmap initiative and is not part of the market participation scope of work. The AESO reported in the Oct 14, 2020 update that the AESO is conducting: Review of policy, technical and economic assessments, market impacts, procurement, transmission planning process and associated requirements for regulatory processes related to SATA.

Storage ownership by TFOs and DFOs is out of scope. As stated in the options paper, the AESO's assumption is "storage will be a market asset that may provide non-wires solutions, rather than a regulated asset capable of participating in the energy and AS markets." As such, there would be no regulated activities provided by assets participating in Alberta's deregulated electricity market.

4) State of charge (SOC)

The AESO does not see the SOC being used as an indicator of available capacity (AC) as is seen in some FERC jurisdiction markets. FERC jurisdiction markets are not real-time energy-only markets. Commitment decisions in those markets are made by the ISO based on multi-part offers and bids. Alberta's energy market allows resources to make their own commitment decisions. For storage, this means managing state of charge is the responsibility of the asset operator, not the AESO. As such, the AESO does not require state of charge be submitted as part of the offer or bid on a time ahead basis. The AESO does require state of charge as a SCADA data point for real-time operations. The AESO will also use this data to assess the Acceptable Operational Reason (AOR) provided by storage resources as part of our ongoing rule compliance assessments for restatements of the energy market submission.

State of charge will be used in the assessment of dispatch compliance where state of charge at 0% is considered an acceptable operating reason for restatement of the energy offer. State of charge cannot be used as the reason for a restatement if the state of charge is greater than zero. This is explained further in the short-term implementation located here. This is not anticipated to be changed as part of the long-term implementation. Further details on state of charge definition will be provided within the recommendation.

Next steps

The AESO will be releasing a Long-term energy storage market participation draft recommendation in early 2021. We will be hosting a virtual engagement session in Q1 2021 where stakeholders will have the opportunity to ask clarifying questions on the draft recommendation prior to submitting written comments. In the meantime, if you have additional questions or comments, please email energystorage@aeso.ca.