

NON-GENERATION RESOURCES IN CAISO ANCILLARY SERVICES MARKET
Comments of MegaWatt Storage Farms on
Issue Paper and Stakeholder Meeting Discussion

December 8, 2009

MegaWatt Storage Farms appreciates the opportunity to provide comments on the CAISO's activities to allow non-generation resources to participate in the Ancillary Services market.

MegaWatt's business is developing, operating and owning electricity storage facilities. MegaWatt also provides advisory services to utilities and others on the capabilities and applications of grid-scale storage. MegaWatt is technology-agnostic. On a project-by-project basis, MegaWatt determines the specific storage needs and applies the best storage technology for that requirement.

Comments

CAISO discusses the use of Limited Energy Storage Resources (LESRs) for Ancillary Services in "Draft Final Proposal for Participation of Non-Generator Resources in California ISO Ancillary Services Market", November 20, 2009, [hereafter "Draft Proposal"] and related documents.

Notation Comments - MW and MWh

In the Draft Proposal, CAISO, at certain points, refers to various MW ratings as energy (e.g. "The resource then procures 2 MW of energy in interval 8." on page 12.)

We realize that the industry sometimes uses the shorthand "1 MWh per hour" by saying "1 MW" which is intending to express an average power level for the duration. However, the distinction between MW and MWh is critical for LESRs. The MWh rating of the storage device is limited by both the maximum capacity of the storage device as well as the immediate state of charge of the storage device. The history of operation of the storage device directly impacts the MWh rating at any instant. In contrast, the MW rating is limited by both the storage device (battery, flywheel, etc.) and the power electronics.

MegaWatt respectfully suggests that CAISO be rigorous in its use of MW and MWh so as to more clearly explain the Proposal, with MW used only for power ratings (e.g. charge and discharge rates) and MWh used for all energy metrics.

We found the example on page 12 unclear and suggest it be revised to more clearly show the steps being taken, to explicitly show the state of charge as both percent charged and MWh, and to indicate the applicable units for each row of data.

Capacity

We also note that at the start of 12.1, CAISO says "In the scenario below, a resource has a rated capacity of 20 MW." This is misleading and would be better expressed as "a resource has a dispatchable range of 20 MW." For an LESR in the scenario described, the power electronics would be capable of 10 MW charge or discharge on the AC side, but would not have a 20 MW rating (20 MW in one direction). Of course, when a generator provides regulation services, it does need a capacity of at least 20 MW to provide 10 MW regulation up and 10 MW regulation down.

On this same issue of "20 MW capacity", are we to infer from the sentence "In the scenario below, a resource has a rated capacity of 20 MW" that CAISO proposes that a 10 MW LESR (10 MW regulation up & 10 MW regulation down) receive a capacity payment of 20 MW? If the intent is different, this should be called out.

Ramp Rates

MegaWatt also respectfully requests that CAISO explicitly identify the minimum MWh capacity required from an LESR to meet the CAISO Proposal. Ramp rate specifications directly affect the the necessary MWh rating of the storage. While there is discussion in the CAISO documents of a continuous energy requirement of 15 minutes for real time regulation, the actual MWh needed to meet this requirement is dependent on the assumptions made regarding the ramp rates. Allowing 10 minute ramp rates would significantly change the MWh transferred. Ramp rate specifications are needed for both the response to the regulation signal and the response to the energy injection/extraction dispatch.

Capital Costs and Storage Durations

The cost of providing ancillary services in the CAISO market using LESRs will depend on the total MWh rating required of the storage device. MegaWatt notes that there has been a tendency in the storage industry to focus on a 15 minute total usable storage capacity as the target capacity needed for regulation (i.e. 0.25 MWh of usable storage per 1 MW power rating). Some other ISO's have used this 15 minute model in developing their specifications for LESRs and MegaWatt's understanding is that some LESR demos on the CAISO grid have had 15 minutes total usable capacity.

Although the CAISO Proposal is not specific on this issue, at least some of the specifications suggest that the CAISO Proposal may require up to 30 minutes of total usable storage in an

LESR. The capital cost of this would be appreciably higher than a storage device with a total usable capacity of just 15 minutes. It is reasonable to expect that this higher capital cost would necessitate higher regulation bids by LESR owners. It is also possible that if the capital cost was too high, some storage technologies would simply not be viable given expected regulation prices. It is in the best interest of CAISO and the ratepayers to have low prices and a multiplicity of technologies competing in the regulation market.

Wholesale Energy Price Risk

At the bottom of page 11, CAISO says the storage resource will be exposed to the volatility of real time energy prices. CAISO is doing the dispatch so the impact of energy price risk on the storage owner should be minimized. Is CAISO planning to use 5 minute energy prices? Hourly average energy prices? Is the same pricing schedule used for both the energy transferred for the regulation services, and the energy transferred for the energy injection/extraction? Is CAISO committing to returning the storage with the same state of charge as it had at the start of the CAISO dispatch period?

An additional factor to consider is round trip efficiency. Storage devices range in efficiency from below 65% to above 90%. The energy injection/extraction calculation needs to account for the losses due to round trip efficiency.

Market Clearing Rules; Asymmetric Bids & Awards

There are a whole series of questions regarding the market clearing mechanism for LESRs. What happens when the storage enters the dispatch period with an asymmetric bid (e.g. 10 MW of regulation up and 20 MW of regulation down), perhaps due to the storage having an asymmetric state-of-charge (perhaps only 33% charged, rather than 50% charged)? What happens if the storage bids 10 MW up and 10 MW down, but due to market clearing price dynamics (we note that regulation up and regulation down are distinct markets at CAISO), the storage is awarded 10 MW up and only 5 MW down (or even 0 MW down)? What 'neutral point' state of charge will CAISO drive towards using energy injection/extraction in the case of asymmetric awards? How does this 'neutral point' play into subsequent bids?

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Thank you again for the work done to date and the opportunity to contribute to the process.

Sincerely,

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