California ISO

Stakeholder Comments Template

Energy Storage and Distributed Energy Resources (ESDER) Phase 4

This template has been created for submission of stakeholder comments on the Straw Proposal Working Group Meeting for ESDER Phase 4 that was held on August 21, 2019. The paper, stakeholder meeting presentation, and all information related to this initiative is located on the initiative webpage.

Upon completion of this template, please submit it to initiativecomments@caiso.com. Submissions are requested by close of business **September 4, 2019**.

Submitted by	Organization	Date Submitted
Grant McDaniel	*Wellhead*	*September 3, 2019*

Please provide your organization's general comments on the following issues and answers to specific requests.

1. **Discussion on non-24x7 settlement of BTM Resources**

   Which areas will require the local regulatory authority to change its rules or provide clarification to load serving entities?

   No comments at this time

2. **Market Power Mitigation for energy storage resources**

   As discussed at the MSC meeting, a DEB that is too high, too low, or that otherwise does not accurately represent the true marginal cost of operating a storage system across its operating range will result in either lost revenue for market participants, early degradation of the asset without appropriate cost recovery, or both. With this in mind, Wellhead appreciates the CAISO's thoughtful approach to this issue and its current priority of first solving for the best fit methodology to determine the marginal cost of battery cycling. Given the nature of CAISO's multi-interval market optimization, the best fit should create a bid set that will encourage the market to use the battery in its economic "sweet spot" while ensuring that the entire capacity is available to the market at an appropriate premium (if any).

   At this time, Wellhead finds that only Option 2 provides the appropriate marginal cost of cycling across the entire operating range AND only if we add segment multipliers based on SOC level. Option 2 as proposed calculates the battery cycle

depth from its output power over time. While this is appropriate, the method as proposed does not account for the additional stress that occurs around the upper and lower SOC edges. To account for this, Wellhead proposes 2 to 3 segment multipliers. The following shows an example of an 80% dispatch of a 20 MW, 80 MWh battery under Option 1 and Option 2 (with segments), where:

- Option 1 r = 20
- Option 2 r = 380
    - r Multiplier [(>70%, <80%), (>30%, <40%)] = 1.3
    - r Multiplier [(>80%, <95%), (>5%, <30%)] = 1.69
    - r Multiplier [(>95%, <5%)] = 8.45

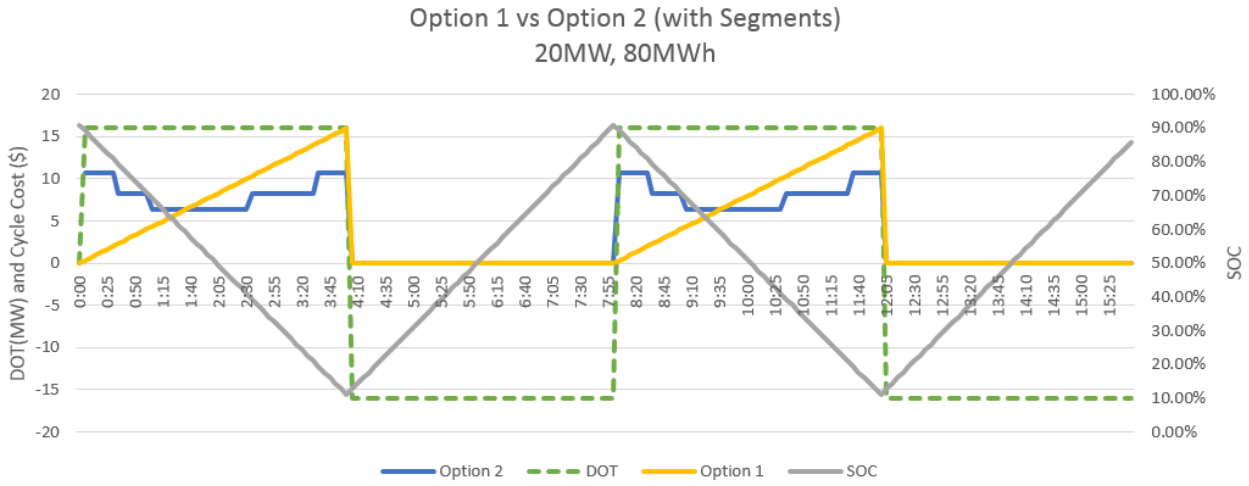

Figure 1

While both Options shown in this Figure 1 example produce the same marginal cost of cycling ($65/day, $41/cycle) the bid set created by Option 1 indicates that the cheapest MW are always the first delivered. This is not necessarily false, but in a multi-interval market optimization this would indicate the that most economic use of the battery *could* very well be from 100% to 60% SOC, which is clearly false.

The bid set created by Option 2 (with segments) in a multi-interval market optimization, would indicate the that most economic use of the battery is in the mid-range (30% to 70%) which is true in this example. At the same time operation closer to the SOC edges is fully available at an appropriate premium.

Figure 2

In the example shown in Figure 2, the same battery is charged and discharge at 10 MW in 15-minute intervals over the same period which results in one full cycle for the day. In this example Option 1 results in just $3.33/cycle where Option 2 with segments results in a more reasonable $31.67/cycle. Wellhead is not arguing that the rho and/or segment multiplier values used in these examples are correct at this time, but they are reasonable enough for discussion and clearly demonstrate that Option 2 with segments can approximate marginal cost across the operating range and varying use profiles.

The use of segment multipliers in Option 2 will also allow for variations by technology and could include multipliers of 1 or even less than 1 if appropriate. Wellhead notes that this method should be extended to SIBR as well. In the SIBR instance, the bid set (which will be monotonically increasing with power output) would also be accompanied by the segment multipliers. Further discussion is obviously required on the specifics and the differences in how the DA and RT market optimizations would differ, but it is Wellhead's hope that this will provide a general roadmap for a more efficient dispatch of storage technologies in CAISO's market in both mitigated and non-mitigated instances.

3. **Variable Output Demand Response resources**

   No comments at this time

4. **Additional comments**

   Please offer any other feedback your organization would like to provide from the topics discussed during the working group meeting.

   No additional comments at this time