



Stakeholder Comments Template

Energy Storage and Distributed Energy Resources Phase 4

This template has been created for submission of stakeholder comments on the Draft Final Proposal and associated May 27 meeting discussions, for the Energy Storage and Distributed Energy Resources (ESDER) Phase 4 initiative. 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 June 10, 2020.**

Submitted by	Organization	Date Submitted
Cody Hill, chill@lspower.com Sandeep Arora, sarora@lspower.com	LS Power	6/10/2020

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

LS Power appreciates the CAISO team's latest iteration on the concepts in the Energy Storage and Distributed Energy Resources Phase 4 stakeholder process. Progress is being made in the right direction on Default Energy Bids and End of Hour State of Charge management in particular, although some work is still needed, and we comment on those below. Importantly however, a critically important item is absent from the Draft Final Proposal despite requests from various stakeholders, and its absence is a major oversight.

Storage is not like traditional generation resources in that its variable costs are not determined by an outside factor like the cost of fuel, and the way that multi-interval optimization treats storage today has the effect of throwing away important information about the cost of these resources, creating suboptimal outcomes. CAISO should discontinue using the buy/sell "spread" concept in the Real Time market, and should instead use the actual bid prices submitted by a storage resource's scheduling coordinator. This issue is a problem today, unlike market power for storage resources, and addressing it is truly low hanging fruit that would improve the functioning of the market with respect to its dispatch of storage resources.

1. Default Energy Bid for Storage Resources

Please provide your organization's feedback on the default energy bid proposal for storage resources, as described within the draft final proposal and discussed during the May 27 stakeholder meeting.

At the previous straw proposal stage we commented that CAISO's Default Energy Bid proposal seemed to be on the right track as a means of applying storage-specific rules in the event that market power mitigation is needed. However, the initial analysis of the proposed default energy bid calculation raises red flags that some parameters need to be refined. Specifically, it appears that the calculated DEB prices on page 26 Table 1 are far too low almost across the board, that Opportunity Costs are generally calculated at a far too low number, and using the previous day's bilateral hub prices to calculate the operating day's opportunity costs is not the right choice, one that will perform at its worst on the very days when it matters most for reliability.

We urge CAISO staff to specifically consider the likely results of taking a large storage project's bid curve down to a DEB in the stated \$32-\$60 range on an extreme day with a potential for sustained high prices, and heightened risk of a loss of load. Without market power mitigation, that resource would almost certainly be willing to charge at high prices in expectation of discharging at even higher prices when truly needed. As we have previously commented, it is not uncommon that a storage resource's opportunity cost on a high load day is well north of \$100/MWh in our experience, particularly in the Real Time market. But if the DEB is applied and the unit discharged by the market at prices below \$60 for example, it will likely end up empty and unavailable sooner than would otherwise be the case, including potentially at the height of the evening peak. CAISO should exercise caution to avoid such a scenario, specifically by calculating expected opportunity costs not off of average days, but off of the most extreme days when these resources are most needed for system reliability.

Part of the problem is the choice to always look at the previous day's hub prices in the calculation. This is not a good idea, especially on days with heatwaves, wild fires, or other events driving high prices and volatility, although on an average day it is probably fine. When weather is extreme and/or load is high, the market power mitigation algorithm should take that into account instead of blindly following the previous day's results, and allow for reasonably high priced bids for both charging and discharging in order to maximize the likelihood that the CAISO operators have full batteries ready to be dispatched when they need them in the evening peak. We recommend that CAISO not risk reliability on scarcity days by running an optimization model based on a prior day or "average" value. Rather, it would be preferable to factor in price spikes from historical extreme days, as well as Real Time market price volatility during the same day, into DEB. To the extent possible, oversupply during the day and evening peak price volatility should also be accounted for and used to adjust the DEBs. Mathematically, one option for these adjustments is to dynamically adjust the scalar 1.1 in the Storage DEB formula, increasing it to a larger value when volatility/risk metrics are sufficiently high.

Lastly, a minor issue noted in the meeting is that the choice of formatting of Equation 1 is confusing, and appears to have an exponential where there should not be one.

2. End-of-Hour Charge Parameter(s)

Please provide your organization's feedback on the end-of-hour charge parameter(s) proposal, as described within the draft final proposal and discussed during the May 27 stakeholder meeting.

The End-of-Hour State of Charge ("EOH SOC") biddable parameter is a very good idea, and we respectfully suggest that CAISO should both implement the EOH SOC biddable parameter, and concurrently make adjustments to the MOO rules allowing its use by resources that are providing RA. We agree and support CAISO in that "a scheduling coordinator should not submit an end-of-hour state-of-charge parameter that is below the resource's must offer obligation, or use it to withhold additional RA Capacity not scheduled in the IFM or RUC" as noted in Draft Final Proposal. However, as discussed at the stakeholder call, not allowing RA resources to use EOH SOC for Real Time markets risks rendering the tool useless and could lead to unintended consequences. Nearly all of the storage being built in CAISO is being brought online to provide RA. These resources will need to use EOH SOC in real time to better manage their SOC's to meet their Day Ahead schedules resulting from their RA obligations. If a resource's use of EOH SOC in Real Time markets is considered to be withholding capacity and that leads to a RA availability hit, then it undermines the cornerstone of most projects' long term contractual revenues and will not be used. As explained below there are several reasons why a RA resource would need to use EOH SOC in Real Time. These should not lead to counting against availability for the resource.

EOH SOC can be a valuable tool for Scheduling Coordinators to ensure that a resource's physical operation resulting from dispatches in the real time market is aligned with any schedules from the day ahead market. Doing so can cover off both the resource's market risks of the type discussed in the previous straw proposal's "Minimum Charge Requirement" section (without that proposal's many downsides discussed at the ESDER 4 meeting in March), where a unit ends up empty and exposed to extreme prices, and the grid operator's risk of not having enough generation to serve load in the evening due to a failure to maintain sufficient aggregate state of charge across the storage fleet.

The way EOH SOC would get used in practice is as follows:

1. A Non Generator Resource ("NGR") submits its Day Ahead bids to CAISO, with economic offers across all hours, thus meeting its RA Must Offer Obligation.
2. This NGR receives a schedule in the Day Ahead market, most likely with a discharge in the evening.
3. The NGR's SC would review the Day Ahead schedule, and develop the next day's Real Time bids for each hour of the day. In order to minimize risk of being empty during the hours with a Day Ahead discharge, it will be desirable to gradually increase the minimum EOH SOC during the hours leading up to the DAH schedule.
4. During the discharge hours of the Day Ahead schedule, the NGR's SC would logically submit an extremely low or no minimum EOH SOC to allow full operation and coverage of the market schedule. As long as the EOH SOC parameter does not prevent the resource from discharging during its DAH schedule, the goals of the CAISO grid operators, CAISO policy team, and the NGR's SC are all in alignment here.

The results are storage units meeting their RA Must Offer Obligations ("MOOs") in the Day Ahead, and then ensuring that it can physically meet its Day Ahead schedule, with reduced risk to the resource and entire system. The tradeoff of this sequence is that it

could somewhat reduce the MW available to discharge in the Real Time market during the hours immediately preceding a Day Ahead discharge. However, this reduction in real time flexibility in off peak hours will dramatically increase the certainty that a resource to be fully available for its Day Ahead schedules when CAISO needs it most, and is far less restrictive than the Minimum Charge Requirements proposal (which was aimed at that exact purpose) and should not affect resource's availability for RA purposes in any way.

There are truly no reasonably likely operational risks that should prevent CAISO from making this tool available to NGRs that have Resource Adequacy contracts. Scheduling Coordinators will naturally be incentivized by their resource's exposure to market prices to minimize the use of this tool, and the tool increases the certainty of resources showing up to hit their Day Ahead schedule. The RA rules for NGRs should therefore be adjusted to allow them to make use of this tool with no reduction of their availability as long as its use supports meeting Day Ahead schedules and is not being used to artificially limit availability in Day Ahead IFM or RUC. Implementing the EOH SOC biddable parameter, and concurrently making the necessary adjustments to the Resource Adequacy and Must Offer Obligation rules should be top priorities in CAISO's Final Proposal for ESDER4.

3. Variable-Output DR

Please provide your organization's feedback on variable-output DR, as described within the draft final proposal and in the ELCC study discussed during the May 27 stakeholder meeting. Please explain your rationale and include examples if applicable.

LS Power has no comments on the Variable-Output DR aspects of ESDER at this time.

4. Additional comments

Please offer any other feedback your organization would like to provide from the straw proposal and topics discussed during the web meeting.

LS Power has previously submitted these comments but since we have not received a response on this we are hereby resubmitting.

NGR resources providing Ancillary Services

Another issue that has not been part of this initiative but was being discussed as part of CAISO' Day Ahead Market Enhancements initiative is the issue of NGR resources not able to fully offer their Ancillary Services capability into the market due to the Day Ahead market construct. Currently NGR resources providing Ancillary Services get awards based on their 1 hour dispatch capability. This is primarily due to the current 1 hour optimization construct for the Day Ahead market and is not in line with CAISO's tariff and BPM definitions of Ancillary service, which state this to be a 30 min product. The issue for NGRs would have been resolved if CAISO proceeded to implement a 15 min market in Day Ahead. Since CAISO is no longer proceeding with a Day Ahead 15 min market, the NGR AS issue should be addressed in this ESDER initiative. Non-generating resources (NGRs) with a state of charge should be required to be capable of a 30 minute discharge to be awarded regulation-up, spinning reserves and non-spinning and 30 minute charge to be awarded regulation down and not 1-hour. We recommend that CAISO include this issue in the scope for ESDER4.