California ISO

Stakeholder Comments Template

Energy Storage and Distributed Energy Resources Phase 4 – Work Shop

This template has been created for submission of stakeholder comments on the ESDER Phase 4 - Workshop that was held on June 27, 2019. The workshop, stakeholder meeting presentations, and other information related to this initiative may be found on the initiative webpage at:
http://www.caiso.com/informed/Pages/StakeholderProcesses/EnergyStorage_DistributedEnergyResources.aspx

Upon completion of this template, please submit it to initiativecomments@caiso.com. Submissions are requested by close of business on **July 11, 2019.**

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Please provide your organization's comments on the following issues and questions.

As an overarching principle, CPUC staff requests that the CAISO market rules for energy storage, including its proposed default energy bid (DEB) calculation and approach, should be made with particular goals in mind. For instance, CAISO could clearly state that the rule changes should seek to support California's goals for energy storage procurement as provided in Assembly Bill 2514. These goals include:

(1) Increasing the integration of renewables at their full capacity and with reliable operations;
(2) Reducing the need for fossil-fuel powered peaking generation and reducing the purchase of generation with emissions of greenhouse gases, and
(3) Grid optimizing by reducing the use of fossil fuel generation to meet peak demand, avoiding or delaying investments in new and existing transmission, distribution and fossil fuels peaker powerplants, and eliminating and or reducing transmission and distribution losses.[1]

CPUC staff suggests that CAISO adopt clear objective(s) for storage market participation rules so that the implementation of market changes can be measured against the objective(s) to ensure that whatever market DEB occurs meets the pre-established goals. To that end, CPUC staff suggests

[1] *Assembly Bill No. 2514, Chapter 469*, Approved by the Governor September 29, 2010, filed with the Secretary of State September 29, 2010, Section 2, 2837.

that the CAISO design reporting concurrently with market changes such that market participants can easily see whether storage market behavior changes in-line with proposed goals.

1. Default Energy Bids for Energy Storage

Please provide your organization's feedback on the ISO's presentation on the *default energy bids for energy storage* topic. Please explain your rationale and include examples if applicable.

CPUC staff believes that the current energy storage bidding options do not capture the real motivations and costs for this type of resource, and therefore default energy bids (DEBs) based on these options will not be appropriate. Instead, CPUC staff recommends that the CAISO pursue development of the spread bidding option for energy storage that was discussed at the June 27, 2019 workshop. A new type of DEB could then be developed as a default spread bid. Staff recommends that this new DEB be based on operations and maintenance costs, as well as opportunity costs.

Allow Minimum Spread Costs for Day-Ahead Bidding

Currently, energy storage resources must submit a bid for the price at which they are willing to buy, and for the price at which they are willing to sell. The costs that are incurred through energy storage's operations are recovered through the difference between the prices at which the energy storage buys energy and the prices at which the energy storage sells energy. To bid into the market, energy storage owners must predict future prices and then set bids to buy and sell energy according to their predictions.

Because the operating costs of energy storage resources are recovered through the differences between their buy and sell prices also referred to as the spread, CPUC staff believes that these resources should be able to reflect their willingness to participate in the market as the difference or desired spread between buy and sell prices. For example, if an energy storage resource needs to make $30 for each megawatt (MW) they buy and sell in order to turn a profit, then their bids should consist of that $30 number. The energy storage resource is indifferent to buying at $5 and selling at $35 versus buying at $50 and selling at $80 as long as that $30 spread is there. If an energy storage resource could submit their necessary spread, it could be used by the market in either the ($5, $35) or ($50, $80) scenario. Under the current system, energy storage owners must predict when they should charge, and discharge based on price forecasts. If an energy storage owner predicts the ($5, $35) scenario and then the ($50, $80) scenario happens, they will likely not operate. For the case when the energy storage resource predicts the ($5, $35) situation, even if reality lands at ($7, $37) they may not operate. However, if the energy storage owner were able to submit the $30 spread bid, they could operate under all of these scenarios and provide significantly greater value to the market and to California ratepayers.

CPUC staff also understands that the current CAISO real-time optimization may not be able to account for resource opportunity costs completely. Since the real-time market only looks out four and ½ hours, if the optimal action is to charge in a given hour and then discharge six hours later, the real-time market will not be able to schedule the resource optimally. Some

adjustments may also need to be made to account for the energy storage's opportunity costs. These spread bids costs could be adjusted for the actual number of cycles in the given day.

The Day-Ahead Market performs a longer outlook and should be able to account for a resources' opportunity costs within the optimization. For this reason, CPUC staff believes that the use of spread bidding is more easily implementable in the Day-Ahead Market. Staff recommends that the CAISO work on developing an energy storage spread bidding option for the Day-Ahead Market now, and then afterwards look at how to implement this option in the real time.

Include Variable Operations and Maintenance Costs in DEBs

CPUC staff supports the CAISO's consideration of cycling, energy, losses and opportunity costs in DEB calculation. CPUC staff would like to confirm that the DEB would account for the variable operations and maintenance (VOM) costs of energy storage. During an early stage of the ESDER Phase 4 process, LS Power requested that the CAISO allow energy storage owners to inform the CAISO of their VOM costs of cycling a battery in $/megawatt hour.[2] CPUC staff supports the use of these VOM costs in any DEB calculation that the CAISO proposes. Properly structuring these costs may include an ability to reflect different spreads for different levels of charging and discharging. For example, an energy storage resource could have 40 MWs of capacity that needs $30 between its buy and sell prices to cover costs, and then another 10 MWs of capacity that could be available but needs $100 between its buy and sell prices to be worthwhile. This kind of stepped spread bidding would not be particularly different than the stepped bid segments for variable cost DEBs. CPUC staff understands that the lack of ability to incorporate these correct costs may also be related to low compensation of costs in the Bid Cost Recovery (BCR) process. Including these costs may also improve BCR outcomes for energy storage resources.

Discuss Negotiated Energy Storage DEBs

CPUC staff believes that it is appropriate to allow energy storage resources the opportunity to negotiate resource specific DEBs with the CAISO as other resources are currently allowed to do under the negotiated DEB option. Due to the new and developing technologies that fall under the energy storage resource umbrella, this option is particularly important for these resources no matter which type of DEB and bidding construct the CAISO adopts.

Please provide your organization's feedback on DMM's presentation on *default energy bids for energy storage*.

The presentation by the Department of Market Monitoring (DMM) was an excellent demonstration of the mechanics of opportunity cost for energy storage resources. Unfortunately, it does not lead to any actionable policy developments. DMM seems to suggest that the CAISO could take a set of predicted prices and from those prices calculate an opportunity cost for an energy storage resource that has market power and use that calculated cost in a Default Energy Bid (DEB).

[2] *LS Power stakeholder comments on the Energy Storage and Distributed Energy Resources (ESDER) Phase 4 Issue Paper*, February 27, 2019, p. 5.

CPUC staff has two concerns with DMM's DEB calculation approach. First, the estimation of prices for a resource that has market power necessarily depends on the resource's bids. Prices for the resource are a function of bids for the resource. This is essentially the definition of market power. Because of this fact it would be very difficult to estimate prices in a way that was independent of the resource's bidding behavior. Price estimations that are not independent of the bidding behavior can be manipulated by the resource. The second issue arises when the resource's bid is mitigated. Because the bids have an impact on prices, mitigation of the bids will change prices. This means that the calculation of opportunity cost that was done on the estimated set of prices will no longer be relevant because the mitigation creates a new set of prices. This new set of prices then represents the resource's real opportunity costs.

CPUC staff appreciates DMM's work on this and the role this presentation plays in advancing the conversation on how to include energy storage resources in the market.

Please provide your organization's feedback on SCE's presentation on *resource availability.*

Other Stakeholders Requests for Spread Price Bidding

Southern California Edison (SCE)'s presentation on *Energy Storage Participation in the CAISO Markets, Battery Storage Availability as a System Resource* also recommended that the CAISO allow energy storage owners to bid their minimum price spread between charging and discharging, which CPUC staff supports for the reasons provided in the response to question 1.

Additional Grid Benefits with Spread Price Bidding

SCE's presentation also illustrated the additional grid benefits that could be gained if energy storage resources were allowed to submit their minimum price spread in their bid. These additional grid benefits include increased capacity to schedule energy storage for energy during the evening ramp and peak hours. If an energy storage resource is used to serve the evening ramp and peak hours, it would likely displace higher cost gas generation, along with the associated greenhouse gas emissions.

In 2018, the energy storage participating in the CAISO energy markets was primarily scheduled for regulation (referred to as reg up and reg down) grid services instead of evening peak hour energy as reported in the Department of Market Monitoring (DMM)'s 2018 annual report.[3] Based on discussions with DMM and other stakeholders, this trend could be related to limited experience operating energy storage in the CAISO market, warrantee agreements as well as other possible factors. For reference, there are 13 energy storage resources on the CAISO grid that have a total megawatt capacity of approximately 150.[4]

For SCE, scheduling energy storage in the CAISO market has two challenges which are: (1) forecasting real-time prices, and (2) changing bids in the real-time. Given these challenges, SCE opted to schedule its energy storage primarily for regulation services versus energy in 2018. As a remedy to these challenges, SCE suggested that the CAISO consider allowing energy storage owners to bid their minimum price spread between charging and discharging prices. With a spread price bid, SCE stated that energy storage owners could establish their

[3] *2018 Annual Report, Department of Market Monitoring*, May 23, 2019, p. 11.
[4] *2018 Annual Report on Market Issues and Performance*, Department of Market Monitoring, May 2019, p. 271.

minimum recovery costs needed to schedule a resource for energy.[5] During the stakeholder discussion on these stated challenges, a Pacific Gas and Electric Company (PG&E) representative stated that PG&E is experiencing the same scheduling challenges as SCE with the energy storage they own, and for these reasons PG&E also found it more valuable to provide regulation services versus energy in 2018.

CPUC staff supports further investigation of the spread price bid option for energy storage based on this stakeholder presentation discussion to enable energy storage to meet evening ramp and peak hour needs at potentially lower costs and with reductions in greenhouse gas emissions during the evening peak time frame and for the reasons stated in the answer provided to question 1.

2. NGR State-of-charge parameter

Please provide your organization's feedback on the ISO's presentation on *the NGR State-of-charge* topic. Please explain your rationale and include examples if applicable.

As stated in the CPUC staff comments on the ESDER Phase 4 proposal submitted on May 17, 2019, CPUC staff supports the State of Charge parameter proposal because it

> "allows scheduling coordinators to achieve the optimal use of an energy storage resource throughout the day through desired end-of-hour SOC parameters. The SOC parameter proposal is thus useful overall to achieving the Multiple Use-case Application (MUA) framework[6] developed jointly by CAISO and CPUC.[7]"

CPUC staff and stakeholders also made recommendations on the CAISO's approaches to address when an energy storage resource would not be eligible for Bid Cost Recovery based on their state of charge bid or charging activity.[8] Specifically, stakeholders identified new directions for the CAISO to pursue on this topic. The new directions include: (1) counting the total MWs of SOC and then using that number to track when the energy storage resource has acquired the desired SOC, and (2) possibly using the shadow price on the constraint related to the SOC as an indicator of when the energy storage resources is being moved for the SOC and not for other purposes. CPUC staff looks forward to working with the CAISO and stakeholders on how to design this process.

Please provide your organization's feedback on WPTF's presentation on *the NGR State-of-charge* topic.

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[5] *California ISO (CAISO) Energy Storage and Distribution Energy Resources Phase 4 (ESDER 4) Working Group Meeting*, June 27, 2019, p. 4.

[6] *Decision 18-01-003, Decision on Multiple-Use Application Issues, issued January 17, 2018 in R.15-03-011, Order Instituting Rulemaking to consider policy and implementation refinements to the Energy Storage Procurement Framework and Design Program (D.13.-10-040, D.14-10-045) and related Action Plan of the California Energy Storage Roadmap*.

[7] *CPUC stakeholder comments on Energy Storage and Distributed Energy Resources Phase 4 Straw Proposal*, May 17, 2019, p. 1.

[8] CAISO Energy Storage and Distributed Energy Resources Stakeholder Workshop (Presentation), June 27, 2019, slides 23-32.

The Western Power Trading Forum (WPTF) presentation on the NGR State of Charge topic suggests that the CAISO's State of Charge (SOC) parameter proposal allow scheduling coordinators to have the option to submit a SOC target as well as range.[9] This would allow energy storage scheduling coordinators to take advantage of all market opportunities that are feasible and still comply with reliability obligations if the energy storage is also required to meet storage as transmission asset needs or other services.[10]

CPUC staff agrees that this proposal would enhance the management of energy storage and thus supports WPTF's proposal.

3. Variable Output Demand Response

Please provide your organization's feedback on the ISO's presentation on *the variable output demand response* topic. Please explain your rationale and include examples if applicable.

CPUC staff may comment on these issues in a later comment period.

4. Maximum Run Time Parameter for DR

Please provide your organization's feedback on the ISO's presentation on *the maximum run time parameter for DR* topic. Please explain your rationale and include examples if applicable.

CPUC staff may comment on these issues in a later comment period.

Additional comments

Please offer any other feedback your organization would like to provide on the topics discussed during the workshop.

[9] *WPTF State of Charge Proposal (Presentation)*, WPTF, June 2019, slide 6.
[10] *WPTF State of Charge Proposal (Presentation)*, WPTF, June 2019, slide 8.