California ISO

Stakeholder Comments Template

Energy Storage and Distributed Energy Resources Phase 4 – Work Shop

Submitted by	Organization	Date Submitted
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Please provide your organization's comments on the following issues and questions.

1. Default Energy Bids for Energy Storage

SCE is encouraged by the CAISO's move toward a more empirical approach by soliciting data from stakeholders, in regard to key determinants of storage costs.

As stated in its prior comments[1], SCE continues to find that the option to combine the existing variable cost option with new adders may show promise. The option on semi-customizable DEB for storage resources needs further detailing, as requested by SCE in its prior comments.

SCE is also encouraged by the DMM presentation on this topic[2]. As mentioned by SCE in its prior comments, the price forecast is key to any proper performance of such a proposal. This was also noted by the CPUC during the call while emphasizing on protection against the exercise of market power. The DMM also noted the importance of this element in its presentation. In addition, the DMM also noted that the proposal also hinges on the future assumption of the SOC.

a. What are the key contributors to battery marginal costs to operate?–In this discussion, were there any key costs that were omitted?

b. How does the depth of discharge impact these costs?

c. What is the cost for replacing a battery cell replacement and how much do those costs change in the future?

[1] http://www.caiso.com/Documents/SCECommentsonEnergyStorageandDistributedEenergyResourcesphase4StrawProposal.pdf

[2] http://www.caiso.com/Documents/DMMPresentation-EnergyStorage-DistributedEnergyResourcesPhase4-Jun27-2019.pdf

SCE Comments:

a) The CAISO correctly identified key marginal costs

b) Although depth of discharge and number of cycles directly affect battery degradation, a better metric to capture these attributes is energy throughput (i.e., the amount of energy discharged). For example, considering a 100MWh battery system, a 400MWh energy throughput could be the result of 4 cycles at 100% Depth of Discharge (DoD), or 8 cycle a 50% DoD leading to a similar (but not identical) degradation. This approach is already widely used by battery suppliers in their warranty terms, where the battery degradation will be a function of energy throughput.

c) When considering managing battery degradation two approaches are usually considered; (1) maintaining system energy capacity by periodically adding capacity (i.e., adding battery modules), typically referred to as system augmentation or (2) allowing the energy capacity to degrade, which leads to a reduction in capacity to maintain the same discharge duration (e.g., 4 hr. to support RA). Ultimately, after a defined level of degradation, battery replacement may be considered. The cost will be based on the labor required to replace the battery modules, and the cost of the actual modules at the time of replacement. Lithium-ion batteries are still following an aggressive cost reduction curve, with another 35% reduction expected by 2023.

2. NGR State-of-charge parameter

SCE is not opposed to exploring different options within the ESDER framework. However, the CAISO has yet to address the demonstrated concerns raised by SCE in its prior comments. These include, an SC specified SOC parameter:

a. Reduces the CAISO fleet's flexibility when the CAISO consistently asks for greater flexibility in every other stakeholder initiative.

b. Reduces the expected profits of resources that avail of this parameter.

c. Increases the frequency of uneconomic participation.

d. Increases the risk for BCR gaming. A proposal increasing the possibility of BCR gaming should be avoided more so given the CAISO's history of susceptibility to such behavior.

All of these items are serious concerns. Most importantly, a proposal that increases the risk of BCR gaming is sufficient reason, by itself, to not propose concepts that have not been carefully vetted.

The CAISO should note that the two 2011 emergency filings at the FERC were due to BCR gaming[3]. The nature of such gaming involved setting up resources to get the CAISO to commit them thereby ensuring BCR with certain bid setups. The current CAISO proposal is focused on allowing resources to set up their SOC so that they may be eligible for commitment. While the setting up toward commitment may not allow BCR eligibility, the CAISO may find itself in situations where certain resources are best suited for commitment due to prior SC-provided SOC targets. The CAISO has not properly vetted that their processes are not susceptible to gaming under this proposal of allowing SC-provided SOC targets.

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.

The CAISO stated[4] in its Working Group presentation that it will advance the variable-output demand response issue by discussing how to perform a Loss of Load Expectation (LOLE) study and establish an Effective Load Carrying Capability (ELCC) value for variable-output Demand Response (DR). It would be beneficial to moving the stakeholder discussion forward, if the CAISO provided quantitative examples that show the impact of the ELCC method that the CAISO envisions on DR Resource Adequacy MW.

Further, the CAISO stated[5] it is considering leveraging industry experts for the purposes of developing an ELCC approach for California variable-output DR. The CAISO should include key California stakeholders (e.g. CPUC, IOUs, other DR stakeholders) in exploring a potential ELCC approach for DR. Furthermore, any such approach should be coordinated with the CPUC within its Resource Adequacy framework.

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.

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[3] http://www.caiso.com/informed/Pages/StakeholderProcesses/CompletedClosedStakeholderInitiatives/PostEmergencyBidCostRecoveryFilingReview.aspx

[4] P. 35, http://www.caiso.com/Documents/Presentation-EnergyStorage-DistributedEnergyResourcesPhase4WorkingGroup-Jun27-2019.pdf

[5] P. 50, http://www.caiso.com/Documents/Presentation-EnergyStorage-DistributedEnergyResourcesPhase4WorkingGroup-Jun27-2019.pdf

The proposed solution to the max run time issue the CAISO presented at the June 27, 2019 Stakeholder Workshop, is a significant step towards addressing the issue that stakeholders, including SCE, have raised concerning the management of the run time for DR resources. At the June 27 CAISO Working Group meeting, SCE stated that a max run time per day parameter can be very effective at managing use-limits for DR.

In the proposal[6], the CAISO defines max run time as the "maximum amount of time a unit can stay on-line after being started-up."

This definition works well and is effective at addressing the run time limitation for resources that have run hour imitations tied to each event (e.g. one event or start per day and 4 hours per event). However, it is not effective at addressing the issue of resources that have a limit on the number of total event hours per day, regardless of the number of events/starts.

For example, SCE's Summer Discount Plan (SDP) (air conditioner cycling), a 200+ MW demand response (DR) program, has the flexibility of allowing multiple events (starts) per day during Hour Ending (HE) 12 through HE 20, but no more than four event hours per day. Due to the temperature sensitivity of the SDP DR program, expected output (load drop) varies by hour throughout the day, and therefore the current Maximum Daily Energy Limit parameter in the CAISO market model is not effective at managing the run hour restrictions. If a DR program's use-limit was managed by the SC with the max run time per start parameter (as proposed by the CAISO), the SC would have to conservatively specify in the Resource Data Template (master file) a max daily number of starts equal to one (1), and max run hours per start equal to four (4) to avoid infeasible award patterns. By doing this, the SC would achieve feasible awards and the CAISO would achieve more certainty around resource performance according to awards, but the market would miss out on possible higher value associated with the true capabilities of the resource. Essentially, in this example, the market would clear this resource in the highest valued contiguous hours (in a sequence of one (1) hour to up to four (4) hours), but the market would miss out on the opportunity associated with possible higher value achieved by awarding up to four (4) hours spread out throughout the day. This is a clear example of where a max run time parameter that is defined as the maxium run time per day (maximum online time per day) would more effectively manage the use-limit of the resource, while providing the SC and the market more value and predictability from the resource.

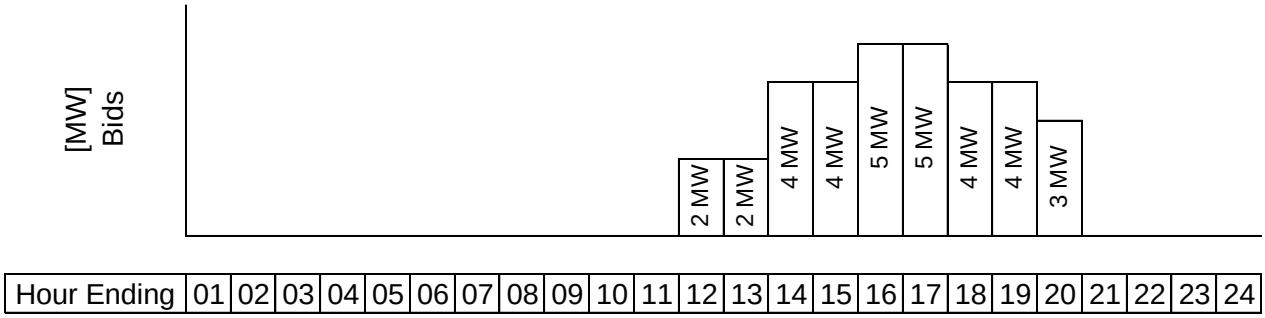
Illustrative example:

For discussion purposes, consider a resource with available load drop that varies by hour, and is subject to hour limitations of max four hours event time per day (but it allows for multiple events day).

[6] P. 53, http://www.caiso.com/Documents/Presentation-EnergyStorage-DistributedEnergyResourcesPhase4WorkingGroup-Jun27-2019.pdf

1) Resource offered(bid) into CAISO for all available hours:

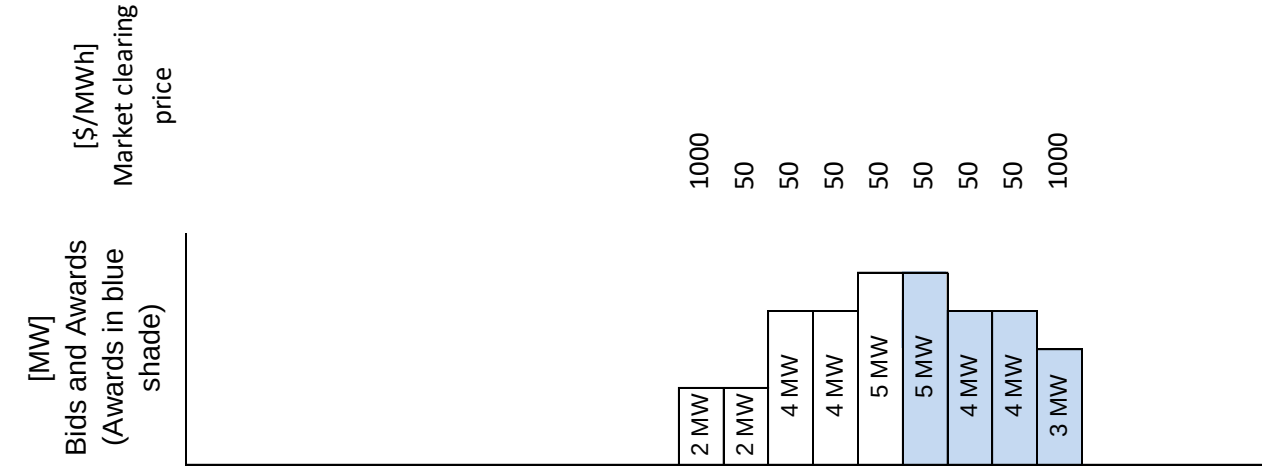
The resource in this example is bid in according to its variably (by hour) MW output.



Hour Ending	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

2) Max run-time per start solution (i.e. CAISO proposal, June 27 Working Group):

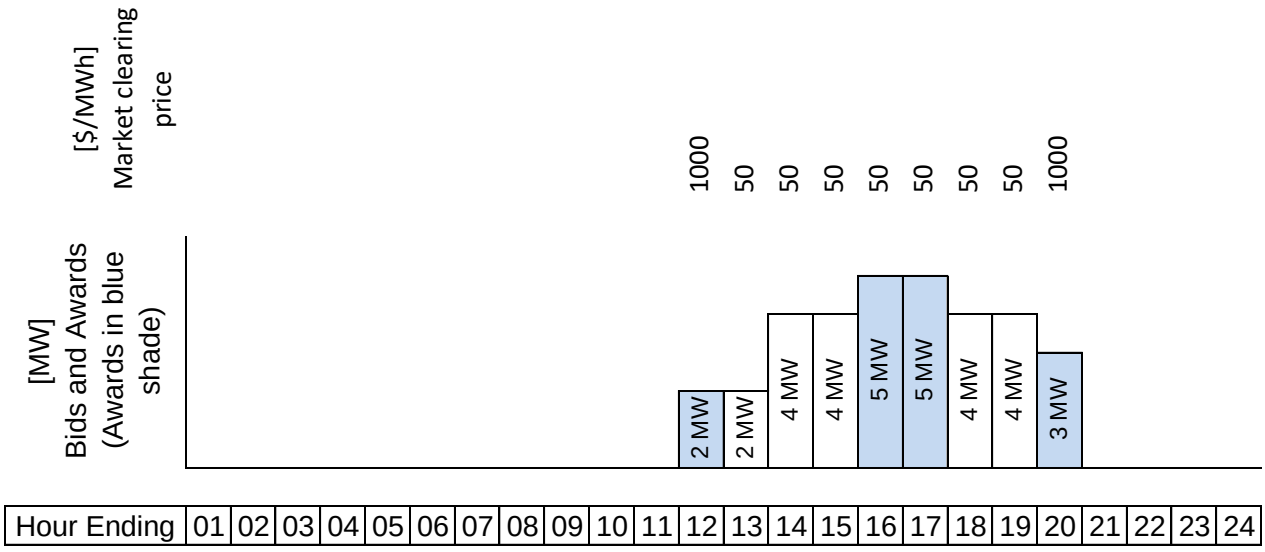
If the resource's use-limit is managed with the max run time per start parameter as proposed by CAISO, CAISO awards the four contiguous hours of highest value. In the example below, with market clearing price assumptions shown, the award would yield a total value of $3,650:



Hour Ending	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

3) Max run-time per day solution:

If the resource's use-limit is instead managed with the max run time per day parameter (as discussed and proposed by SCE above), CAISO awards the four hours of highest value. In the example below, with the same market clearing price assumptions as shown above, the award would yield a total value of $5,500.



SCE suggests that both the max run time parameter per event and per day (optional to use at SC's discretion) will help the CAISO get a more accurate view of what DR resources can contribute to the grid, and lead to more accurate awards that the DR resources can consistently fulfill (e.g. if a max run time parameter is implemented, DAM awards would be in line with the DR resource's capabilities, and as a result SCs could reduce their use of other means like outages to reflect the infeasabilitiy of the DAM awards). Battery-backed (i.e. Behind-the-Meter energy storage) DR is another type of DR resources whose run-hour use limit could be better managed with max daily run time parameters, in particular if there are daily charging restrictions tied to the resource's use-limitations.

In the CAISO's proposal[7], on page 58, the CAISO states that it plans to develp the max run time per start, but with certain rules. The CAISO puts forward a suggested max runtime threshold and suggested a 4 hour threshold to align with Resrouce Adequacy requirements. SCE thinks the max run time paramters should be set by the SC and could be potentially less or more than 4 hours, based on the DR resource characteristics. Further, SCE notes that a max run time parameter can be useful for any type of DR resource, not just DR resources that provide Resource Adequacy. Additionally, a max run time per day parameter can be useful for resource types other than DR as well (e.g. hydro).

Finally, SCE proposes that the CAISO implement two max run time parameters:

1) Max run time per start (as proposed by CAISO, similarly defined as minimum run time)
2) Max run time per day (similarly defined as Maximum Daily Energy Limit)

[7] http://www.caiso.com/Documents/Presentation-EnergyStorage-DistributedEnergyResourcesPhase4WorkingGroup-Jun27-2019.pdf

Additional comments

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