California ISO

Stakeholder Comments Template

Energy Storage and Distributed Energy Resources Phase 4

This template has been created for submission of stakeholder comments on the Second Revised Straw Proposal and associated March 2 & 3 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 **March 16, 2020.**

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

LS Power truly appreciates the CAISO team's proactive and open discussions on how to improve the integration of energy storage and distributed energy resources into the market. As background, LS Power has been operating a Battery Storage resource since 2018 and has direct experience on many of the questions brought up in this initiative, and we applaud the CAISO's leadership in integrating storage into its markets. In this ESDER4 proposal, there are several very good ideas under discussion, as well as some that need significant amounts of work, but all of it is focused on important specific concerns about how to operate these resources in the future, and we are glad to have the opportunity to contribute to the conversation. We will respond to most of the stated question areas below, but wish to first highlight an important consideration that CAISO should take up in this ESDER4 stakeholder initiative.

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.

CAISO's current use of the "spread" between charge and discharge prices as opposed to the actual bid values (submitted as $/MWh price pairs) has many undesirable side effects in the Real Time market, and thus the physical operation of storage resources. Note that this existing structure works in the Day Ahead market, because of the 24 hour optimization window, and no change is needed there.

Once a resource has a DAH award, there is now actual price discovery for the resource for the day, and its operation in the Real Time should be in relation to the LMPs it sees in the Day Ahead (i.e. if you are selling energy in the evening for $100, you would not discharge your resource ahead of that time period unless prices are much higher) which seems obvious. At this time, the SC better knows its marginal costs for the day, and can make this information available for CAISO to optimize dispatch for the region.

However, CAISO currently ignores the absolute $ value in the real time optimization, and instead effectively looks for a spread between charge and discharge prices expected to occur over the upcoming intervals, so a bid that says “charge below $35 and discharge above $65” is instead treated by CAISO as “charge and discharge any time you expect a difference bigger than 65-35=$30. Thus, CAISO can and does discharge storage resources today in Real Time for prices that are lower than what resource owners have bid in, such as in the scenario where prices are currently $30 but CAISO expects a negative price later, in which case it will discharge the above resource with a “Sell only above $65” bid in the market. Depending on the Day Ahead schedule this can lock in losses for the storage resource, and more importantly for system reliability it can leave the resource emptier than it would have otherwise been later in the evening when it is really needed. This current practice inadvertently leads to CAISO disregarding important information from resource owners on what the marginal costs of operating their projects actually are.

Today there are relatively few storage resources in the market, so the impact of CAISO’s uneconomic dispatches is minimal, but scaling this current practice to 1000s of MWs of storage in future would lead to uneconomic consequences for many resource owners and will have CAISO unnecessarily risking reliability. CAISO is clearly concerned about the reliability issues stemming from having storage resources discharged at the wrong time, and on the basis of good market design principles it should also reconsider its current practices, which we do not think would get FERC approval as currently implemented if it were reviewed, given that it in effect discards the instructions of resource owners as to what prices they are able to charge and discharge their resources at.

LS Power has brought this up several times in recent years, and hope that CAISO will take this discussion up in ESDER4 stakeholder process, particularly now that so much storage is about to come online. Many new storage resource owners and SCs are about to discover this current quirk of the market and will have the same request as we do. We look forward to collaborating with CAISO and other stakeholders on this topic.

1. **Demand Response (DR) ELCC Study Preliminary Results**

   Please provide your organization’s feedback on the Effective Load Carrying Capability (ELCC) study preliminary results for DR resources, as discussed during the March 2 (day 1) stakeholder meeting. Please explain your rationale and include examples if applicable. Please also include any additional study results that would be helpful on this topic.

   No comments at this time.

2. **Operational Processes and Must Offer Obligations for Variable-Output DR**

   Please provide your organization's feedback on the proposed operational processes and must offer obligations for variable-output DR, as described within the second revised straw proposal. Please explain your rationale and include examples if applicable.

   No comments at this time.

3. **End-of-Day State of Charge**

   Please provide your organization's feedback on the proposed end-of-day state of charge, as described within the second revised straw proposal. Please explain your rationale and include examples if applicable.
   The End-of-Day State of Charge Parameter as proposed would be a useful tool, specifically for Scheduling Coordinators to manage their energy storage asset's physical operation to meet contractual requirements they may have with other market participants such as load serving entities. It is not something everyone will want or need to use, and should strictly be optional. We anticipate most storage SCs would view the tool as presenting too high of a lost opportunity cost to use aggressively (i.e. due to foregone sales at high prices during the evening, or due to charging at higher than necessary prices just before midnight), and as such do not feel that the simulations that were presented suggesting that this tool would harm reliability are reflective of reality due to the disciplined self-interest of actual resource owners exposed to market prices.

   As several groups agreed during the ESDER meeting on 3/3, the most practical version of this would be to simply state what the minimum SOC a resource should be at the end of the day, as opposed to specifying a particular SOC (i.e. it would be useful to specify "at least 20% SOC at midnight", but nearly useless to specify "exactly 20% SOC at midnight").

   If there is any question of whether to prioritize End-of-Day or End-of-Hour state of charge parameters, End-of-Hour should clearly be the higher priority.

4. **End-of-Hour State of Charge**

   Please provide your organization's feedback on the proposed end-of-hour state of charge, as described within the second revised straw proposal. Please explain your rationale and include examples if applicable.

   This is an excellent proposal, and would be a very useful tool for Storage SCs, and would provide CAISO operators with much more certainty that storage resources will meet their Day Ahead schedules while still providing substantial flexibility in Real Time. Of the items in ESDER 4, this should be CAISOs top priority for implementation. As with the End-of-Day parameter discussed above, this should be implemented as an optional tool for SCs to manage all NGRs, and should be implemented for a range rather than a specific SOC (i.e. it would be useful to both resources and the grid operator to have an SC specify "at least 20% SOC at 10 AM", but nearly useless to specify "exactly 20% SOC at 10 AM").

   It would also eliminate much of the risk described of resources all becoming empty in Real Time mid-day, and then failing to have energy available for their Day Ahead schedules.

5. **Default Energy Bid for Storage Resources**

Please provide your organization's feedback on the proposed default energy bid for storage resources, as described within the second revised straw proposal. Please explain your rationale and include examples if applicable.

We feel that the DEB proposal is headed in the right direction. We encourage CAISO to revisit how it thinks about opportunity costs for storage, especially in the Real Time market. Provided it calculates these in an appropriate way we feel that the DEB proposal will be workable.

It is desirable for the entire CAISO controlled grid to have storage resources dramatically increase the price they are willing to charge and discharge for on days with RT high volatility, such that the storage resources can fill up to be available for conditions when the need is most acute, and these fast responding resources can be most valuable. Care should be taken by CAISO to calculate the opportunity cost parameters on a rapidly sliding scale, and not to artificially cap them at too low values that would result in any bid-mitigated resource discharging at too low a price and not being available when operators really need it.

6. **Minimum Charge Requirement**

Please provide your organization's feedback for inclusion of the minimum charge parameter in the ESDER initiative, and feedback on presented material at the stakeholder meeting on March 3, 2020.

1. The current proposal is not workable, should be dismissed and CAISO should prepare a new proposal based on inputs received at the stakeholder meeting.

While LS Power and all of the other stakeholders at the meeting recognized the importance of putting in place tools to prevent shortfalls of generating capacity on days when the grid is depending on storage in certain hours, the specific MCR proposal is grossly overreaching and goes against basic market principles. As various stakeholders brought up, the proposal is discriminatory against energy storage resources, encourages resources to withhold capacity from the Day Ahead market in order to participate in Real Time, works against the CAISO's long stated desire to get more flexible resources online and bidding into real time markets, and may give rise to a host of other unforeseen consequences. This current proposal should be dismissed and CAISO should work with stakeholders to prepare a new proposal.

2. This drastic and unnecessary action is based on a faulty premise that resource owners would ignore the risk of large losses during high price periods.

As was discussed at the meeting, the assumption that resource owners would bid their resources in a way that leaves them empty during their dispatch schedules, thus exposing them to massive losses every evening is extremely unrealistic. And it is this unrealistic scenario that is used to justify taking any storage resource with a Day Ahead schedule out of the Real Time market for the entire day leading up to the Day Ahead discharge. Further, the addition of tools such as End-of-Hour State of Charge could give SCs a vital tool for such risk mitigation, further reducing if not eliminating the already small likelihood of the reliability event used to justify the MCR proposal.

Since well over 90% of the market is scheduled in the Day Ahead market, we should expect that a similarly huge proportion of energy storage resources would be effected in this way, an undesirable outcome for both CAISO operators and anyone considering investing in energy storage.

The MCR proposal as-is would effectively remove the vast majority of the capacity from energy storage projects, many of which are the most flexible resources CAISO can dispatch, and it would remove them from the market during the afternoon solar ramp-down hours ("the neck of the duck") when it needs them most. This would be a totally unnecessary and undesirable outcome.

3. To address reliability risks in the future when CAISO is dependent on large quantities of storage to serve load, and lacks reserve margin to deal with such resources becoming empty at the wrong time, we offer several considerations for minimizing the reliance of out of market actions.

When it needs to, CAISO will of course use the out-of-market tools already at its disposal such as exceptional dispatch to maintain reliability. Contrary to the approach in the current MCR proposal, CAISO should seek to minimize the amount of exceptional dispatch-like activity, such as removing many resources from a market potentially for many hours. Instead, CAISO should apply a test to determine if exceptional dispatch is necessary, which should be straightforward as this is a simple calculation of how much generation is available, and how much time remains in the day before CAISO enters into the period where supply is tight.

If grid conditions are such that there is so little generation reserve margin in certain hours that an exceptional dispatch is necessary, then CAISO should remove a unit from the Real Time market only after it has calculated that there is actually such a scarcity event coming up. And even then, the market intervention should be on the minimum number of time periods and MWs necessary to ensure reliability.

For example, even if CAISO does anticipate having if there is a brief period of scarcity driving a price spike in the real time market, and prices exceed offer costs that a resource's SC has bid in (again, our note in the introduction about using actual $/MWh offer costs and not spreads applies here), and there is plenty of time to charge the resource back up before the unit's Day Ahead schedule, then CAISO should award the resource a discharge now, and a charge later, before the Day Ahead schedule. Thus, rather than the current proposal's approach of taking a unit out of Real Time all day every day if it regularly has Day Ahead discharge schedules in the evening, CAISO would only need to remove the resource from Real Time during a few hours prior to the evening discharge, on only those few days where there is actually a reliability need that justifies doing so.

We look forward to collaborating with the CAISO team to define the appropriate exceptional dispatch measures to ensure reliability specifically on days with tight generation and storage reserve margins for the future. In all non-scarcity periods, we encourage CAISO to explore whether the pricing signal could be improved to drive desired outcomes on an economic basis.

7. **Additional comments**

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

CAISO should add the ability for NGR owners to more accurately represent their marginal costs by offering a second offer curve that kicks in once a certain amount of cycling/throughput has occurred in a day.

One item that was not part of the Straw Proposal but that was discussed in person at the meeting is that it is not currently possible for resources to indicate the non-linear effect on

cost of more cycling (i.e. 1 cycle/day vs 2 or more) to CAISO through its bid curve, although this is a huge concern for resource owners. Wellhead has made an excellent proposal in this regard. Realistically the difference between 1x/day and 2x/day cycling could mean replacing the entire battery system 10 years earlier on some systems, in addition to increased short run costs like drastically higher HVAC use, etc. A simple, elegant fix would be to allow resource owners to offer 1 curve for the first cycle (or equivalent # of MWhs of charge/discharge in a day), and another for additional MWh throughput after that. This would work well for both the Day Ahead and Real Time markets. We look forward to discussing adding this functionality to better map the CAISO market engine's view of resource costs onto the reality for energy storage resources in regards to heavier cycling.

CAISO should fix the existing scheduling issue stemming from the 1-hour Day Ahead schedule granularity that prevents NGR resources from providing their full 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.