



Submit comment on Second revised straw proposal

Initiative: Energy storage enhancements

1. Please provide a summary of your organization's general comments on the second revised straw proposal presentation for this initiative:

The California Energy Storage Alliance (CESA) appreciates the opportunity to provide feedback to the California Independent System Operator (CAISO or ISO) on the Second Revised Straw Proposal (SRSP) of the Energy Storage Enhancements (ESE) Initiative. CESA supports the scoping changes that the ISO has applied to the ESE Initiative. By focusing ESE on near-term improvements such as the reliability-related and co-located enhancements, the ISO will be better positioned to continue developing novel participation pathways in upcoming initiatives. In addition, CESA also welcomes the inclusion of default energy bid (DEB) enhancements to the scope of this initiative. Consideration of this issue is timely and certainly aligned with the spirit of ESE.

In these comments, CESA offers feedback on the SRSP's approaches to mitigating unfeasible ancillary service (AS) awards, compensate storage resources that were issued state-of-charge exceptional dispatches (SOC ED), and consider unavailability of storage components participating under the electable co-located functionality. CESA's comments can be summarized as follows:

- Incorporating the impact of regulation on the SOC calculation is preferred over requiring accompanying energy bids.
 - CAISO staff should focus on developing hourly μ values per month on a resource basis.
- SOC ED compensation should strive to consider 24 hours of data.
 - CESA supports the proposed extended horizon but considers SOC ED impacts could impact more than one trading day, especially if storage ED occurs in net peak period.
- The use of outage cards to reflect unavailability of the storage component for an asset using the electable co-located functionality is unwarranted considering the treatment of other energy-limited resources, the currently applicable qualifying capacity (QC) counting methodology, and the expected relative sizing of the components that make up the co-located resource.
- CESA welcomes revisions to the day-ahead DEB formulation.
 - CESA requests further clarity on the methodology that shall be used to calculate opportunity costs for the day-ahead DEB.

2. Provide your organization's comments on the proposed reliability enhancements for storage resources, as described in the second revised straw proposal:

Incorporating the impact of regulation on the SOC calculation is preferred over requiring accompanying energy bids

In the SRSP, the ISO notes that it has encountered situations in which storage assets that have AS awards, particularly regulation, are unable to meet said awards. The ISO underscores that this can be due to the storage resource having insufficient SOC, which would force a buy back of the real-time market's AS award and a rescission of the day-ahead AS payment, resulting in incremental ancillary services procurement in the 15-minute market. This, in turn, has the potential to both increase the total costs associated with serving load, and hinder real-time reliability. In this context, the ISO proposes two distinct measures to ensure the feasibility and provision of AS from storage assets. First, the ISO proposes an enhancement to the equation that governs SOC so that the impact of AS awards is reflected. Second, the ISO would require that storage resources have availability of economic bids for energy while providing regulation up or regulation down.

CESA understands the importance of ensuring an adequate and reliable supply of AS. Moreover, CESA supports the CAISO's exploration of alternatives that would minimize the likelihood of communicating unfeasible dispatch instructions to energy storage assets. Noting this, CESA favors further development of the ISO's proposal to enhance the formulae that currently govern SOC for storage resources. This approach is preferred as it gets to the source of the problem by addressing a fundamental deficiency regarding the ISO's visualization of storage resources today. Enhancing the SOC formulation represents a more lasting approach that would not only mitigate the reliability risks identified by the ISO within the SRSP, but more generally improve the modeling and optimization of these resources.

In the SRSP, the ISO notes that improving the SOC formulation entails development of two μ values that represent the material impacts of regulation up and down on SOC, on an hourly basis. For the purposes of the SRSP, the ISO has calculated μ values using three months of data from 2022. With this simplified methodology, the ISO proposes μ values of 0.08 and 0.19; nevertheless, as the SRSP notes, μ values vary by hour across the year. In light of this proposal, CESA urges the ISO develop hourly μ values per month using data from the past year. These should inform the first set of μ values to be applied to the SOC formula and be updated on a regular basis. CESA recommends updating these values every 12 months but welcomes ISO input on the optimal regularity of these updates.

In developing these values, CESA urges the ISO to consider the benefits of developing them on a per resource basis, not on a system-wide basis. This is desirable as the impacts of regulation on SOC are largely determined by the bidding strategy followed by each asset, as well as the unique marginal costs for each (e.g., cycle life, battery chemistry). So far, the ISO has not provided data that demonstrates we should assume all assets utilize the same or even comparable bidding strategies or have the same marginal cost structures. As such, we can assume that the effects of regulation on SOC are heterogeneous. CESA therefore recommends the ISO explore development of resource-specific hourly μ values per month.

Enhancing the SOC formulation will obviate the need to require all AS awards for storage resources to be accompanied with bids for energy. While CESA recognizes the ISO's relaxation of the proposal, requiring energy bids equal to 50% of the AS award is still overly restrictive. In essence, this requirement would mean that a storage resource with equal Regulation Up and Down awards will be restricted to provide up to two-thirds of its Pmax with the remaining one-third reserved for

energy bid. Thus, the proposal materially limits the amount of flexibility storage can provide to the grid. This limitation is also unfounded since the SRSP does not offer an explanation behind the proposed 50%, nor does it explain how it relates to the observed hourly μ values. In this vein, we agree with the concerns shared by Pacific Gas & Electric (PG&E) during the July 7, 2022 stakeholder meeting: the adoption of both of these proposals would be overly burdensome and unduly restrictive. Thus, CESA recommends the ISO pursue improvements to the SOC formulation to better reflect the impacts of regulation by developing hourly μ values per month on a per resource basis.

SOC ED compensation should strive to consider 24 hours of data

In the SRSP, the ISO notes that it has updated its SOC ED proposal to reflect comments regarding the duration of the timeframe considered for the revenue counterfactuals. Specifically, the ISO will now consider a window that extends through the end of the operating day of the SOC ED when assessing revenue counterfactuals, instead of a window equal to the duration of the storage resource. Importantly, the ISO notes that it is not proposing a longer timeframe as extending this into another operational day may be more burdensome in the settlements process.

CESA recognizes the ISO's consideration of our comments. The expansion of the window considered for compensation of opportunity costs related to the SOC ED is a step in the right direction. Nevertheless, CESA remains concerned about the implications of the proposed approach, particularly considering the times in which SOC ED is likely to be used.

Given its energy-limited nature, energy storage is well-positioned to address peak and net peak needs. As such, SOC ED is expected to be used to hold SOC through the peak period and into the net peak period, likely resulting in traditional (*i.e.*, discharging) ED instructions being issued between HE 18 through 22. Given this, using a timeframe that considers the entirety of the day when the SOC ED was issued offers little added benefit and ignores the fact that the economic decisions of the storage asset will be affected in all subsequent intervals, regardless of the arbitrary boundary between trading days.

Ultimately, the SOC ED is a tool that will allow retirement of the minimum SOC (MSOC) requirement. The MSOC requirement, a measure adopted as part of the RA Enhancements Initiative in 2021, limits energy storage market participation in the real-time market when the Residual Unit Commitment (RUC) process identifies an unfeasibility in meeting load. The MSOC is seldom activated; in fact, as of August 2, 2022, the MSOC has not been utilized in 2022. Considering the sporadic need for the MSOC and acknowledging that establishing a counterfactual window that exceeds the trading day may be overly burdensome at this time, CESA understands that moving forward with the proposed window is reasonable at this time. This being said, the ISO should monitor use of the SOC ED closely and report if a window that covers all of the trading day is sufficient to correctly identify the opportunity cost impacts of said ED. If said window is found to be insufficient following, *ad maximum*, 24 months of use, the ISO should continue developing a methodology to consider 24 hours of data when estimating compensation for SOC ED.

3. Provide your organization's comments on the proposed co-located enhancements, as described in the second revised straw proposal:

In the SRSP, the ISO notes that several stakeholders have requested the introduction of a new mechanism for co-located resources that ensures revenue recovery if a storage resource seeking the Investment Tax Credit (ITC) were to incur costs due to grid charging. In essence, market

participants have expressed interest in a participation pathway that ensures compliance with the requirements associated with the ITC, particularly those related to the charging of storage assets paired with on-site renewable generation. In response to these requests, the ISO proposes an electable co-located functionality that will be optional and would prevent the co-located storage from being dispatched above the scheduled output from on-site renewable resources. Moreover, this functionality would also allow co-located storage to deviate from its dispatch instructions to ensure real-time charging does not exceed actual real-time co-located renewable generation. As such, this electable functionality would eliminate the possibility of grid-charging, thus easing ITC compliance.

CESA appreciates the ISO's consideration of stakeholder feedback regarding the need for an ITC-compliant co-located pathway. Furthermore, CESA, fully supports the ISO's elimination of the eligibility requirements previously considered for this electable functionality. Optionality for co-located resources that envision capturing ITC benefits is particularly welcome considering the importance of this revenue stream for both existing paired resources, those in development, and standalone generation assets that seek to add energy storage. Thus, CESA fully supports the creation of this electable functionality and the elimination of any eligibility requirements associated with it.

While supportive of the proposal, CESA is concerned with the ISO's requirement to have co-located storage assets submit outage cards when they cannot discharge as they have a depleted state of charge and there is no ability to charge the resource due to unavailability of the on-site renewable generator. Importantly, the use of outage cards would be subject to the ISO's resource adequacy availability incentive mechanism (RAAIM). CESA opposes this element of the proposal for three reasons. First, the use of outage cards is inconsistent with the treatment of other energy-limited resources, such as hybrid resources. Second, the differentiated treatment of co-located and hybrid resources with regards to the use of outage cards is unwarranted considering the currently applicable qualifying capacity (QC) counting methodology. Third, the expected co-located configurations and the relative sizing of their components do not suggest that energy insufficiency will be an issue.

Today, paired assets participating under the hybrid pathway are expected to be able to limit their bids and dispatch instructions via the dynamic limit tool (DLT), a market functionality that has been delayed but is expected to be available by Fall 2022. After the Hybrid Phase 2-B functionality is available, the hybrid DLT will be used to transmit information to the ISO regarding real-time availability for these resources. Crucially, the DLT offers a way to communicate real-time unavailability of an asset without the use of outage cards. CESA is aware of the complexities behind developing the DLT and understands that the ISO might want to finalize and test it for hybrid resources before expanding its use. Nevertheless, the clear contrast between the communication and treatment of unavailability between these two pathways underscores that using outage cards is inconsistent and would represent a clear disadvantage relative to a hybrid configuration.

Today, both hybrid and co-located resources that provide resource adequacy (RA) have their QCs determined by the same counting methodology. This additive methodology makes no distinction between both of these participation pathways and assumes that only on-site renewable generation is utilized to charge the paired storage component. The potential for energy insufficiency is thus already contemplated within the methodology, which is set as follows:

- Total QC = Effective Storage QC + Effective Renewable QC
 - Effective Storage QC = the minimum of:
 - Energy production from the renewable resource until 2 hours before the net load peak, divided by four

- The QC of the storage
- Effective Renewable QC = the remaining renewable capacity required to charge the battery, multiplied by the ELCC factor of the month

As observed above, the potential for energy insufficiency is captured by the fact that the effective QC of the storage component is the minimum of its standalone QC or the total energy production up until two hours prior to the net peak, divided by four. If the configuration of the components is expected to result in insufficient energy to fully charge the storage asset, the counting methodology already applies a “derate” to account for the expected level of unavailability. In this context, requiring the use of outage cards is unwarranted and could constitute a double penalization of the asset relative to its hybrid homologue.

Finally, CESA considers that requiring the use of outage cards to signal unavailability of the storage component might be trivial in the context of meeting daily peak and net peak needs due to the expected configurations of future paired resources. According to the latest publicly available data on queue cluster (QC) 14, the Preliminary Cluster 14 Project List as of May 20, 2021, of the 105,995 MW seeking interconnection at the POI, 32,848 MW (~31%) are solar plus storage projects. While the shares of hybrid and co-located projects is not directly obtainable through this dataset, we can estimate that, across all solar plus storage projects, the ratio of generation to storage is 1.02. This essentially means that each solar plus storage project in QC 14 has, on average, 1.02 MW of solar for each 1 MW of storage. Studies evaluating the reliability contributions of paired assets have found that a hybrid configuration with this ratio of generation to storage are reliably able to provide adequate energy to consistently charge the linked energy storage resource. The 2020 Joint Investor-Owned Utility (IOU) effective load carrying capability (ELCC) Study found that a 1:1 solar plus storage asset with a 4-hour battery would have a marginal ELCC of 100% through 2026 and 96% by 2030.¹ This is largely due to the fact that ELCC is highly correlated with the ability to fully charge prior to the highest net load peak periods and that the coupled solar component is able to consistently charge the storage device with a 90% confidence interval across the highest CAISO net daily load peaks, with an average charging potential of roughly 7 hours.² As such, paired assets with such configurations are likely to readily contribute to grid reliability on a daily basis, minimizing the need for the use of outage cards as contemplated in the SRSP.

4. Provide your organization’s comments on the proposed WEIM classification for this initiative, as described in the second revised straw proposal:

CESA offers no comments at this time.

5. Provide your organization’s comments on the addendum to the second revised straw proposal:

CESA appreciates the ISO’s consideration of issues related to the use of DEBs within the day-ahead market. The ISO’s identification of this issue and its quick inclusion to the initiative demonstrate a commitment to continuously improve the utilization of storage assets within the ISO’s markets. CESA is supportive of the proposal to modify the day-ahead DEB to be aligned with its real-time counterpart. By including consideration of opportunity costs within the day-ahead formulation, the

¹ Astrape Consulting, *2020 Joint IOU ELCC Study*, 2021, at 4. Available at: https://www.pge.com/tariffs/assets/pdf/adviceletter/ELEC_6041-E.pdf

² *Ibid*, at 12-13.

enhanced DEB will ensure alignment between the principles of competitive bidding, profit maximization, and grid reliability.

This being said, CESA requests clarity regarding the methodology that shall be used to calculate the opportunity cost component of the day-ahead DEB. The way in which opportunity costs would be calculated is not included in the Addendum and, while Section 39.7.1.8 of the CAISO Tariff explains how the opportunity cost would be calculated for the real-time DEB, its language is not readily applicable to the day-ahead DEB as it states:

"The storage opportunity cost represents the opportunity cost of being dispatched during lower-priced RTM intervals, equal to the cost of Energy the resource could discharge during the highest-priced continuous RTM block, accounting for the resource's discharge duration. To calculate this component in the Real-Time Market, the CAISO will use the lowest price of Energy during the highest priced period over which the resource could have discharged, based upon the LMP from the IFM at the relevant PNode on the Trading Day."

Thus, while CESA supports the proposal to enhance day-ahead DEBs to include opportunity costs, we request added clarity on the methodology proposed to calculate this factor, as well as an opportunity to provide feedback on said approach.