MARKET SURVEILLANCE COMMITTEE

Storage Resource Bid Cost Recovery Rules

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Topics

- Role of BCR
- Managing State of Charge
- Solutions

Role of BCR

The normal role of bid cost recovery rules in the CAISO and other North American ISOs is to ensure that resources that are committed by the ISO or dispatched out-of-merit by the ISO do not incur losses as a result of following ISO commitment and dispatch instructions.

- The CAISO's BCR rules for storage resources that are exceptionally dispatched are consistent with that role.
- As CAISO and the Department of Market Monitoring have noted, battery storage resources generally do not have commitment costs, so cannot incur losses as a result of CAISO commitment decisions.
- It is not the normal role of bid cost recovery to make a resource whole if it is unable to cover its day-ahead market schedule as a result of a derating or as a result of dispatch consistent with its offer prices.

Role of BCR

The CAISO has provided a number of examples of how battery operators can adjust their offer prices based on their current state of charge to extract profits under the current BCR rules. ¹

The CAISO also provided a number of examples of ways in which BCR can insulate battery operators from the financial consequences of prematurely depleting their state of charge or charging capacity.

- Several stakeholders commented at various points during the Stakeholder meeting on July 22 that in their view the payment of BCR did not allow the battery operator to earn profits in the examples in which it avoided losses.
- This is not the case. Even if BCR is calculated based on bid and offer prices that do not create artificial profits, there is still an incentive problem, and a potential for unwarranted BCR payments and profits, because the BCR payments can incent battery operators to submit offers that they know risk premature depletion of state of charge.
 On some days the premature depletion will be profitable and on the days it results in losses, the resource will receive BCR.
- 1. See California ISO, "Storage Bid Cost Recovery (BCR) and Default Energy Bid (DEB) Enhancements, July 22, 2024, pp. 19-20, 23-24

Role of BCR

Unwarranted BCR payments can incent the submission of offer prices that would incur losses absent BCR payments but are made profitable over time by BCR payments. Suppose that if a battery operator submits offer prices during hours 12-17 of \$150:

- On 3 out of 20 days it earns net profits of \$40,000 a day in addition to its day ahead market profits despite being prematurely dispatched, because prices are low at the net load peak;.
- On 15 days it is not be dispatched prematurely and is able to cover its day-ahead market schedules at the net load peak.
- On 2 days it is dispatched prematurely and loses \$140,000 in real-time because it has depleted its state of charge prior to the net load peak, but the losses are made up by BCR payments.
- This bidding strategy would be highly unprofitable without BCR payments, losing \$160,000, but it would earn real-time profits of \$120,000 with BCR payments.

CAISO software systems and market rules currently limit the ability of battery operators to efficiently manage state of charge.

- Current bid change timelines and offer price structure can result in long time lags between the time market conditions change in unexpected ways and storage operators are able to change their offer prices.
- On September 6, 2022 something changed around 1:30 that resulted in a large increase in battery dispatch. By the time battery operators could raise their offer prices effective 4 p.m., it was too late.

Battery operators need to manage their state of charge by submitting higher offer prices during the hours 12 to17 than they have in the past.

- The CAISO Department of Market Monitoring has presented summary offer price data in reports and comments that show that a great deal of battery capacity is offered at low prices during hours 12-17, including on days on which battery capacity was depleted during stressed system conditions.¹
- Retaining the current BCR design would not improve the ability of battery
 operators to manage their state of charge, it would just reduce the consequences
 of failing to do so.
- In the long run the CAISO should implement rules that enable battery operators to more efficiently manage their state of charge over the day, such as more frequent offer price or limit changes with shorter time lags, state of charge dependent bids and offers, and/or perhaps other design changes.

1. See for example, California ISO, Department of Market Monitoring, 2023 Special Report on Battery Storage, July 16, 2024, Figures 2.6, 2.7 and 2.8; California ISO, California ISO, Department of Market Monitoring, "Comments on Price Formation Enhancements, April 30, 2024 Figures 2 and 4.

Another problem in managing state of charge for battery operators providing ancillary services is that the generic attenuation factors used by the CAISO in the day-ahead market may be too low for particular resources, resulting in day-ahead market schedules that are prone to prematurely depleting state of charge.

- In the near term, battery operators for whom this is an issue can raise their ancillary service offer prices to reduce how often they are scheduled and to reflect the cost of occasional infeasible dayahead market schedules.
- In the long run, the CAISO could perhaps introduce the flexibility for battery operators to specify higher attenuation factors for their resources than those calculated by the CAISO.

A third problem in managing state of charge is the potential for storage resources to deplete their state of charge in real-time as a result of being prematurely dispatched based on mitigated offer prices.

- There are references to this happening on September 6, 2023 in the summer report.¹ We understand this has happened on other days with stressed system conditions, but there are no comprehensive data on which hours this mitigated dispatch has occurred, nor of how often mitigation has contributed to depleted state of charge over the net load peak hours.
- We do not know how material this impact would be in the short-run. Resources would only be mitigated if they fail the three pivotal supplier test, but we do not know how many storage resources typically fail the three pivotal supplier test over hours 10-17.
- 1. California ISO, September 2022 Summer Report p. 149

Resources would be unable to avoid being prematurely dispatched based on mitigated prices when they raise their offer prices to preserve state of charge.

- The same approach used for exceptional dispatch could be used to calculate BCR for dispatch due to mitigation that reduced resource revenues over the day.
- In the longer run, the mitigation design could be changed to not apply mitigation to resources that are not pivotal, such as small batteries operated by entities that do not control other large assets in the market.
- In the even longer run, the CAISO may be able to develop tools that provide reasonable estimates of real-time opportunity costs to include in default energy bids.

A fourth problem in managing state of charge is that it is perhaps conceivable that storage resources would deplete their state of charge in real-time as a result of being prematurely dispatched, or not charged, based on mistaken future price forecasts in the RTD multiple interval optimization.

- These short-term forecast errors appear unlikely in practice to result in premature depletion of state of charge as multiple interval optimization would only cause resources to uneconomically discharge when they are full or nearly full and low future prices are erroneously forecasted.
- Similarly, the multiple interval optimization would only cause resources to fail to economically charge when they nearly full and even lower future RTD prices are erroneously forecasted.
- Premature reduction in state of charge due to mistaken forecasts in the RTD multiple interval optimization would be difficult for battery resource operators to avoid through adjustments to offer prices. But it is not clear it is a material issue.
- We are not aware of any data indicating that uneconomic dispatch due to short-term mistaken forecasts has more than transitory impacts. If data showed that there were sustained material impacts on state of charge from dispatch based on mistaken short-term price forecasts, the ED BCR design could be applied to these instances.

Solutions

The CAISO has proposed BCR calculation changes that might potentially eliminate many unwarranted BCR payments.

- However, storage operators would still potentially receive BCR to cover charges for buy back of their day-ahead market schedules.
- Storage resources would apparently still receive BCR if they maintained a minimal state of charge which was not depleted because it was offered at a high price. Storage operators that prematurely deplete most of their state of charge could apparently circumvent the proposed BCR settlement rules by offering their remaining supply at such high prices that the resource would not be dispatched.
- This possibility highlights the unwarranted role of storage BCR payments. No other resource would receive BCR because it offered supply at such a high price it was not dispatched to cover its day-ahead market schedule.
- Consideration should be given to eliminating all BCR except for that calculated for exceptional dispatch, compensation for losses due to mitigation caused premature dispatch, and if found to occur, depletion due to mistaken short-term price forecasts in RTD.