WESTERN ENERGY MARKETS

Opinion on Storage Bid Cost Recovery and Default Energy Bid Enhancements: Final Proposal for Track 1

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This presentation provides my opinion on the ISO's Final Proposal for Track 1 of the Storage Bid Cost Recovery and Default Energy Bid Enhancements initiative ("Final Proposal", October 31, 2024).

- Contents:
 - Opinion on Final Proposal before Governing Body
 - Discussion
 - Unwarranted storage bid cost recovery (BCR)
 - Pros and cons of final proposal
 - Observations on process and suggestions for Track 2
- Q&A with Governing Body

Opinion: I support the ISO proposal to modify the formulas used to calculate BCR for storage resources as described in section 7 of the Final Proposal. For clarity, a high-level summary of my understanding of the proposal follows.

- The Final Proposal would modify the BCR calculation for storage resources in all intervals of the RTM (FMM and RTD)
 - Intervals in which a storage resource sells incremental energy (discharges), including those in which it "sells back" a DA charging schedule
 - Intervals in which a storage resource buys incremental energy (charges), including those in which it "buys back" a DA discharge schedule
 - Intervals without DA schedules

Summary of the Final Proposal (continued).

- The modification would substitute a proxy for the FMM Bid or RTD Bid in the current formulas for calculating storage BCR
 - For example, for a RTD incremental purchase (charging), the proxy for the RTD Bid in the BCR calculation would be

Max[RTD Bid, Min (DA LMP, RT DEB, RTD LMP)]

- Analogous formulas apply for
 - Incremental RTD discharging
 - Incremental FMM charging, and
 - Incremental FMM discharging
- The BCR paid for the RTM for a day would be the sum of the BCR profits and losses calculated for each interval of the day

Summary of primary take aways:

Topic	Take Away
Unwarranted BCR	 BCR paid when storage resource SOC is binding Not needed to incentivize supplier to follow dispatch Can be inflated without risk through strategic bidding
Pros of CAISO Final Proposal	 Will very substantially reduce the use of strategic bidding to increase BCR Does not appear to reduce warranted BCR for storage Could fix a publicly known problem quickly (per CAISO) Frees resources to focus on holistic improvement of market rules for storage resources
Cons of CAISO Final Proposal	 Reduces but does not eliminate unwarranted BCR Limited empirical assessment and testing of Proposal Possible impacts on storage bids and offers has not been fully vetted, especially for WEM-only entities Does not address Concern 2: storage resources are not exposed to RT prices for deviating from day-ahead schedules
Suggestions for Track 2	 Begin with clear definition of what storage BCR is warranted vs unwarranted Employ definitions in presenting results of analyses and in testing improvements to rules for storage market participation
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There is broad agreement about the need to assess and improve bidding, scheduling, and settlement rules for storage resources.

• ISO initiated Track 1 to focus on two concerns

Concern 1: Storage assets are not exposed to real-time (RT) prices for deviating from day-ahead schedules.

Concern 2: Storage assets are incentivized to bid strategically to maximize the combined BCR and market payment.

 Track 1 addresses payments that are inconsistent with the intent of BCR as described in last month's briefing

> The BCR payment is made to provide the supplier with the assurance that it will not lose money by following dispatch instructions, i.e., to align the resource operator's incentives with a system reliability need

BCR is not intended to compensate suppliers for operational difficulties preventing them from meeting their day-ahead schedule

An active stakeholder process revealed the difficulty of expeditiously resolving Track 1.

- BCR currently paid to storage resources may be
 - Warranted under certain conditions
 - Paid when not needed to incentivize efficient or reliable operation
 - Inflated by strategic bidding
- Proposals to resolve Track 1 concerns confronted the lack of a ready process to identify unwarranted BCR
 - The Final Proposal, as a result, is a near term fix for Concern 2
 - ISO is starting an initiative to holistically improve bidding, scheduling, and settlements for storage resources



There are three primary drivers of unwarranted BCR for storage resources under current market rules.

- **Driver 1:** Storage resources are paid BCR in intervals in which their schedules are constrained by their state of charge (SOC)
 - Cannot feasibly charge or discharge in alignment with their DAM schedule, base schedule, and/or ancillary services schedules
 - Are being paid as if the deviation from their DAM schedules was at the request of the system operator, to improve economics or reliability
 - BCR calculation assumes the resources are losing money to hold schedules that they would not otherwise voluntarily follow, but this is not the case



Primary drivers for unwarranted BCR for storage resources (continued).

Buy Back BCR



- Driver 2: Possible incentive to change bids and offers to increase BCR for the interval in which the storage SOC binds
 - Decrease offer when buying back
 DAM or base schedule
 - Increase offer when selling back
 DAM or base schedule
 - The current BCR payment is calculated assuming the bid or offer in the relevant interval reflects marginal costs or opportunity costs

Primary reasons for unwarranted BCR for storage resources (continued).

Increased discharge to trigger buy back



- **Driver 3:** Possible incentive to modify bids and offers in prior intervals to cause the SOC to bind later and trigger BCR
 - For example, for buy back:
 - Decrease offer in prior interval to increase RT discharge schedule
 - Leads to insufficient charge to meet DAM or base schedule in later interval
 - Triggers buy back BCR
 - SOC constraint can be triggered by shifting charging or discharging to earlier intervals

There can be a cost to modifying bids or offers in prior intervals to trigger BCR; this factors into the net profitability of strategic bidding.



Net Profit Calculation Reduces to: Offer in binding interval – Offer in prior interval

(MSC proof with same Δ MWs in two intervals, 10/31/2024)

- For example, for a buy back:
 - RT offer to increase RT discharge schedule may be less than the storage operator's estimate of opportunity costs
 - Lower offer *increases* "deemed" profit for the incremental RT sales (for a sell-back, there is a deemed cost reduction)
- Calculation of net profits also includes payment for difference between DA and RT schedules

Track 1 proposals have aimed to defuse the drivers of unwarranted BCR.

- Initial ISO proposal (Driver 1): Disallow BCR in periods when SOC is binding
 - Would have addressed Concern 1 and Concern 2
 - Not pursued because of how MIO schedules storage resources
- Subsequent proposals (Driver 2): Replace the RT Bid variable in BCR formula
 - Pros and cons of various proposals under different conditions is discussed in MSC opinion (October 31, 2024) and are summarized in the Final Proposal
 - General agreement around Final Proposal as near term fix
- Final ISO proposal (Driver 3): Apply revised BCR formula in all RT intervals
 - Reduces profitability and, thus, incentive for strategic bidding

The advantages of the Final Proposal support moving forward with it at this time.

- The proposal will substantially reduce the ability to increase BCR through strategic bidding
 - Caps the amount of BCR calculated for intervals when the SOC may be binding
 - Substitutes proxy variables not controlled by the bidder (DA LMP, DEB, and RT LMP) for the RT Bid
 - Does not appear to reduce warranted BCR
 - Reduces the incentive to increase BCR by strategically bidding in prior periods
 - Bidders incur losses (i.e., phantom cost reductions or profits) in prior periods to strategically trigger the SOC constraint
 - Formulas place a floor on ability to reduce size of these losses
 - Final proposal applied in all intervals, so losses cannot be avoided

The advantages of the Final Proposal support moving forward with it at this time (continued).

- The proposal does not appear to reduce warranted BCR
- The ISO states that the Final Proposal can be implemented quickly
 - Will address a bidding strategy to increase BCR that is not difficult to implement and is publicly known
 - ISO suggests the Final Proposal as a near term solution to enable the start of a holistic initiative to assess and improve storage participation in the markets



The disadvantages of the Final Proposal appear to be limited, speculative, or infeasible to address quickly.

- The Final Proposal reduces but does not eliminate unwarranted BCR or the potential for strategic bidding
 - MSC suggests there might be possible improvements, but this would need further study
 - ISO suggests the start of a holistic initiative to assess and improve storage participation in the markets rather than additional effort to improve Final Proposal
- The potential magnitude and circumstances of unwarranted BCR payments has not been thoroughly investigated
 - The methodology for some of the data analyses presented is unclear; it is difficult to understand what the results establish
 - Some DMM results appear to show minimal impacts of strategic bidding
 - MSC opinion (October 31, 2024) discusses empirical issues

The disadvantages of the Final Proposal appear to be limited, speculative, or infeasible to address quickly (continued).

- Possible impacts on bids and offers has not been fully thought through, especially for WEIM-only entities
- The Final Proposal does not address Concern 2, that storage resources are not exposed to RT prices for deviating from DA schedules
 - Storage needs correct incentives to manage state of charge
 - Market efficiency and reliability are enhanced by storage bids that reflect opportunity costs over the day because the RTM look-ahead window is only 2 hours in FMM and 1 hour in RTD
 - However, Track 1 has not identified any alternatives for addressing Concern 2



Nothwithstanding appreciation of the efforts of the ISO, DMM, and stakeholders to move quickly with this initiative, I would like to offer suggestions for Track 2.

- The provision of well-documented empirical analyses should keep pace with the initiative to enable evaluation of issues and proposals
- In Track 2, it would be helpful (among other things) to:
 - Clearly define what BCR is warranted vs unwarrented
 - WPTF, Vistra and MSC provided thoughts in this vein
 - Definitions should address technical complications (e.g., ancillary services schedules and MIO) and RT bid change scenarios
 - Employ definitions in presenting results of analyses and in testing improvements to market rules to align storage participation with operational efficiency and reliability