California ISO

Storage Design and Modeling: Storage Bid Cost Recovery

Department of Market Monitoring

June 30, 2025

DMM continues to recommend the ISO address storage BCR issues as a top priority

- Existing BCR rules were designed for traditional generators
  - Do not consider battery attributes (e.g., state of charge, constraints)
  - Applying existing BCR rules to storage resources can lead to unwarranted and/or inefficient bid cost recovery payments

- Importantly, the current BCR rules remove the exposure to real-time prices for storage resources when buying back infeasible day-ahead schedules
  - Incentivizes batteries to submit real-time bids that are inconsistent with real-time opportunity costs when they have day-ahead schedules
  - Does not properly incentivize batteries to provide accurate estimation of their day-ahead initial state of charge

Why existing framework is inefficient/inappropriate for storage resources

- A primary purpose of BCR is to incentivize efficient bidding by allowing for recovery of discrete or “lumpy” costs
  - Batteries do not have commitment costs
  - Current BCR framework distorts bidding incentives for batteries

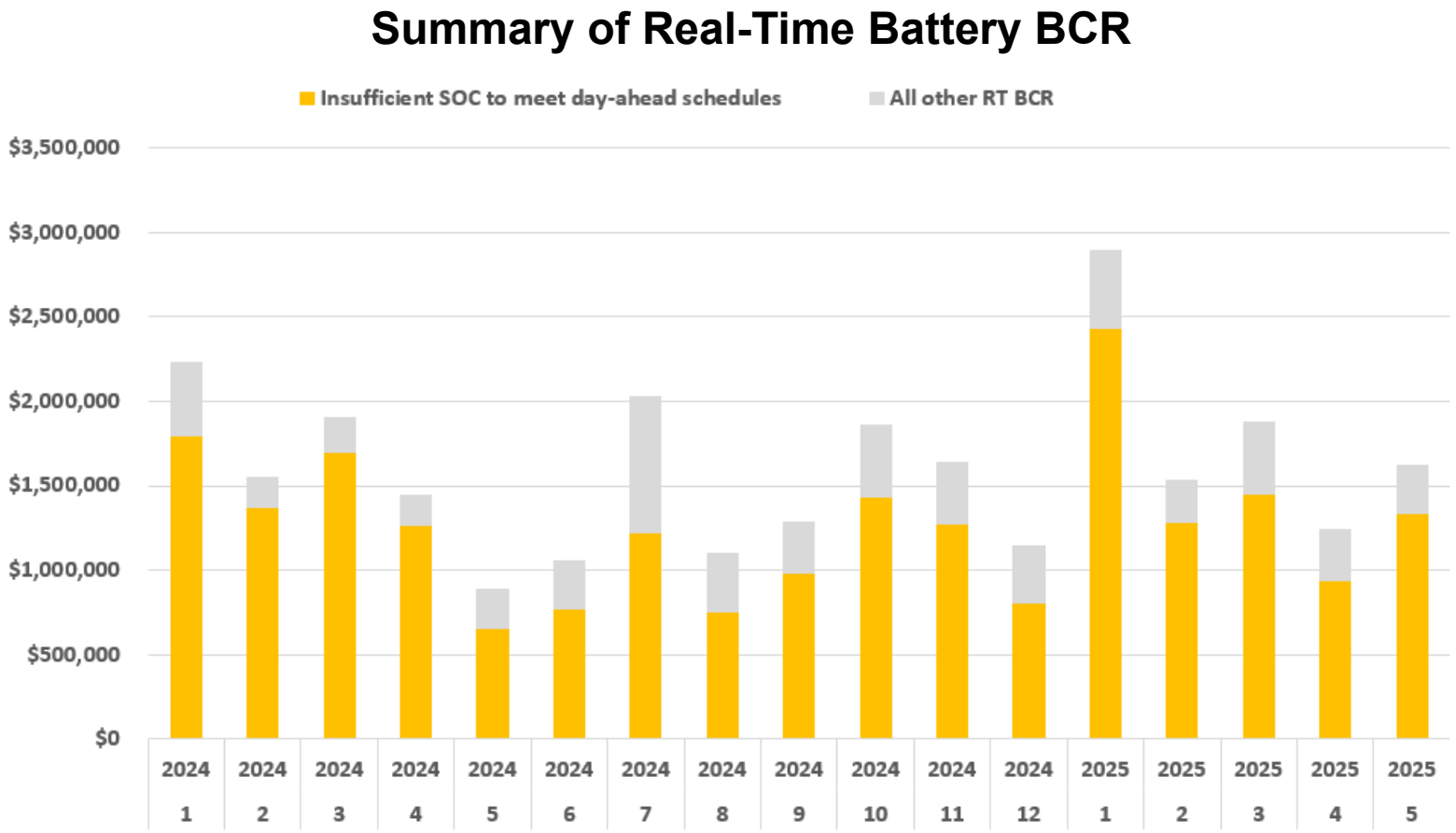
- In general, traditional resources do not receive BCR due to outage-related or operator-imposed limitations
  - Because of unique battery operating constraints, storage resources frequently receive BCR when essentially on outage
    - State of charge (SOC) constraint

Drivers of battery BCR

- **Day-ahead battery BCR**
  - Primarily due to unintended interactions between submitted storage resource parameters and features of the day-ahead optimization

- **Real-time battery BCR**
  - Almost exclusively driven by battery resource constraints not considered in BCR rules
    - ASSOC (addressed September 2022)
    - State of charge (continues to be major driver of real-time battery BCR)

Most real-time battery BCR results from state of charge limitations



Settlements as of T+70B. Earlier preliminary data for April and May 2025. Older data not updated to reflect resettlement in later settlement cycles.

BCR for buying back day-ahead schedules due to SOC limitations

Causes efficiency, reliability, and gaming concerns:

Efficiency Concerns

- Removes exposure to real-time prices during hours with day-ahead schedules
  - Distorts perceived real-time opportunity cost of not delivering day-ahead schedules
  - Results in inefficient bidding incentives for storage resources

Reliability Concerns

- Reduced likelihood that SOC will align with real-time needs
  - Less likely that day-ahead schedules will be deliverable in real-time without manual intervention

Gaming Concerns

- Resources could strategically bid in a manner that maximizes bid cost recovery payments
  - Will be largely addressed with ISO's battery BCR changes approved in Fall 2024

BCR for buying back day-ahead schedules due to SOC limitations

Results from a combination of two sources:

Revenue Losses

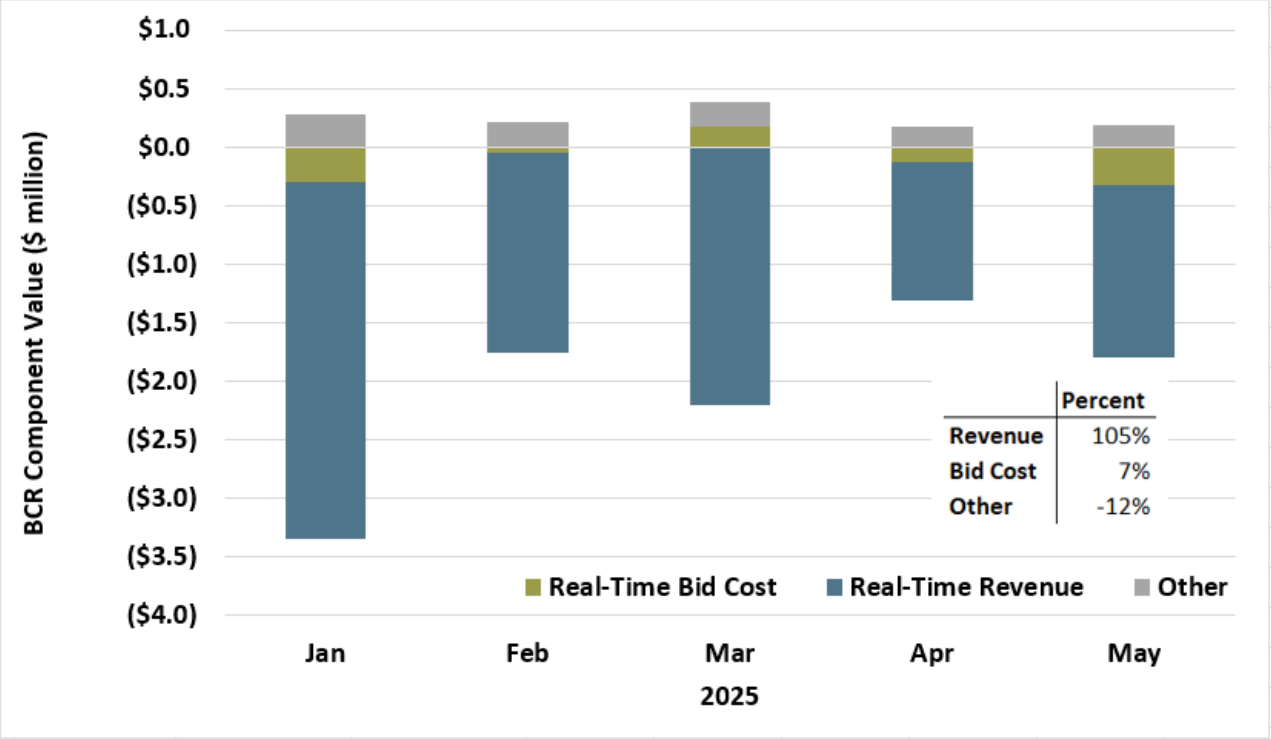
- Occur when incremental real-time revenue is insufficient to cover the real-time cost of reversing an infeasible day-ahead schedule
- Determined by market price
  - **Not impacted by ISO's 2024 policy change**

Bid-Cost Losses

- Occur when incremental bid cost associated with real-time dispatch is greater than the avoided bid cost from reversing an infeasible day-ahead schedule
- Determined by energy bid
  - **Impacted by ISO's 2024 policy change**

Revenue losses are the primary driver of BCR for day-ahead buybacks

Battery BCR payments from buy-backs of day-ahead schedules due to insufficient state of charge



- Negative revenues are the primary driver of BCR, not bid costs
- ISO's current solution only addresses bid cost component

Batteries will continue to receive BCR for revenue losses which will continue to distort bidding incentives

- Largest driver of BCR payments to batteries for infeasible day-ahead schedules results from net revenue losses
- Net revenue losses will remain unchanged once ISO's current battery BCR solution is implemented
- Bid cost recovery associated with revenue losses removes the battery operator's exposure to real-time prices in hours with day-ahead schedules
    - Distorts bidding incentives and leads to inefficient scheduling of battery resources in the real time

DMM Recommendations

- Consider eliminating day-ahead BCR for battery storage resources
  - DMM has yet to identify instances where day-ahead BCR is appropriate
  - Recommends stakeholders discusses and provide scenarios
- Consider eliminating most real-time BCR for battery storage resources
  - DMM recommends redesigning the BCR rules to assume no eligibility for batteries and add eligibility only under specific situations where BCR is warranted
  - Eliminating default real-time BCR from buying back day-ahead schedules would
    - Incentivize more accurate estimation of day-ahead bidding parameters
    - Incentivize real-time bidding that reflects intraday opportunity costs based on real-time prices
- Eliminating BCR associated with OMS limitations on SOC is consistent with treatment of other OMS MW derates

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Questions?