

190 FERC ¶ 61,047
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Mark C. Christie, Chairman;
Willie L. Phillips, David Rosner,
Lindsay S. See, and Judy W. Chang.

California Independent System Operator Corporation

Docket No. ER25-576-000

ORDER ACCEPTING TARIFF REVISIONS

(Issued January 24, 2025)

1. On November 26, 2024, pursuant to section 205 of the Federal Power Act,¹ California Independent System Operator Corporation (CAISO) submitted proposed revisions to its Open Access Transmission Tariff (Tariff) to address a market design issue affecting real-time bid cost recovery rules for energy storage resources (storage resources). CAISO proposes to modify the real-time bid cost recovery calculations for storage resources to consider other cost proxies in addition to the real-time energy bid cost in all real-time intervals, which CAISO states will mitigate the potential for unwarranted real-time market bid cost recovery payments. In this order, we accept CAISO's proposed Tariff revisions, effective December 1, 2024, as requested.

I. Background

2. CAISO states that the quantity of battery storage resources participating in CAISO markets has increased from about 500 MW in 2020 to over 10,000 MW in October 2024, including 3,500 MW in the Western Energy Imbalance Market. CAISO explains that as states continue to integrate renewable resources to meet their clean energy goals, battery storage resources play an increasingly crucial role in maintaining the flexibility and reliability of the power grid and are the fastest growing resource type within the CAISO footprint.² CAISO explains that storage resources in CAISO markets generally use the non-generator resource model, which tracks each resource's state of charge.³

3. CAISO explains that bid cost recovery payments provide "uplift payments" to a resource when the revenues from sale of energy and ancillary services do not cover the

¹ 16 U.S.C. § 824d.

² Transmittal at 2.

³ *Id.* at 6-7. CAISO defines the state of charge to mean the energy available to CAISO markets from a non-generator resource or storage device.

resource's start-up, minimum load, and energy bid costs over a day. CAISO states that bid cost recovery uplift payments eliminate the incentive for resources to add a risk premium to their market offers to cover the possibility of not recovering these costs, which could lead to inefficient market outcomes, with higher overall costs for energy.⁴ CAISO explains that, in addition, bid cost recovery payments provide an incentive for resources to follow dispatch instructions because bid cost recovery helps ensure resources recover their operating costs even if they are dispatched out of merit order.⁵

4. CAISO explains that storage resources are significantly different from the conventional (thermal) resources regarding bid cost recovery. According to CAISO, storage resources lack start-up and minimum load costs and generally have fast ramp rates. Further, CAISO highlights that bids from storage resources reflect energy production costs in a given interval, in addition to perceived opportunity costs in the future based on a desire for later dispatch.⁶

5. CAISO states that, as a result, current bid cost recovery may allow for unwarranted compensation to energy storage resources at a higher value than actual costs. CAISO asserts that this creates an incentive for storage resources to bid in a manner that could result in excessive bid cost recovery payments. CAISO states that in these circumstances, the storage resources' bids do not represent the resources' actual costs, and allowing uplift payments under these conditions cannot be justified by the principles of bid cost recovery.⁷

6. CAISO explains that current bid cost recovery rules treat storage resources differently from conventional resources when resources are unavailable to provide energy. CAISO notes that conventional resources are ineligible for bid cost recovery payments when unavailable due to lack of fuel, whereas storage resources are eligible for bid cost recovery when unavailable due to state of charge limitations.⁸ CAISO explains that, for example, when a battery lacks sufficient state of charge to deliver a day-ahead market award in the real-time market, the real-time market software may force the battery to forgo charging or discharging out of merit order to "buy back" or "sell-back" the day-ahead market award.⁹ CAISO states that, currently, this situation triggers bid cost

⁴ *Id.* at 2.

⁵ *Id.* at 6.

⁶ *Id.* at 2-3.

⁷ *Id.* at 3.

⁸ *Id.* at 8.

⁹ CAISO explains that the real-time market's short optimization horizon (e.g., a limited number of additional advisory intervals) can lead to real-time dispatches that conflict with day-ahead schedules (e.g., optimized over the 24 hours of a trading day) by

recovery, which CAISO calculates as the difference between the storage resource's real-time bid costs and its revenues from the real-time market.¹⁰

7. Further, CAISO states the current market design also allows scheduling coordinators for storage resources to bid strategically to maximize their bid cost recovery payments. For example, CAISO notes a storage resource may directly impose state of charge limitations in its bid that can lead to bid cost recovery payments or simply adjust bids to increase real-time bid cost recovery shortfalls when the storage resource believes its state of charge will bind and force a buy-back of a day-ahead schedule.¹¹

8. CAISO explains that storage resources may also bid or take other actions to prevent charging or discharging in earlier intervals to restrict state of charge in later intervals in a manner leading to undeliverable day-ahead schedules. For example, CAISO states that a scheduling coordinator might decrease its offer in a prior interval to discharge in real-time prior to the interval for which it has a day-ahead schedule. CAISO asserts that this could lead to an insufficient state of charge at that time, triggering a buy-back and increasing the resource's real-time bid cost recovery.¹²

9. CAISO argues that, because storage resources do not have underlying commitment costs or operating constraints, they should not receive more bid cost recovery than conventional resources. CAISO states that absent Tariff changes, scheduling coordinators for storage resources may exploit market buy-backs and sell-backs through strategic bidding to inflate bid cost recovery payments even more.¹³

10. CAISO reports that between January 2022 and September 2024, storage resources received bid cost recovery payments totaling approximately \$58 million (most of which reflect real-time bid cost recovery payments) representing a much higher portion of bid cost recovery payments compared to the portion of energy they provided to the grid.¹⁴ CAISO also cites a 2024 report published by CAISO's Department of Market Monitoring

affecting state of charge beyond the real-time window. *Id.* at 9-10.

¹⁰ *Id.* at 8-9 (citing CAISO, CAISO eTariff, § 11.8.4 (RTM Bid Cost Recovery Amount) (31.0.0)).

¹¹ *Id.* at 10-11.

¹² *Id.* at 11.

¹³ *Id.* at 12-13.

¹⁴ *Id.* at 3. CAISO notes that storage resources received around 8% of bid cost recovery payments compared to the 1.7% share of energy they provided to the grid.

(DMM), which noted numerous situations where storage resources may receive inappropriate or unwarranted bid cost recovery payments.¹⁵

II. Filing

11. CAISO proposes to revise its Tariff to use proxy values for a storage resource's real-time energy bid cost based on the market dispatch of that resource in the 15-minute and five-minute market in relation to the resource's market award in the day-ahead market or the 15-minute market, respectively. CAISO notes these proxy values will apply to storage resources in all real-time market intervals. CAISO asserts that these values will mitigate the risk of unwarranted real-time bid cost recovery payments and reduce the incentive for scheduling coordinators to engage in strategic bidding for storage resources.¹⁶

12. First, CAISO proposes to modify the real-time bid cost recovery rules for a storage resource participating as a non-generator resource¹⁷ when it receives a dispatch instruction in the 15-minute market that results in incremental energy to its day-ahead energy schedule, or a dispatch instruction in the five-minute real-time dispatch that results in incremental energy to its schedule from the 15-minute market. In these instances, CAISO proposes that the resource's real time energy bid cost will reflect the lower of: (1) the resource's energy bid in the real-time market interval, or (2) the greater of the resource's day-ahead locational marginal price (LMP), its real-time market default energy bid, or its real-time LMP for that interval, which are alternative proxy values to a resource's real-time incremental energy costs.¹⁸

13. CAISO asserts that using the lower of the storage resource's energy bid in the real-time market, or the greater of the alternative proxy values for incremental energy reflects

¹⁵ *Id.* at 3, 10 n.22 (citing CAISO DMM, 2023 *Special Report on Battery Storage* 24 (Jul. 2024), <https://www.caiso.com/documents/2023-special-report-on-battery-storage-jul-16-2024.pdf>).

¹⁶ *Id.* at 15.

¹⁷ CAISO's non-generator resource model tracks each resource's state of charge. CAISO, CAISO eTariff, § 30.5.6 (Non-Generator Resource Bids) (8.0.0), § 30.5.6.1.

¹⁸ Transmittal at 15; CAISO, CAISO eTariff, § 11.8.4 (RTM Bid Cost Recovery Amount) (33.0.0), § 11.8.4.1.5.1; *id.* § 29.11 (Settlements and Billing for EIM Market Participants) (23.0.0), § 29.11(f)(3). CAISO notes that incremental energy may include a reduction in a charge schedule, an increase in a discharge schedule, or both, and notes that decremental energy may include a reduction in a discharge schedule, an increase in a charge schedule, or both. Transmittal at 4 nn.6,7.

the resource's likely costs to provide incremental energy and ensures that the bid does not result in unduly inflated cost recovery. CAISO explains that each of the alternative proxy values (day-ahead LMP, real-time market default energy bid, and the real-time LMP for that interval) reflect a reasonable estimate of costs to provide incremental energy. CAISO further explains that the day-ahead LMP reflects the day-ahead market clearing price for the resource in the relevant trading hour, the resource's real-time default energy bid is a calculated value that reflects opportunity costs to provide incremental energy, and the real-time LMP reflects the market clearing price of providing incremental energy as reflected in the real-time market for the relevant market interval. CAISO proposes to use the greater of these proxy values to calculate bid cost recovery payments unless a resource's real-time energy bid costs is lower than these values. CAISO asserts that using the greater of the proxy values will help ensure the proposed rules do not over-mitigate a resource's real-time market energy bid costs.¹⁹

14. Second, CAISO proposes to modify the real-time energy bid cost recovery rules for a storage resource participating as a non-generator resource when it receives dispatch instruction in the 15-minute market resulting in decremental energy or no change to its day-ahead energy schedule, or a dispatch instruction in the five-minute real-time dispatch that results in decremental energy or no change to its schedule from the 15-minute market. In these instances, CAISO proposes that the real time energy bid cost will reflect the greater of the following two values: (1) the resource's energy bid in the real-time market for that interval; or (2) the lower of its day-ahead LMP, its real-time market default energy bid, or its real-time LMP for that interval, which are alternative proxy values for the resource's real-time energy bid cost to provide decremental energy.²⁰

15. According to CAISO, using the greater of the storage resource's energy bid in real-time or the alternative proxy values for incremental energy reflects the likely costs to provide decremental energy and ensures the resource's bid does not result in unduly inflated bid cost recovery. CAISO asserts that each value is reasonable, but proposes to use the lower of the alternative proxy values unless a resource's real-time energy bid costs are greater than these values, which would ensure that the proposed rules do not overstate a resource's real-time market energy bid costs. CAISO states this structure protects the market from outlier real-time energy bid costs that bear no relation to the resource's actual costs (the formula will only use the bid rather than the chosen proxy value if doing so will result in a lower bid cost recovery calculation).²¹

¹⁹ Transmittal at 16.

²⁰ *Id.*; CAISO, CAISO eTariff, § 11.8.4 (RTM Bid Cost Recovery Amount) (33.0.0), § 11.8.4.1.5.1.

²¹ Transmittal at 18-19.

16. Finally, for energy storage resources without a day-ahead energy schedule or a base schedule for an Energy Imbalance Market participant, CAISO proposes to use similar proxy values for both incremental and decremental dispatch instructions. However, CAISO notes that the day-ahead LMP would not be considered as a proxy in these cases.²²

17. CAISO notes that several stakeholders expressed support for the proposed rules²³ and requested that CAISO continue working on a holistic redesign of the uplift mechanism for storage resources. CAISO states it will continue to discuss longer-term enhancements it might make to the Tariff with stakeholders, but notes that such an effort need not interfere with the Commission accepting the proposed Tariff changes, which address a pressing market design issue that affects real-time bid cost recovery rules that can result in unwarranted payments to resources that do not reflect actual costs. CAISO asserts its proposed Tariff revisions are just and reasonable and not unduly discriminatory or preferential.²⁴

18. CAISO requests that the Commission grant waiver of its prior notice requirements and accept the Tariff revisions effective December 1, 2024, stating that permitting the Tariff revisions to go into effect on this date will address the issue of storage resources' unwarranted bid cost recovery payments and help prevent resources from taking advantage of the existing rules through strategic bidding.²⁵

III. Notice and Responsive Pleadings

19. Notice of CAISO's filing was published in the *Federal Register*, 89 Fed. Reg. 95762 (Dec. 3, 2024), with interventions and protests due on or before December 17, 2024. Timely motions to intervene were filed by Boston Energy Trading and Marketing LLC; California Department of Water Resources State Water Project; Calpine Corporation; Cities of Anaheim, Azusa, Banning, Colton, Pasadena, and Riverside, California; City of Santa Clara, California; Northern California Power Agency; Pacific Gas and Electric Company; and Public Citizen, Inc. DMM submitted a timely motion to intervene and comments.

20. DMM states it does not oppose CAISO's proposed Tariff revisions as a temporary short-term measure that may limit inappropriate bid cost recovery payments, and notes

²² *Id.* at 17-18, 21 (citing CAISO, CAISO eTariff, § 11.8.4 (RTM Bid Cost Recovery Amount) (33.0.0), § 11.8.4.1.5.1).

²³ *Id.* at 21.

²⁴ *Id.* at 22.

²⁵ *Id.* at 23.

that the revisions would limit the potential for gaming of bid cost recovery rules for batteries. However, DMM states that CAISO's proposed changes do not fully eliminate gaming concerns, do not address the underlying problematic bidding incentives created by current bid cost recovery rules, and might still lead to inefficient dispatches. DMM acknowledges CAISO's recent steps to further develop bid cost recovery rules through a newly launched stakeholder initiative and supports CAISO's continued work in this area.²⁶

21. DMM notes that binding state of charge constraints primarily lead to bid cost recovery through the uneconomic reversal of day-ahead schedules when the battery's real-time state of charge is insufficient to meet its day-ahead schedule. DMM notes that this is by far the largest driver of bid cost recovery paid to battery resources and results from a combination of: (1) revenue losses, which occur when incremental real-time revenue is insufficient to cover the real-time cost of reversing an infeasible day-ahead schedule; and (2) bid-cost losses, which occur when the incremental bid cost associated with real-time dispatch is greater than the avoided bid cost from reversing an infeasible day-ahead schedule. DMM notes that CAISO's proposed Tariff revisions only address the bid-cost component of the bid cost recovery calculation, which reduces gaming potential, but does not address inefficient bidding incentives created by the revenue component of the calculation.²⁷

22. DMM argues that CAISO's proposal does not address the core problem of bid cost recovery payments when state of charge constraints are binding. DMM explains that the core problem is that these payments remove storage resources' exposure to real-time opportunity costs, creating incentives that can lead to inefficiencies and reliability issues. DMM states that it hopes CAISO will promptly file additional changes that address the core problems with the bid cost recovery rules for storage resources.²⁸

IV. Discussion

A. Procedural Matters

23. Pursuant to Rule 214 of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.214 (2024), the timely, unopposed motions to intervene serve to make the entities that filed them parties to this proceeding.

²⁶ DMM Comments at 1-2.

²⁷ *Id.* at 3-4.

²⁸ *Id.* at 7-8.

B. Commission Determination

24. We accept CAISO's Tariff revisions modifying the real-time energy bid cost recovery framework for storage resources as just and reasonable and not unduly discriminatory or preferential. We accept the filing effective December 1, 2024, as requested.²⁹

25. We find that the revisions can help mitigate the magnitude of unwarranted or inflated bid cost recovery payments to storage resources, especially in real-time. The primary purpose of bid cost recovery is to provide uplift payments to a resource when energy market revenues are not sufficient to cover operating costs (often due to intertemporal constraints), allowing the resource to recover start-up, minimum load, and energy bid costs.³⁰ We agree with CAISO and DMM that these operating costs are not generally applicable to storage resources.

26. With respect to bid cost recovery related to incremental energy, we find CAISO's proposal to use the lower of a resource's real-time energy bid or proxy (the maximum of a resource's day-ahead LMP, real-time market default energy bid, or real-time LMP for that interval) provides a reasonable representation of the operational nature of storage resources. These proxies appropriately reflect a storage resource's cost of providing incremental energy as such resources do not have commitment costs, start-up costs, or other operating constraints. Further, we also find it reasonable that CAISO proposes to use the greater of these proxy values to further ensure that it does not over-mitigate a resource's real-time market energy bid costs.

27. With respect to bid cost recovery related to decremental energy, we find CAISO's proposal to use the greater of a resource's real-time energy bid or (the minimum of) the aforementioned proxies better reflect the costs of providing decremental energy. We note that CAISO's proposal allows for the bid cost recovery calculation to use the lower of these proxies unless a resource's real-time energy bid cost is greater than these values, which we find reasonable, as it could moderate any overstatement of a resource's real-time bid costs. In addition, this approach helps ensure that resources are more appropriately compensated based on their costs.

28. We note that certain of the "core problems" that DMM identified, such as the inefficient dispatches of storage resources caused by state of charge constraints, are beyond the scope of the instant proceeding. We find that CAISO's proposal is a

²⁹ We grant waiver of the Commission's 60-day prior notice requirement for good cause shown. 18 C.F.R. § 35.11 (2024); *see Cent. Hudson Gas & Elec. Corp.*, 60 FERC ¶ 61,106, *reh'g denied*, 61 FERC ¶ 61,089 (1992).

³⁰ *Cal. Indep. Sys. Operator Corp.*, 181 FERC ¶ 61,146, at P 33 (2022).

reasonable step in mitigating real-time bid cost recovery payments for the reasons discussed above.

29. While we accept this Tariff revision as a reasonable first step, we recognize CAISO, DMM and stakeholders are seeking further solutions to address gaming concerns, and we encourage such efforts to further refine the Tariff.

The Commission orders:

CAISO's proposed Tariff revisions are hereby accepted, effective December 1, 2024, as requested, as discussed in the body of this order.

By the Commission.

(S E A L)

Carlos D. Clay,
Deputy Secretary.