

177 FERC ¶ 61,153  
UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Richard Glick, Chairman;  
James P. Danly, Allison Clements,  
and Mark C. Christie.

California Independent System Operator Corporation      Docket No. ER21-2853-000

ORDER ACCEPTING TARIFF REVISIONS

(Issued November 30, 2021)

1. On September 8, 2021, the California Independent System Operator Corporation (CAISO) filed, pursuant to section 205 of the Federal Power Act,<sup>1</sup> proposed revisions to its Open Access Transmission Tariff (Tariff) to clarify market rules for hybrid and co-located resources. Specifically, CAISO proposes tariff rules to: (1) enhance market participation for hybrid and co-located resources, and (2) allow for the use of multiple aggregate capability constraints by co-located resources at a single generating facility. As discussed below, we accept the proposed Tariff revisions, effective as of the actual implementation dates, subject to CAISO notifying the Commission of the actual implementation date for each set of Tariff records within five days of that date.<sup>2</sup>

**I. Background**

2. CAISO explains that energy storage resources are a significant and growing part of its system and that load-serving entities and developers are seeking to pair energy storage resources with solar and wind resources. CAISO states that it may model these combinations as separate co-located resources or as a single integrated hybrid resource,<sup>3</sup>

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<sup>1</sup> 16 U.S.C. § 824d.

<sup>2</sup> As discussed further below, CAISO requests different effective dates for certain components of its proposed Tariff revisions.

<sup>3</sup> In CAISO, co-located resources are interconnected at the same generating facility, but with separate Resource IDs, bids, and market dispatch instructions. In contrast, a hybrid resource is modeled and dispatched as a single resource, possessing one bid curve for its constituent parts and settled under a single Resource ID. As formally defined, the terms hybrid and co-located refer both to a resource type and a method of

and that it expects increased deployment of both hybrid and co-located resources in its balancing authority area, and in the western Energy Imbalance Market (EIM), over the next several years.<sup>4</sup>

3. CAISO explains that the Tariff revisions in the instant filing arise from both the second phase of CAISO's Hybrid Resource initiative, and an effort undertaken earlier in 2021 to enhance the use of aggregate capability constraints by co-located resources at a single generating facility. CAISO also states that it has planned a stakeholder process in 2022 to address the evolution of hybrid and co-located resource deployment, including a review of the market rules in place and market functionality to allow more effective operation of these resources.

## II. CAISO Proposal

### A. Market Participation Rules for Hybrid and Co-Located Resources

#### 1. Roles and Responsibilities for Hybrid and Co-Located Resource Scheduling Coordinators and Data Requirements

4. CAISO proposes new Tariff section 4.18 to make clear that hybrid resources are subject to the same rules as generating units under Tariff section 4.6,<sup>5</sup> and to establish a requirement for scheduling coordinators for hybrid resources to provide accurate data to CAISO regarding the capacity and operating characteristics of the resource's components.<sup>6</sup> CAISO proposes to modify section 29 of its Tariff to recognize requirements related to hybrid resources that include intermittent (i.e., wind and solar) components to parallel existing provisions for variable energy resources that apply to EIM participants.<sup>7</sup>

5. CAISO also proposes to include more specific information requirements for hybrid resources in Appendix Q (Eligible Intermittent Resources Protocol) of its Tariff,

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participation for such resources. Transmittal at 2-3.

<sup>4</sup> CAISO expects these resources to be primarily solar photovoltaic and battery energy storage or wind and battery energy storage. Transmittal at 2.

<sup>5</sup> CAISO, CAISO eTariff, OATT, Tariff § 4.6 (9.0.0) addresses the "Relationship between CAISO and Generators" and requires generating units to have scheduling coordinators and execute participating generator agreements.

<sup>6</sup> Proposed CAISO Tariff §§ 4.18 and 4.6.11. Transmittal at 5, 8.

<sup>7</sup> Proposed CAISO Tariff §§ 29.2 (b), 29.6 (e), 29.11 (j), and 29.34 (q). Transmittal at 8.

including data related to meteorology, state of charge (for resources that have a storage component), site information, topographic, and other associated information. In addition, CAISO proposes certain additional data clarifications for hybrid resources: (1) clarifying that eligible intermittent resources or hybrid resources with a wind generation component may not share meteorological stations; (2) revising the format and data categories associated with site information requirements; and (3) requiring the submission of a shape file to illustrate the location of meteorological station(s) and a resource's project boundaries.<sup>8</sup> CAISO explains that hybrid resources with variable energy resource components will need to provide information similar to that which eligible intermittent resources provide, which will allow CAISO to forecast the likely output of the hybrid resource's renewable components. CAISO explains that although hybrid resources may have a variable energy component, they will not be eligible intermittent resources under Appendix Q of its Tariff. CAISO contends that while eligible intermittent resource operators cannot store electricity and are susceptible to variability outside their control, hybrid resource operators can store electricity and manage the variability of their resources. However, CAISO explains that hybrid resources with variable energy components will need to provide information similar to that which eligible intermittent resources provide, which will allow CAISO to forecast the likely output of the hybrid resource's renewable components.

6. CAISO also proposes to require each hybrid resource and co-located eligible intermittent resource to provide its "high sustainable limit"<sup>9</sup> via telemetry every 12 seconds.<sup>10</sup> CAISO explains that this parameter is a real-time estimate of the instantaneous maximum output capability of a variable energy resource or the variable component of a hybrid resource, based on the resource's physical properties and weather conditions. Specifically, CAISO asserts that the parameter would improve forecast accuracy for: (a) hybrid resources that include a variable component and an energy storage component; and (b) eligible intermittent resources co-located with an energy

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<sup>8</sup> Transmittal at 11. Proposed CAISO Tariff, app. Q §§ 3.1.5, 3.2.1.4, and 3.2.3.

<sup>9</sup> CAISO proposes to define the term high sustainable limit as "the instantaneous generating capability of a variable Generating Unit (or component thereof), provided to CAISO through telemetry at the Generating Unit." Proposed definition in Appendix A of the Tariff; and proposed Appendix Q of the Tariff.

<sup>10</sup> CAISO states that the high sustainable limit is not the resource's Pmax, which is its maximum operating level; rather the high sustainable limit represents its instantaneous capability based on real-time conditions. Transmittal at 5 n.9.

storage resource. CAISO also states that using high sustainable limit data can enhance the accuracy of CAISO's persistence forecast.<sup>11</sup>

7. CAISO explains that when a variable energy resource is subject to market action reducing its MW output and telemetry value, CAISO shifts its persistence forecasting to a forecast created by an external service reflecting current weather conditions. CAISO contends that, based on data it presented during the stakeholder process, using high sustainable limit data correlates more closely to the actual output of a resource than the weather-based forecast model CAISO currently uses, and could enhance the accuracy of CAISO's persistence forecast.<sup>12</sup> CAISO includes this data point as a requirement for hybrid resources and co-located eligible intermittent resources to provide regulation, spinning reserve, and non-spinning reserve, stating that it would allow the forecasting model to assess the capability of the resources notwithstanding an ancillary service award or dispatch, and help validate whether a co-located eligible intermittent resource or hybrid resource is capable of providing ancillary services during the real-time market.<sup>13</sup>

## 2. Hybrid Dynamic Limit Bidding Functionality

8. CAISO proposes to implement a hybrid dynamic limit functionality for scheduling coordinators of hybrid resources. CAISO states that this functionality will allow scheduling coordinators to specify the upper and lower operational limits for a resource for each five-minute interval, over a rolling six-hour forward time horizon, and communicate this real-time generating capability to CAISO.<sup>14</sup>

9. CAISO states that a hybrid dynamic limit functionality can better account for the different technologies participating as an integrated hybrid resource and inform CAISO's market optimization about the hybrid resource's availability in both the next dispatch interval and near-term horizon based on available fuel, state of charge, or site charging needs. CAISO notes that scheduling coordinators may also use hybrid dynamic limits to manage onsite charging of the energy storage component of a hybrid resource, and that it alleviates the need for scheduling coordinators to utilize CAISO's outage management system manually.<sup>15</sup>

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<sup>11</sup> *Id.* at 10.

<sup>12</sup> *Id.*

<sup>13</sup> Proposed CAISO Tariff, app K Pt. A.1.2.2.5, B.17, and C.2.3. Transmittal at 10.

<sup>14</sup> Proposed CAISO Tariff § 30.5.6.1.

<sup>15</sup> Transmittal at 13-14.

10. CAISO states that the Commission should accept the hybrid dynamic limit, as it reflects a more efficient and effective way to represent the unavailability of hybrid resources in the real-time market optimization. CAISO also states that it plans to monitor the submission of this information and assess its accuracy and effectiveness as part of the hybrid evolution stakeholder initiative it will commence in 2022, in addition to monitoring for potential economic withholding behavior.<sup>16</sup>

**3. Clarification of Resource Adequacy Rules Related to Hybrid Resources**

11. CAISO states that under its existing Tariff eligible intermittent resources and energy storage resources may provide resource adequacy capacity, whether co-located or not; hybrid resources may also provide resource adequacy capacity. CAISO proposes two changes applicable to hybrid resources: (1) exempt hybrid resources from its resource adequacy availability incentive mechanism (RAAIM) framework to reduce risk of double-penalizing these resources;<sup>17</sup> and (2) clarify rules for assessing hybrid resources' effective flexible capacity.

12. CAISO explains that the existing methodology to assign resource adequacy values to solar and wind resources uses an effective load carrying capability (ELCC) calculation, which applies an "effectiveness factor" to the nameplate value of the resource to determine qualifying capacity for resource adequacy.<sup>18</sup> CAISO states that for hybrid resources, the CPUC established that the qualifying resource adequacy capacity value is equal to the combined value of the variable energy resource and the storage resource.<sup>19</sup> Thus, CAISO asserts that the variable energy resource component's capacity value is effectively discounted via the ELCC methodology and by onsite charging. Consequently,

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<sup>16</sup> *Id.* at 14.

<sup>17</sup> Proposed CAISO Tariff § 40.9.2 (b). CAISO explains that RAAIM is designed to incentivize resources to ensure they offer capacity during specific availability assessment hours by comparing a resource's monthly availability to a defined threshold range. Those that are available less than the threshold (94.5% of its must-offer obligation) incur a charge, while those that are available above the threshold (98.5% of its must-offer obligation) receive a payment based on charges collected. Transmittal at 15.

<sup>18</sup> Transmittal at 15. CAISO notes that within its balancing authority area, local regulatory authorities such as the California Public Utilities Commission (CPUC) determine qualifying capacity for resource adequacy resources.

<sup>19</sup> *Id.* 1 at 16 and n.36 (citing CPUC Decision No.20-06-031, *Decision Adopting Local Capacity Obligations for 2021-2023, Adopting Flexible Capacity Obligations for 2021, and Refining the Resource Adequacy Program* at 25-31 (June 30, 2020).

CAISO states that applying RAAIM to hybrid resources may double penalize the hybrid resource's variable component for its unavailability: once by discounting its capacity contribution based on its past performance, and again through a RAAIM charge.<sup>20</sup>

13. CAISO states that it would require complex settlement provisions to separate the application of the incentive mechanism to the storage component of a hybrid resource.<sup>21</sup> CAISO additionally notes that currently, variable energy resources are exempt from RAAIM due to the same circumstances that affect the variable component of hybrid resources.<sup>22</sup>

14. CAISO proposes to calculate the effective flexible capacity value of a hybrid resource as the sum of the effective flexible capacity values of the constituent components of the hybrid resource if those components were each a distinct generating unit. CAISO explains this treatment aligns with the flexible capacity counting rules in place for co-located resources and storage resources.

**B. Use of Multiple Aggregate Capacity Constraints by Co-Located Resources at a Single Generating Facility**

15. CAISO proposes to allow multiple sets of co-located resources to use distinct aggregate capacity constraints<sup>23</sup> simultaneously within a single generating facility.<sup>24</sup>

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<sup>20</sup> CAISO asserts that applying RAAIM to co-located resources is straightforward, as the variable energy resource component is exempt from RAAIM in co-located resources, and the incentive mechanism applies solely to the storage component. Transmittal at 15.

<sup>21</sup> *Id.* at 15-16. CAISO notes that it plans to review resource adequacy incentives for hybrid resources in its resource adequacy enhancements initiative.

<sup>22</sup> *Id.* at 6. Variable energy resources are exempt from system and local capacity RAAIM, but not flexible capacity RAAIM. CAISO's proposed Tariff revisions in this instant filing would similarly exempt hybrid resources from system and local capacity RAAIM, but not from flexible capacity RAAIM. *See* Proposed CAISO Tariff section 40.9.2 (b).

<sup>23</sup> Aggregate capacity constraints model the maximum and minimum capabilities of co-located generating units at a generating facility for purposes of issuing day-ahead and real-time market awards and dispatch.

<sup>24</sup> Transmittal at 6-7. Currently an interconnection customer with co-located resources may use an aggregate capacity constraint that models the maximum and

CAISO explains that using multiple aggregate capability constraints at a single generating facility will allow it to nest a set of constraints that are subordinate to the master aggregate capability constraint, but still observe the generating facility's total interconnection service capacity limit. According to CAISO, the master and subordinate aggregate capability constraints serve different functions: the master aggregate capability constraint limits combined dispatch from all co-located resources at a single generating facility, and cannot be relaxed by the market software, whereas the subordinate constraints represent contractual limitations on the output of co-located resources (not reliability considerations) and, therefore, limit output based on contractual entitlements.<sup>25</sup> CAISO states that expanding the use of aggregate capability constraints at the generating facility level will accommodate commercial transactions between developers of co-located resources and off-takers.<sup>26</sup>

16. CAISO elaborates that under this proposed construct, it could relax enforcement of subordinate aggregate capability constraints in its real-time market to ensure there is sufficient supply to meet forecasted demand. CAISO states that in its initial implementation of this tool, it would set the penalty price for master and subordinate aggregate capability constraints at the same level. Subsequently, CAISO states that it would implement changes to its optimization such that the penalty price of subordinate aggregate capability constraints is less than the system energy-balance constraint.<sup>27</sup> CAISO explains that it would not relax these subordinate aggregate capability constraints unless it is necessary to access available generating capability at the generating facility.<sup>28</sup>

17. Finally, CAISO explains that in the instant proposal it has limited co-located resources utilizing an aggregate capability constraint to those providing only energy but

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minimum capabilities of the co-located generating units for purposes of day-ahead market and real-time market awards and dispatches.

<sup>25</sup> *Id.* at 18.

<sup>26</sup> *Id.* at 7; 16-17.

<sup>27</sup> CAISO states that the penalty prices will be reflected in its Business Practice Manual for Market Operations.

<sup>28</sup> Transmittal at 7. CAISO avers that the need to relax subordinate aggregate capability constraints should occur infrequently and only if there is capacity that otherwise would be stranded by the subordinate aggregate capability constraint and unavailable to serve demand.

plans to lift this restriction in fall 2021 so that co-located resources utilizing an aggregate capability constraint may provide both energy and ancillary services.<sup>29</sup>

18. CAISO requests an effective date on or before December 1, 2021, for all Tariff revisions except those related to the dynamic limit functionality where CAISO requests an effective date no later than June 1, 2022, subject to CAISO notifying the Commission of the actual implementation date for each set of Tariff records within five days of that date.<sup>30</sup> CAISO also seeks waiver of the Commission's 120-day notice requirement between the date a rate schedule is filed and the date it must take effect.<sup>31</sup>

### **III. Notice of Filing and Responsive Pleadings**

19. Notice of CAISO's filing was published in the *Federal Register*, 86 Fed. Reg. 51,135 (Sept. 14, 2021), with interventions and protests due on or before September 29, 2021. Timely motions to intervene were filed by: Calpine Corporation; Southern California Edison Company; City of Santa Clara, California; and the Cities of Anaheim, Azusa, Banning, Colton, Pasadena, and Riverside, California. U.S. Energy Storage Association and California Energy Storage Alliance (ESA/CESA), the Department of Market Monitoring (DMM), and Pacific Gas and Electric Company (PG&E) filed timely motions to intervene and comments. Middle River Power, LLC (Middle River) filed a timely motion to intervene and limited protest. On October 6, 2021, CAISO submitted an answer to Middle River's protest. On October 15, 2021, Middle River submitted an answer to CAISO's answer.

#### **A. Comments in Support**

20. PG&E and ESA/CESA support CAISO's proposed Tariff revisions for hybrid resources and co-located resources. PG&E states that CAISO conducted a thorough stakeholder process and approached this process in a balanced way.<sup>32</sup> ESA/CESA state

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<sup>29</sup> *Id.* CAISO explains that it would relax the subordinate constraint prior to relaxing enforcement of the system energy-balance constraint, and the market optimization cannot balance supply and demand without relaxing the constraint. CAISO states it will effect this change by issuing a market notice as contemplated under current Tariff § 27.13.

<sup>30</sup> The eTariff records submitted by CAISO contain an effective date of 12/31/9998.

<sup>31</sup> Transmittal at 2.

<sup>32</sup> PG&E Comments at 3.



that the changes will remove operating constraints for hybrid and co-located resources, allowing them to participate more fully in CAISO markets.<sup>33</sup>

21. ESA/CESA support a temporary exclusion from RAIM for hybrid resources as they would be potentially double penalized for periods of non-performance if RAIM penalties were applied. ESA/CESA encourage CAISO to develop resource availability incentives for hybrid resources.<sup>34</sup>

22. DMM supports CAISO's proposal to define responsibilities of hybrid resource scheduling coordinators, including the dynamic limit bidding functionality enhancement for hybrid resources, and meteorological and other data for the variable energy and energy storage components. However, DMM notes that the dynamic limit parameter could also be used to withhold capacity and it thus argues that CAISO's proposed requirements to provide operational capability data for individual hybrid resource components are particularly important.<sup>35</sup> DMM suggests that CAISO consider automating the dynamic limit in the future by using data on hybrid resource component physical capabilities and data flags to indicate the charging of, or the intent to charge, the energy storage component. DMM states that automating the parameter as part of a future enhancement would improve transparency while also indicating to CAISO operators when the hybrid dynamic limit could potentially be relaxed if needed for reliability purposes.<sup>36</sup>

23. DMM also states it does not oppose the resource adequacy rule clarifications proposed in the instant filing. With respect to CAISO's proposal that the effective flexible capacity value of a hybrid resource will be equal to the sum of the effective flexible capacity values of the resource components, DMM offers that an alternative approach to calculating effective flexible capacity for hybrid resources may be appropriate as a future enhancement—if CAISO observes a loss of flexibility when separate generation components are modeled as a single resource.<sup>37</sup> Finally, DMM expresses support for CAISO's proposal to allow multiple aggregate capability constraints at a single generating facility, but suggests that if impacts on the market dispatch of co-located resources lead to observed inefficiencies, CAISO should revisit the

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<sup>33</sup> ESA/CESA Comments at 3-4.

<sup>34</sup> *Id.* at 4-5.

<sup>35</sup> DMM Comments at 3-5.

<sup>36</sup> DMM Comments at 5-6. As currently proposed, DMM notes that the dynamic limit does not distinguish whether the limit is a true physical limitation or was put in place to facilitate charging.

<sup>37</sup> DMM Comments at 6-8.

details of the subordinate aggregate capability constraint design in a future enhancement.<sup>38</sup>

## **B. Protest and Answers**

### **1. Middle River Protest**

24. Middle River objects to CAISO's proposal to exempt hybrid resources from RAAIM penalties, contending that exempting a significant portion of future resources that will be providing resource adequacy capacity to the CAISO is unreasonable. Middle River argues that CAISO's characterization that resource adequacy values for variable energy resources are determined by their historical performance is inapt. Middle River explains that ELCC studies apply aggregate variable energy resource generation profiles, based on historical output (determined by historical weather), to a forecast of weather in future years. Middle River states that asserting that a variable energy resource's qualifying capacity value is affected by its historical performance overstates the role an individual resource's performance plays in setting its ELCC-based qualifying capacity value.<sup>39</sup>

25. Middle River explains that by CPUC rule, the net qualifying capacity value for hybrid resources is determined as the sum of the net qualifying capacity of the storage resource, and the residual portion of capacity of the variable energy resource not used to charge the storage resource. Middle River asserts that, if the storage resource's nameplate value has at least four hours discharge duration, it is likely that the qualifying capacity value of the storage resource will be a significant fraction of the overall qualifying capacity for the hybrid resource, unless the renewable component of the hybrid resource is greatly oversized relative to the storage component. Middle River states that exempting the entire hybrid resource from RAAIM because of the challenges associated with a relatively small fraction of net qualifying capacity related to the variable energy resource component is questionable, especially when considering the explosive growth of hybrid storage in CAISO's interconnection queue.<sup>40</sup>

### **2. CAISO Answer**

26. CAISO reasserts that applying RAAIM to hybrid resources with a variable energy component would penalize them and would not ensure they offer their resource adequacy capacity during specific availability assessment hours. CAISO explains that its Tariff

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<sup>38</sup> DMM Comments at 10.

<sup>39</sup> Middle River Limited Protest at 2-4.

<sup>40</sup> *Id.* at 4-5 (citing CPUC Decision 20-06-031, Ordering Paragraph 11).

exempts several resource types (including variable energy resources) from RAAIM for local and system resource adequacy capacity. According to CAISO, these resources are not assessed charges, and do not receive payments based on whether they offered their resource adequacy capacity during specified hours.

27. CAISO acknowledges that Middle River explains that it is the historical performance of a resource technology type—and not the specific resource—that informs the monthly resource adequacy value of a variable energy resource or the variable component of a hybrid resource. CAISO asserts that this clarification in no way changes that applying RAAIM would further penalize that resource. CAISO explains that unlike gas-fired generating facilities, the marginal cost of fuel for these variable energy components of hybrid resources is zero—and applying RAAIM to these resources will not create additional incentives for them to offer resource adequacy capacity or withhold capacity from the market during specific availability assessment hours. CAISO explains that it has proposed a similar exemption for hybrid resources in part because it expects hybrid resources will largely reflect capacity from variable energy components.<sup>41</sup>

28. In response to Middle River's argument that the energy storage capacity will be a significant fraction, if not the majority, of the overall qualifying resource adequacy capacity for the hybrid resource, CAISO contends that it is too early to speculate how developers will configure their facilities.<sup>42</sup> Further, CAISO states that Middle River's references to its interconnection queue fails to explain that this information identifies battery energy storage resources that propose to interconnect *either* as co-located resources or hybrid resources, not just hybrid resources. CAISO explains that if these resources interconnect as co-located resources, then the current RAAIM rules will apply to the storage resources and that to date, CAISO has observed more interest in the co-located resource model.<sup>43</sup>

29. Finally, CAISO argues that if subject to RAAIM, hybrid resources likely would not offer capacity from their variable energy component as resource adequacy capacity, due to uncertainty about the weather-dependent fuel source. Therefore, CAISO asserts that the risk of paying ongoing RAAIM penalties will discourage hybrid resources from offering their full capacity, which in turn reduces competition in the resource adequacy market. While CAISO urges the Commission to reject Middle River's arguments, it states it is willing to evaluate the performance of hybrid resources providing resource adequacy capacity and submit an informational report within one year of the date the Commission issues an order on this filing if the Commission so requires. CAISO

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<sup>41</sup> CAISO Answer at 4-5.

<sup>42</sup> *Id.* at 5-6.

<sup>43</sup> *Id.* at 6.

explains that the proposed Tariff rule to exempt hybrid resources from RAAIM is separate from other Tariff revisions the CAISO has proposed in its filing.<sup>44</sup>

### 3. Middle River Answer

30. Middle River acknowledges that the ELCC analysis already discounts the capacity value of variable energy resources; however, Middle River argues it is still not a reason to exempt hybrid resources from RAAIM. Middle River asserts that extending CAISO's argument would imply that any resource whose qualifying capacity value is discounted from its nameplate value should be exempt from RAAIM. Middle River further argues that discounting the amount of resource adequacy capacity that a variable energy resource can provide is not unreasonable or discriminatory and instead reflects the inherently variable nature of the resource.<sup>45</sup>

31. Additionally, Middle River argues that while the Commission initially found it reasonable to exempt variable energy resources from RAAIM because their qualifying capacity values are based on historical performance, the CPUC has since changed the qualifying capacity methodology for variable energy resources from the exceedance methodology to the ELCC methodology, which CAISO acknowledged no longer accounts for an individual resource's historic output. Middle River states that, consequently, the premise may no longer be valid.<sup>46</sup>

32. Middle River acknowledges that a variable energy resource's low variable cost may make it unlikely that it will withhold bids from the CAISO's markets when the resource is physically available. However, Middle River states that excluding a variable energy resource from RAAIM under all conditions will not capture outage unavailability. Middle River also adds that a standalone variable energy resource should not receive an exemption for its entire resource adequacy capacity simply because a portion of its capacity is exempt.<sup>47</sup> Middle River states that to the extent a variable energy resource component's resource adequacy capacity value is penalized, it is penalized (i.e., discounted) by the way

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<sup>44</sup> CAISO Answer at 7-8.

<sup>45</sup> Middle River Answer at 2-3.

<sup>46</sup> *Id.* at 3-4 (citing *Cal. Indep. Sys. Operator Corp.*, 153 FERC ¶ 61,002, at P 73 (2015) (October 2015 Order)).

<sup>47</sup> *Id.* at 4.

the CPUC assigns resource adequacy capacity value under its current capacity counting rules, not by the application of the RAAIM mechanism.<sup>48</sup>

33. Middle River posits that if problems of applying RAAIM to certain resource adequacy resources stem from the counting or must-offer rules that apply to those resources, the proper solution lies in amending those counting and must-offer rules—not in expanding exemptions. Similarly, Middle River asserts that CAISO’s proposed exemption is questionable because the proposed RAAIM exemption is only for local and system resource adequacy capacity but not for flexible capacity, arguing that if a hybrid resource is committed as both flexible and local/system capacity, then such a resource would have to offer its capacity regardless.<sup>49</sup>

#### **IV. Discussion**

##### **A. Procedural Matters**

34. Pursuant to Rule 214 of the Commission’s Rules of Practice and Procedure, 18 C.F.R. § 385.214 (2020), the timely, unopposed motions to intervene serve to make the entities that filed them parties to this proceeding.

35. Rule 213(a)(2) of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.213(a)(2) (2020), prohibits an answer to a protest unless otherwise ordered by the decisional authority. We accept the answers of CAISO and Middle River because they have provided information that assisted us in our decision-making process.

##### **B. Commission Determination**

36. We find that CAISO’s proposed Tariff revisions are just and reasonable, and we therefore accept them, effective as of the actual implementation dates, subject to CAISO notifying the Commission of the actual implementation date for each set of Tariff revisions within five days of that date.<sup>50</sup> We also find good cause to grant CAISO’s

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<sup>48</sup> Middle River Answer at 5-6.

<sup>49</sup> Middle River Answer at 6-7.

<sup>50</sup> CAISO requests an effective date on or before December 1, 2021, for all Tariff revisions except those related to the dynamic limit functionality, where CAISO requests an effective date no later than June 1, 2022, subject to CAISO notifying the Commission of the actual implementation date within five days of that date. Accordingly, the eTariff records submitted by CAISO contain an effective date of 12/31/9998. CAISO must submit a filing to confirm the actual effective date for each set of Tariff revisions using Type of Filing Code 150 – Report within five days of the actual implementation date.

request for waiver of the 120-day notice requirement contained in section 35.3(a)(1) of the Commission's regulations, to allow the proposed tariff revisions to become effective upon implementation.

**1. Market Participation Rules for Hybrid Resources**

**a. Clarification of Roles and Responsibilities and Data Requirements**

37. We accept CAISO's proposal to require scheduling coordinators for hybrid resources to undertake similar roles and responsibilities as scheduling coordinators for other resources under CAISO Tariff section 4.6. We find that these revisions provide clarity for hybrid resource participation, given those resources' distinct characteristics. In addition, we find that the roles and responsibilities and information requirements for scheduling coordinators of hybrid resources in this proposal provide CAISO with necessary transparency and visibility to allow better forecasting of hybrid resources in its market operations.

38. We also agree with CAISO that requiring hybrid resources with variable energy components to provide information similar to co-located eligible intermittent resources (including providing high sustainable limit, meteorological, and topographic information) and state of charge data for storage resources will help provide hybrid resources with feasible dispatches based on real-time conditions, as well as better quality information for CAISO.

**b. Hybrid Dynamic Limit Functionality**

39. We accept CAISO's proposal to allow scheduling coordinators of hybrid resources to submit a dynamic limit in the real-time market. We find that the proposal enhances bidding functionality for hybrid resources by better reflecting their operating capability in the real-time market. Further, we recognize that a dynamic limit for hybrid resources alleviates the need for scheduling coordinators to manually submit outage notices. We agree that the dynamic limit can more efficiently reflect hybrid resource unavailability in the real-time market optimization.

40. DMM suggests that CAISO could consider, as part of a future enhancement, automating the dynamic limit to guard against potential withholding. We note that CAISO, as part of its 2022 hybrid evolution stakeholder initiative, has stated its intention to monitor the usage of the hybrid dynamic limit functionality for its effectiveness and accuracy, which we believe should help CAISO evaluate whether further revisions are warranted.

c. **Clarification of Resource Adequacy Rules Related to Hybrid Resources**

41. We accept CAISO's proposal to exempt hybrid resources from its RAIM framework as proposed.

42. First, we find that CAISO has demonstrated that the proposed exemption is just and reasonable. In the October 2015 Order, the Commission approved the existing RAIM exemption for variable energy resources in recognition of the fact that the use of a qualifying capacity methodology that discounts qualifying capacity by taking into account historical performance could lead to effectively penalizing a variable energy resource for a second time under the RAIM framework.<sup>51</sup> We find that CAISO has adequately explained why hybrid resources, if subject to RAIM, would face a similar risk of a double penalty here, and therefore that an exemption is also warranted for them. Specifically, we agree with CAISO that the ultimate resource adequacy capacity of a hybrid resource is reduced under the CPUC's current capacity valuation mechanism – the ELCC methodology – based on the operational and performance characteristics of the variable energy resource component of the hybrid resource. Thus, subjecting hybrid resources to the RAIM framework would introduce the risk of double penalizing a hybrid resource: first by potentially reducing the resource's capacity value upfront under the ELCC methodology, and second by a potential RAIM charge, which would determine availability in part on the same basis.

43. Furthermore, we find that CAISO's existing RAIM exemption for variable energy resources would complicate applying RAIM penalties to hybrid resources, given that variable energy resources are not currently subject to RAIM while energy storage resources are subject to RAIM. Unlike co-located resources, hybrid resource components have a single Resource ID, and are settled together; distinguishing the constituent resources' offers and applying incentives would present a complex challenge for implementation.

44. We do not find persuasive Middle River's assertion that the Commission should re-examine the premise underlying the proposed exemption for hybrid resources given that variable energy resources' qualifying capacity values are no longer based on the historical performance of an individual resource. Middle River cites to Commission precedent approving the exemption of variable energy resources from RAIM, in which the Commission encouraged CAISO to work with stakeholders to eliminate the exemption if and when a new assessment of qualifying capacity that does not consider

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<sup>51</sup> October 2015 Order, 153 FERC ¶ 61,002 at P 72.

historical output is adopted.<sup>52</sup> We recognize that, as Middle River points out, the CPUC changed its qualifying capacity methodology since that time and that under the current resource adequacy Tariff rules, it is the collective performance of a resource technology—and not an individual resource’s performance—that affects its qualifying capacity value. However, we find that the CPUC’s ELCC methodology continues to discount variable energy resources’ capacity, albeit based on the performance of a class of resources rather than an individual resource and therefore we decline to reexamine the exemption established in the October 2015 Order.

45. Middle River also questions the RAIM exemption proposal for hybrid resources because it applies to system and local resource adequacy capacity, but not to flexible resource adequacy capacity. We find that this framework is analogous to CAISO’s treatment of variable energy resources in RAIM under the existing Tariff, which similarly exempts those resources from RAIM for system and local, but not flexible, resource adequacy capacity.<sup>53</sup> Moreover, as the Commission previously recognized in the October 2015 Order, the RAIM process applicable to system and local resource adequacy is distinct from the process applicable to flexible capacity.<sup>54</sup>

46. Middle River also asserts that, if problems in applying RAIM to certain resource adequacy resources stem from the counting or must-offer rules that apply to resources, the proper solution lies in amending these counting and must-offer rules, not in expanding the pool of resources exempt from CAISO’s resource adequacy penalty structure. We find that the proposal that is before us represents a just and reasonable approach for treatment of hybrid resources under CAISO’s resource adequacy framework. Having found that CAISO’s proposal is just and reasonable, we need not consider whether other approaches may also be just and reasonable.<sup>55</sup> However, we note

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<sup>52</sup> Middle River Protest at 4 (citing October 2015 Order, 153 FERC ¶ 61,002 at P 73).

<sup>53</sup> See CAISO, CAISO eTariff, OATT, Tariff § 40.9.2 (b).

<sup>54</sup> See October 2015 Order, 153 FERC ¶ 61,002 at P 74 (stating that “CAISO’s Answer in that proceeding explains that the penalty provisions in contracts only require (system and local resource adequacy) resources to provide energy or face a penalty; they do not require resources to submit economic bids. Thus, CAISO explains that resources can satisfy requirements of their contracts by self-scheduling but that would not satisfy the must-offer obligation for flexible capacity resources.”).

<sup>55</sup> See, e.g., *Cities of Bethany v. FERC*, 727 F.2d 1131, 1136 (D.C. Cir. 1984) (“FERC has interpreted its authority to review rates under the FPA as limited to an inquiry into whether the rates proposed by a utility are reasonable—and not to extend to



that CAISO has indicated that it intends to examine the resource adequacy counting rules and incentives through the stakeholder process. As Middle River notes, the Commission in 2015 encouraged CAISO to work with stakeholders to eliminate the exemption if and when a new assessment of qualifying capacity that does not consider historical output was adopted. Similarly, here, we encourage CAISO to work with stakeholders to examine its resource adequacy counting rules and incentives. CAISO must ensure all resources are equally subject to the tariff.

47. We accept CAISO's offer and require CAISO to submit an informational report 12 months after the issuance of this order that describes the performance of hybrid resources providing resource adequacy capacity. In that report, CAISO should also notify the Commission of any plans to revise the CAISO Tariff sections on resource adequacy counting rules, incentives, or the RAIM framework. CAISO should monitor, evaluate, and make transparent resource adequacy performance by hybrid resources and use this information to inform any future refinements. Furthermore, we note that CAISO intends to review resource adequacy incentives for hybrid resources in its resource adequacy enhancements initiative,<sup>56</sup> and encourage CAISO to continue to study this issue.

48. Finally, we accept as just and reasonable CAISO's proposal to calculate the effective flexible capacity value of hybrid resources as the sum of the constituent resources' components. We agree with CAISO that the proposed approach is just and reasonable, as it aligns the calculation with flexible capacity counting rules for co-located resources (which also offer flexible capacity from resource combinations). It would also reflect the ability of the energy storage resource component of a hybrid resource to be able to count flexible resource adequacy capacity for its full operational range, and allow hybrid resources to provide similar flexibility as standalone energy storage resources.

## **2. Use of Multiple Aggregate Capability Constraints at a Single Generating Facility**

49. We accept CAISO's proposal to allow multiple aggregate capability constraints for co-located resources at a single generating facility. We agree with CAISO that this construct would support the market integration of multiple co-located resources with different off-takers and scheduling coordinators and accommodate existing procurement practices designed to integrate energy storage resources. We find that CAISO's proposal balances the need to enforce physical and interconnection limits with the flexibility to meet contractual obligations, which is beneficial to co-located resources with contractual

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determining whether a proposed rate schedule is more or less reasonable than alternative rate designs.”).

<sup>56</sup> Transmittal at 6.

constraints on their available aggregate capability and allows CAISO to relax the subordinate capability constraints, up to the co-located resources' maximum aggregate capability constraint at the point of interconnection, in instances when grid reliability is threatened.

50. We acknowledge DMM's concerns that there is the potential for inefficiencies in the market if a subordinate aggregate capability constraint prevents the otherwise economic dispatch of a resource that is physically available, leading to higher cost resources being dispatched. Nevertheless, as DMM also observes, allowing the use of multiple aggregate capability constraints is more efficient than establishing restricted PMax values for each resource in order to respect contractual shares of interconnection rights (as is currently the case), rather than the total interconnection limit by the master aggregate capability constraint. We accept CAISO's proposal as just and reasonable and encourage CAISO to consider further efficiency enhancements if the need arises.

The Commission orders:

(A) CAISO's proposed Tariff revisions are hereby accepted, to be effective as of the actual implementation date for each set of Tariff revisions, as discussed in the body of this order.

(B) CAISO is hereby directed to notify the Commission of the actual effective date of the Tariff revisions within five business days of their implementation, in an eTariff submittal using Type of Filing Code 150 – Report.

By the Commission. Commissioner Danly is concurring with a separate statement attached.

( S E A L )

Kimberly D. Bose,  
Secretary.

UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

California Independent System Operator Corporation    Docket No.    ER21-2853-000

(Issued November 30, 2021)

DANLY, Commissioner, *concurring*:

1.     I concur with this order because I agree that the California Independent System Operator Corporation (CAISO) proposed a just and reasonable method by which hybrid and co-located resources can participate in the markets CAISO administers.<sup>1</sup> Enhanced participation of these resources is critical because CAISO faces serious reliability and resource adequacy problems.

2.     I wonder, however, whether CAISO should exempt hybrid resources from the Resource Adequacy Availability Incentive Mechanism (RAAIM) for system and local resource adequacy capacity. RAAIM is designed to improve resource performance, so exempting another entire class of resources from it appears to be problematic on its face, especially in a region suffering an ongoing reliability crisis. But our Federal Power Act standard of review is whether a proposal is just and reasonable, not whether there is a better idea.<sup>2</sup> I am persuaded that there is a risk of “double penalties” under RAAIM for hybrid resources based on the inclusion of outage data in the original capacity factor calculation. Based on this showing, I agree that exempting hybrid resources from RAAIM is just and reasonable.<sup>3</sup>

3.     So while I agree with approving this proposal, I remain concerned that CAISO continues to use band-aids to address its ongoing reliability challenges rather than the emergency surgery that is actually required. Each band-aid may mark a modest incremental improvement, but the patient is still bleeding to death.

4.     Today’s order is a perfect example. CAISO almost certainly can find ways to incorporate hybrids and variable resources into its markets without RAAIM exemptions or other potentially discriminatory measures. I thus agree that it is wise to require CAISO to report within a year on whether the RAAIM exemption discriminates in favor

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<sup>1</sup> *Cal. Indep. Sys. Operator Corp.*, 177 FERC ¶ 61,153 (2021) (*CAISO*).

<sup>2</sup> 16 U.S.C. § 824d.

<sup>3</sup> *CAISO*, 177 FERC ¶ 61,153 at P 41.

of hybrid resources.<sup>4</sup> I hope to see hard data on the actual performance of all resource types. I also want to know the amounts of RAIM incentives and penalties that would have applied to hybrid resources without this exemption. The Commission can then fulfill its obligation to ensure that CAISO's tariff results in just and reasonable markets without undue discrimination.

For these reasons, I respectfully concur.

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James P. Danly  
Commissioner

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<sup>4</sup> *Id.* P 47.