

169 FERC ¶ 61,126  
UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Neil Chatterjee, Chairman;  
Richard Glick and Bernard L. McNamee.

California Independent System Operator Corporation      Docket Nos. ER19-468-000  
ER19-468-001

ORDER ON COMPLIANCE FILING

(Issued November 21, 2019)

1. On December 3, 2018, California Independent System Operator Corporation (CAISO) submitted proposed revisions to its Open Access Transmission Tariff (Tariff)<sup>1</sup> in compliance with the requirements of Order No. 841,<sup>2</sup> which removes barriers to the participation of electric storage resources in the capacity, energy, and ancillary service markets operated by Regional Transmission Organizations and Independent System Operators (RTO/ISO markets). In this order, we accept CAISO's compliance filing, to be effective December 3, 2019, subject to a further compliance filing, as discussed below.

**I. Background**

2. In Order No. 841, the Commission adopted reforms to remove barriers to the participation of electric storage resources in RTO/ISO markets.<sup>3</sup> The Commission modified section 35.28 of its regulations<sup>4</sup> to require each RTO/ISO to revise its tariff to establish market rules that, recognizing the physical and operational characteristics of electric storage resources, facilitate their participation in the RTO/ISO markets. The Commission found that Order No. 841 will enhance competition and, in turn, help to

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<sup>1</sup> Appendix B lists the Services Tariff and OATT sections filed by CAISO.

<sup>2</sup> *Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators*, Order No. 841, 162 FERC ¶ 61,127 (2018), *order on reh'g*, Order No. 841-A, 167 FERC ¶ 61,154 (2019).

<sup>3</sup> Order No. 841, 162 FERC ¶ 61,127 at P 1.

<sup>4</sup> 18 C.F.R. § 35.28 (2019).

ensure that the RTO/ISO markets produce just and reasonable rates, pursuant to the Commission's legal authority under Federal Power Act (FPA) section 206.<sup>5</sup>

3. Order No. 841 requires each RTO/ISO to revise its tariff to establish a participation model for electric storage resources consisting of market rules that, recognizing the physical and operational characteristics of electric storage resources, will help facilitate their participation in the RTO/ISO markets.<sup>6</sup> Specifically, for each RTO/ISO, the tariff provisions for the participation model for electric storage resources must: (1) ensure that a resource using the participation model is eligible to provide all capacity, energy, and ancillary services that it is technically capable of providing in the RTO/ISO markets; (2) ensure that a resource using the participation model can be dispatched and can set the wholesale market clearing price as both a wholesale seller and wholesale buyer consistent with existing market rules that govern when a resource can set the wholesale price; (3) account for the physical and operational characteristics of electric storage resources through bidding parameters or other means; and (4) establish a minimum size requirement for participation in the RTO/ISO markets that does not exceed 100 kW. Additionally, each RTO/ISO must specify that the sale of electric energy from the RTO/ISO markets to an electric storage resource that the resource then resells back to those markets must be at the wholesale locational marginal price (LMP).<sup>7</sup>

## II. Compliance Filing

4. CAISO asserts that it has already implemented the vast majority of the mandates in Order No. 841. Because of this, CAISO explains that its compliance filing describes how its existing Tariff complies with Order No. 841 and, where it does not already comply, describes how it proposes in this filing to revise its Tariff to comply. CAISO's Tariff revisions are therefore limited to Sections 4.6 and 26, and to Appendix A to its Tariff to comply with the remaining requirements of Order No. 841, as we discuss below. CAISO seeks an effective date for its compliance filing of December 3, 2019.

5. On April 1, 2019, Commission staff issued a letter informing CAISO that additional information was necessary to process its compliance filing (Data Request). On

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<sup>5</sup> 16 U.S.C. § 824e (2018).

<sup>6</sup> Order No. 841, 162 FERC ¶ 61,127 at P 3. In Order No. 841, the Commission referred to a set of tariff provisions that are created for a particular type of resource as a participation model. *Id.*

<sup>7</sup> *Id.* P 4.

May 1, 2019, in Docket No. ER19-468-001, CAISO submitted a response to the Data Request with additional explanation and Tariff citations (Data Request Response).

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

6. Notice of CAISO's filing was published in the *Federal Register*, 83 Fed. Reg. 63,852 (2018), with interventions and protests due on or before December 24, 2018. On December 14, 2018, the Commission extended the comment period until and including February 7, 2019.<sup>8</sup> Appendix A to this order lists the entities that filed a notice of intervention and timely-filed motions to intervene.

7. On December 20, 2018, PG&E filed comments. On February 7, 2019, Calpine Corporation (Calpine), Advanced Energy Economy, Energy Storage Association, California Energy Storage Alliance, and Tesla, Inc. (Tesla) filed comments. On February 22, 2019, the National Rural Electric Cooperative Association (NRECA) filed an answer to Advanced Energy Economy and Tesla's comments. On February 27, 2019, CAISO filed an answer to comments. On March 1, 2019, Voith Hydro filed comments.

8. Notice of CAISO's May 1, 2019 Data Request Response was published in the *Federal Register*, 84 Fed. Reg. 20,351 (2019), with interventions and protests due on or before May 22, 2019. On May 23, 2019, California Energy Storage Alliance filed comments.

### **IV. Discussion**

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

9. Pursuant to Rule 214 of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.214 (2019), the notice of intervention and the timely, unopposed motions to intervene serve to make the entities that filed them parties to this proceeding. The entities that filed protests or comments but did not file motions to intervene are not parties to the proceeding.<sup>9</sup>

10. Rule 213(a)(2) of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.213(a)(2) (2019), prohibits an answer to a protest or an answer unless otherwise

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<sup>8</sup> Notice of Extension of Time, Docket Nos. ER19-460-000, ER19-462-000, ER19-465-000, ER19-467-000, ER19-468-000, ER19-469-000, and ER19-470-000 (December 14, 2018).

<sup>9</sup> 18 C.F.R. § 385.211(a)(2) (2019). Tesla filed comments but did not move to intervene. Although we do not grant party status to Tesla, we address its comments and protests in this order.

ordered by the decisional authority. We accept the answers filed in this proceeding because they have provided information that assisted us in our decision-making process.

## **B. Substantive Matters**

11. We find that CAISO's compliance filing, with certain modifications that we discuss below, complies with the requirements that the Commission adopted in Order No. 841. Accordingly, we accept CAISO's compliance filing to be effective December 3, 2019, subject to a further compliance filing as discussed below. We direct CAISO to file the compliance filing within 60 days of the date of issuance of this order.

12. As a preliminary matter, we find that CAISO's existing definitions of Non-Generator Resources (NGR)<sup>10</sup> and Pumped-Storage Hydro Units,<sup>11</sup> collectively, are consistent with the Commission's definition of electric storage resource in Order No. 841 because they encompass resources capable of receiving electric energy from the grid and storing it for later injection back to the grid, regardless of their storage medium, and include electric storage resources located on the interstate transmission system, on a distribution system, or behind the meter.<sup>12</sup> We also find that CAISO has complied with the following requirements of Order No. 841 to: (1) ensure that a resource using the participation model for electric storage resources can be dispatched and can set the wholesale market clearing price as both a wholesale seller and wholesale buyer, consistent with rules that govern the conditions under which a resource can set the wholesale price;<sup>13</sup> (2) demonstrate that its market design will not allow for conflicting

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<sup>10</sup> CAISO defines Non-Generator Resources as “[r]esources that operate as either Generation or Load and that can be dispatched to any operating level within their entire capacity range but are also constrained by a MWh limit to (1) generate Energy, (2) curtail the consumption of Energy in the case of demand response, or (3) consume Energy.” CAISO Tariff, Appendix A (defining “Non-Generator Resources”).

<sup>11</sup> CAISO defines a Pumped-Storage Hydro Unit as “[a] hydroelectric dam with the capability to produce electricity and the ability to pump water between reservoirs at different elevations to store such water for the production of electricity.” *Id.*, Appendix A (defining “Pumped-Storage Hydro Unit”).

<sup>12</sup> Order No. 841, 162 FERC ¶ 61,127 at PP 29-35; 18 C.F.R. § 35.28(b)(9) (defining “electric storage resource” as “a resource capable of receiving electric energy from the grid and storing it for later injection of electric energy back to the grid.”).

<sup>13</sup> Order No. 841, 162 FERC ¶ 61,127 at PP 142-50. *See* CAISO Compliance Filing, Transmittal at 14 (Transmittal); CAISO Data Request Response at 6 and 9-10; *see also* CAISO Tariff, §§ 30.5, 30.5.2.3, 30.5.3, 31.3.1.4, and 34.20.2.3.

supply offers and demand bids from the same resource for the same market interval or modify its market rules to prevent conflicting supply offers and demand bids from the same resource for the same market interval;<sup>14</sup> and (3) ensure that resources available for manual dispatch as a wholesale buyer and wholesale seller under the participation model for electric storage resources are held harmless for manual dispatch by being eligible for make-whole payments.<sup>15</sup> CAISO's compliance with these requirements is not contested in this proceeding. We address all remaining compliance requirements and all comments below.

## 1. Creation of a Participation Model

### a. Participation Model

13. Order No. 841 adds section 35.28(g)(9)(i) to the Commission's regulations to require that each RTO/ISO have tariff provisions providing a participation model for electric storage resources consisting of market rules that, recognizing the physical and operational characteristics of electric storage resources, facilitate their participation in the RTO/ISO markets.<sup>16</sup> Order No. 841 explains that establishing a participation model for electric storage resources does not preclude an RTO/ISO from structuring its markets based on the technical requirements that a resource must meet to provide needed services; it simply requires that each RTO/ISO establish a participation model that ensures eligibility to participate in the RTO/ISO markets in a way that recognizes the physical and operational characteristics of electric storage resources.<sup>17</sup> Order No. 841 requires that resources using the participation model for electric storage resources be compensated for the wholesale services they provide in the same manner as other resources that provide these services.

14. Separate participation models are not necessary for different types of electric storage resources (e.g., slower, faster, or aggregated), and to the extent an RTO/ISO seeks to include in its tariff additional market rules that accommodate electric storage resources with specific physical and operational characteristics, the RTO/ISO may

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<sup>14</sup> Order No. 841, 162 FERC ¶ 61,127 at PP 162-65. *See* Transmittal at 15; CAISO Data Request Response at 11; *see also* CAISO Tariff, § 30.5.2.1.

<sup>15</sup> Order No. 841, 162 FERC ¶ 61,127 at PP 174-79; *see* Transmittal at 17; *see also* CAISO Tariff, § 11.8.

<sup>16</sup> Order No. 841, 162 FERC ¶ 61,127 at P 51.

<sup>17</sup> *Id.* P 52.

propose such revisions to its tariff through a separate FPA section 205 filing.<sup>18</sup> However, Order No. 841 states that, where an RTO/ISO already has a separate participation model that electric storage resources may use (such as participation models for pumped-hydro resources or demand response), the RTO/ISO is not required to consolidate that participation model with the participation model for electric storage resources required by Order No. 841.<sup>19</sup> To the extent that an RTO/ISO modifies existing participation models to comply with Order No. 841, it must ensure that those resulting participation models are available for all types of electric storage resources and comply with all of the Order No. 841 requirements.

15. Lastly, Order No. 841 explains that, while the participation model for electric storage resources should be designed to facilitate the participation of all types of electric storage technologies, the Commission is not requiring all electric storage resources to use that participation model.<sup>20</sup> Under section 35.28(g)(9) of the Commission's regulations, section 35.28(g)(9)(i) applies to resources using the participation model for electric storage resources and section 35.28(g)(9)(ii) applies to all electric storage resources that fall under the definition of electric storage resources. Therefore, electric storage resources that elect not to use the participation model for electric storage resources are still able to pay the wholesale LMP for the electric energy they purchase from the RTO/ISO markets and then resell back to those markets. This issue is discussed further in the Energy Used to Charge Electric Storage Resources section below.

**i. CAISO's Filing**

16. CAISO asserts that its existing Tariff already complies with the requirements of Order No. 841 with respect to the requirement to establish a participation model for electric storage resources. CAISO explains that the majority of CAISO generators use the generic Participating Generator model, and, while different technology and fuel types may enter different master file parameters, the CAISO markets do not distinguish among Participating Generators for settlement, bid-cost recovery, or the ability to set the marginal price.<sup>21</sup> CAISO explains that, because of the unique aspects of electric storage and load-based resources, it also has three other existing participation models used

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<sup>18</sup> *Id.* P 54 (citing 16 U.S.C. § 824d). In Order No. 841-A, the Commission found that a single participation model can be designed to be flexible enough to accommodate any type of electric storage resource. Order No. 841-A, 167 FERC ¶ 61,154 at P 65.

<sup>19</sup> Order No. 841, 162 FERC ¶ 61,127 at P 55.

<sup>20</sup> *Id.* P 56.

<sup>21</sup> Transmittal at 6.

primarily by resources capable of receiving energy from the grid, storing it, and later injecting energy back: (1) the NGR model; (2) the Pumped-Storage Hydro Unit model; and (3) the Demand Response model.<sup>22</sup>

17. CAISO explains that the NGR model is designed specifically for electric storage resources and is the primary model for common storage technologies like lithium-ion and sodium sulfur batteries.<sup>23</sup> According to CAISO, the NGR model recognizes that a resource can operate seamlessly across its entire operating range, reflecting both charging and discharging configurations. CAISO notes that battery storage can discharge in one interval as positive generation and consume energy in the next interval as negative generation, and current technologies have demonstrated that these resources can move nearly instantaneously between positive and negative generation. CAISO notes that, while storage technology is an ideal candidate for the NGR model, the model may also benefit other energy-constrained resources such as dispatchable demand response or microgrids with limited ability to generate or consume energy continuously for wholesale market participation purposes.

18. CAISO states that NGRs may also elect to use the NGR model's Regulation Energy Management functionality, which allows NGRs to bid their capacity more efficiently into the day-ahead regulation markets.<sup>24</sup> CAISO notes that NGRs that select this option can only participate in the regulation markets, but under this functionality, CAISO uses a real-time energy offset to help resources manage the continuous energy requirements for providing regulation service.<sup>25</sup>

19. Second, CAISO explains that it has a distinct participation model for Pumped-Storage Hydro Units which reflects the unique physical and market characteristics of Pumped-Storage Hydro Units.<sup>26</sup> Specifically, CAISO states that Pumped-Storage Hydro Units can operate in the mode of Generating Unit or Participating Load and can submit bid components for both modes. CAISO notes that, besides the start-up cost components and the minimum load cost components (associated with operating in generating mode), Pumped-Storage Hydro Units submit additional bid components to reflect their shut-

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<sup>22</sup> *Id.* at 7.

<sup>23</sup> *Id.*

<sup>24</sup> *Id.* (citing CAISO Tariff, § 8.4.1.2).

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

<sup>26</sup> *Id.* at 8.

down costs, pumping levels, and hourly pumping costs.<sup>27</sup> CAISO also notes that Pumped-Storage Hydro Units' "charging" and "discharging" functions do not depend on the instantaneous movement of electrons, but on the mechanical pumping and flow of water. Accordingly, these resources need charge time and run time limits to account for slow transition speeds, which the Pumped-Storage Hydro Unit model permits them to submit.<sup>28</sup>

20. Third, CAISO explains that certain electric storage resources, particularly those located behind a retail customer meter and smaller resources that wish to aggregate and participate in the CAISO markets as a single resource, may participate in energy and ancillary service markets by providing load curtailment as Proxy Demand Resources or Reliability Demand Response Resources.<sup>29</sup> CAISO states that electric storage resources participating under these demand response constructs are interconnected behind a retail meter.<sup>30</sup> CAISO states that both of these demand response products allow resources to use CAISO's five performance methodologies to calculate their demand response energy measurement, which is the ultimate quantity of performance reported for settlement.<sup>31</sup> CAISO notes that the metering generator output methodology is especially relevant to electric storage resource participation because it examines both load and behind-the-meter generation, which typically comes from batteries.<sup>32</sup> CAISO explains that, through the use of a sub-meter, the metering generator output methodology allows resources to separate and isolate the demand curtailment from load reduction itself and the demand curtailment from the production of behind-the-meter generation. CAISO further explains that this methodology allows it to measure the performance of the demand response

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<sup>27</sup> *Id.* (citing CAISO Business Practice Manual for Market Instruments, § 5.1.1.2.4).

<sup>28</sup> *Id.* at 21 (citing CAISO Business Practice Manual for Market Instruments, § B.5).

<sup>29</sup> *Id.* at 8 (citing CAISO Tariff, §§ 4.13, 30.6). A Proxy Demand Resource is essentially a traditional type of demand response resource, whereas a Reliability Demand Response Resource is dispatched only when the CAISO system is near or in a system emergency. *Id.* (citing CAISO Tariff, § 4.13.5).

<sup>30</sup> *Id.* at 8 and n.37.

<sup>31</sup> *Id.* at 8.

<sup>32</sup> *Id.* at 9.



resource based on the load only, the generation only, or both, according to the resource's configuration and elections.<sup>33</sup>

21. CAISO also notes that it offers distributed resources—including electric storage resources—the ability to aggregate into a single virtual resource to meet CAISO's minimum capacity requirements. These aggregations may participate in the CAISO markets as NGRs.<sup>34</sup>

22. CAISO states that it has structured its markets and participation models based on the technical requirements that a resource must meet to provide services, consistent with Order No. 841.<sup>35</sup> CAISO further asserts that its aforementioned three participation models not only account for the unique characteristics of electric storage resources, but also provide resources the flexibility to optimize performance. CAISO also notes that Order No. 841 identified CAISO's NGR model as a plausible example of a best practice.<sup>36</sup>

## ii. Protests/Comments

23. Energy Storage Association comments that electric storage resources are increasingly likely to be co-located with generation at a shared point of interconnection, known as a "hybrid resource."<sup>37</sup> Energy Storage Association states that CAISO's filing does not address the myriad ways in which Order No. 841 compliance affects the market participation of hybrid resources that include electric storage resources. According to Energy Storage Association, questions remain as to: which category hybrid resources should register in; how they are parameterized in market software; what their capacity value is; and how they interconnect. Given the lack of clarity on these issues and recognizing this is a shared issue across RTOs'/ISOs' compliance filings, Energy Storage Association requests that the Commission open a new docket to address this matter,

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<sup>33</sup> *Id.* at 8-9 (citing CAISO Tariff, §§ 4.13.4, 11.6; *Cal. Indep. Sys. Operator Corp.*, 156 FERC ¶ 61,110, at P 5 (2016)).

<sup>34</sup> *Id.* at 9 (citing CAISO Tariff, § 4.17).

<sup>35</sup> *Id.*

<sup>36</sup> *Id.* (citing Order No. 841, 162 FERC ¶ 61,127 at P 3 n.7).

<sup>37</sup> Energy Storage Association Comments at 4.

which will ensure that RTO/ISO tariffs keep pace with technological innovation that aims to reduce costs and increase competition in wholesale markets.<sup>38</sup>

24. Voith Hydro generally urges the Commission and the RTOs/ISOs to take into account the technical capability of pumped-hydro resources in providing a number of services in the RTO/ISO markets.<sup>39</sup> For example, pumped-hydro resources have the ability to: (1) provide reliable, long duration generation capacity; (2) deliver energy from all sources (e.g., pumped hydro can store excess energy generated by nuclear plants during off-peak hours and then release the energy back to the grid during peak hours); (3) provide spinning and non-spinning reserves; (4) provide black start capabilities; and (5) set the wholesale market clearing price.

**iii. Answer**

25. In response to Energy Storage Association's claim that CAISO's filing does not address the impact of Order No. 841 on hybrid resources, CAISO argues that this claim is both inaccurate and out of scope.<sup>40</sup> According to CAISO, its interconnection customers already have access to a lengthy technical bulletin published in 2016 on the many ways they can choose to pair electric storage resources with traditional resource types, and Order No. 841 does not affect these options.

**iv. Data Request Response**

26. In its Data Request, Commission staff asked CAISO to clarify, and provide citations to relevant Tariff language supporting whether it is CAISO's position that each of its three participation models, considered on their own, complies with all of the requirements of Order No. 841. In response, CAISO states that the NGR model, Pumped-Storage Hydro Unit model, and Demand Response model all fully comply with Order No. 841 in that they ensure eligibility to participate in the RTO/ISO markets in a way that recognizes the physical and operational characteristics of different electric storage resources.<sup>41</sup> CAISO asserts that electric storage resources come in a variety of different forms and technologies, and requiring only one model would either unduly constrain certain technologies or provide them with market attributes their physical

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<sup>38</sup> *Id.* at 4-5.

<sup>39</sup> Voith Hydro Comments at 2-7.

<sup>40</sup> CAISO Answer at 7-8.

<sup>41</sup> CAISO Data Request Response at 2.

characteristics do not warrant.<sup>42</sup> CAISO explains that the terms, labels and models it uses center on the rates, terms, and conditions of service available to all resources rather than the name of any particular resource.

27. CAISO explains that its general Tariff provisions that apply to all resources allow electric storage resources to set the marginal price as well as receive compensation for wholesale services that they provide in the same manner as other resources that provide those services.<sup>43</sup> In addition, CAISO states that electric storage resources are expressly able to set the day-ahead market LMP and the real-time LMP under its Tariff. Specifically, CAISO states that Tariff Sections 31.3.1.4 and 34.20.2.3 state that Generating Units, Participating Loads (which include Pumped-Storage Hydro Units), non-Participating Loads, Proxy Demand Resources, and Reliability Demand Response Resources, *inter alia*, are eligible to set the LMP. According to CAISO, most electric storage resources—using the NGR or Pumped-Storage Hydro Unit models—qualify as Generating Units under these sections. In addition, these Tariff sections expressly provide that electric storage resources participating as demand response resources are eligible to set the LMP. CAISO further states that Tariff Section 11.6.5 expressly provides that electric storage resources using the NGR model will be settled at the relevant LMP, and that CAISO treats charging as negative energy rather than demand.<sup>44</sup>

28. Similarly, CAISO states that compensation is provided based not on a resource's type, but on the basis of services provided. CAISO cites Tariff Section 11.2 as relevant to settling day-ahead transactions.

29. CAISO states that provisions relating to the settlement of specific costs unique to Pumped-Storage Hydro Units are addressed in Sections 11.8.2.1.3 and 11.8.4.1.4 of its Tariff.<sup>45</sup> CAISO explains that these provisions are based on the relevant market and settlement type (e.g., bid cost recovery, instructed energy). According to CAISO, provisions relating to the settlement of resources using the Demand Response model are addressed in Section 11.6 of its Tariff.

#### v. **Commission Determination**

30. We find that CAISO's proposed NGR and Pumped-Storage Hydro Unit models, subject to the modifications directed in this order, collectively comply with the

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<sup>42</sup> *Id.* at 3.

<sup>43</sup> *Id.* at 4.

<sup>44</sup> *Id.* at 5.

<sup>45</sup> *Id.*

requirement of Order No. 841 to ensure the eligibility of all types of electric storage resources to participate in the CAISO markets in a way that recognizes the unique physical and operational characteristics of these resources.<sup>46</sup> Specifically, we find that CAISO's proposal is consistent with the Commission's finding in Order No. 841 that "to the extent an RTO/ISO modifies existing participation models to comply with this Final Rule, it must ensure that those resulting participation models are available for all types of electric storage resources and comply with all of the other requirements set forth in this Final Rule."<sup>47</sup> As CAISO notes, electric storage resources come in a variety of different forms and different technologies with different characteristics. Specifically, while the NGR model is the primary model for electric storage resources that can operate seamlessly across their entire operating range, such as batteries,<sup>48</sup> the Pumped-Storage Hydro Unit model takes into consideration the transition time between charging and discharging required by Pumped-Storage Hydro Units.<sup>49</sup> Further, although some behind-the-meter electric storage resources in CAISO may choose to participate in the CAISO markets using the Demand Response model, such resources also have the ability to participate in the markets through the NGR model if they so choose.

31. As to Voith Hydro's comments, we find that CAISO's Pumped-Storage Hydro Unit model takes into account the capabilities of pumped-hydro resources identified by Voith Hydro, and allows Pumped-Storage Hydro Units to participate in its markets in accordance with the requirements of Order No. 841.

32. While CAISO asserts that its Demand Response model complies with Order No. 841, we disagree. CAISO's Demand Response model does not comply with Order No. 841 because it is designed for load curtailment; specifically, CAISO's Tariff does not permit electric storage resources using the Demand Response model to net inject electric energy to the grid in a particular settlement interval and engage in wholesale sales.<sup>50</sup>

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<sup>46</sup> See Order No. 841, 162 FERC ¶ 61,127 at P 51. We also note that, although the Commission found that separate participation models are not necessary for different types of electric storage resources, it did not prohibit an RTO/ISO from modifying existing participation models to satisfy the requirements of Order No. 841.

<sup>47</sup> *Id.* P 55.

<sup>48</sup> See Transmittal at 7.

<sup>49</sup> See *id.* at 21.

<sup>50</sup> See Order No. 841, 162 FERC ¶ 61,127 at P 33; Order No. 841-A, 167 FERC ¶ 61,154 at P 42; CAISO Tariff, § 4.13.4.2 (d) ("In any Settlement Interval where the behind-the-meter generation is exporting Energy (i.e., where the behind-the-meter generation Energy output exceeds its location Demand), the Meter Data will consist of

Therefore, an electric storage resource using the Demand Response model does not fit within the definition of an electric storage resource in Order No. 841, which specifies that an electric storage resource must be physically designed and configured, and contractually permitted, to inject electric energy back to the grid.<sup>51</sup> In addition, CAISO's Demand Response model is limited to electric storage resources located behind the retail meter,<sup>52</sup> and thus does not meet the Order No. 841 requirement that resources interconnected to the transmission system, distribution system, or behind the meter be allowed to use the participation model for electric storage resources.<sup>53</sup> However, given that the requirements of Order No. 841 were not meant to disrupt or otherwise conflict with the established rules of demand response participation models,<sup>54</sup> we will not direct revisions to CAISO's Demand Response model. In this order, we evaluate CAISO's compliance with the requirements of Order No. 841 based on the NGR and Pumped-Storage Hydro Unit models.

33. The Commission did not address co-location of electric storage resources with other resources in Order No. 841, thus we find that Energy Storage Association's comments regarding electric storage resources co-located with generation are beyond the scope of this proceeding.

**b. Qualification Criteria for the Participation Model for Electric Storage Resources**

34. To ensure that the electric storage resource participation model will accommodate both existing and future technologies, and to implement the new requirement in section 35.28(g)(9)(i) of the Commission's regulations, Order No. 841 requires each RTO/ISO to define in its tariff the criteria that a resource must meet to use the participation model (i.e., qualification criteria).<sup>55</sup> These criteria must: (1) be based on the physical and operational characteristics of electric storage resources, such as their ability to both receive and inject electric energy; (2) not limit participation under the

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the Energy output of the behind-the-meter generation up to, but not including, the output greater than its facility Demand that would represent an export of Energy from that location.”).

<sup>51</sup> Order No. 841, 162 FERC ¶ 61,127 at P 33.

<sup>52</sup> See Transmittal at n.37.

<sup>53</sup> See Order No. 841, 162 FERC ¶ 61,127 at P 29.

<sup>54</sup> *Id.* P 32.

<sup>55</sup> *Id.* P 61.

electric storage resource participation model to any particular type of electric storage resource or other technology; and (3) ensure that the RTO/ISO is able to dispatch a resource in a way that recognizes its physical and operational characteristics and optimizes its benefits to the RTO/ISO.

35. Order No. 841 provides each RTO/ISO with flexibility to propose qualification criteria that best suit its participation model for electric storage resources.<sup>56</sup> However, the qualification criteria should not create barriers to the participation of any electric storage resource in the RTO/ISO markets and should be inclusive of, at a minimum, those resources set forth under the definition of electric storage resources in Order No. 841.<sup>57</sup>

**i. CAISO's Filing**

36. CAISO states that the qualification criteria for existing participation models available to electric storage resources are based on resources' physical and operational characteristics. CAISO states that NGRs must be able to operate as either Generation or Load, and they "can be dispatched to any operating level within their entire capacity range but are also constrained by a MWh limit to (1) generate Energy, (2) curtail the consumption of Energy in the case of demand response, or (3) consume Energy."<sup>58</sup> CAISO states that the only other qualification criterion for an NGR to participate in the CAISO markets is that it execute a Participating Generator Agreement and a Participating Load Agreement.<sup>59</sup> CAISO asserts that its proposal complies with the requirements of Order No. 841 because the existing NGR qualification criteria are based on physical and operational characteristics rather than electric storage technology or fuel type.<sup>60</sup>

37. Additionally, and along similar lines, CAISO states that its participation models recognize that different electric storage resources have different physical and operational characteristics such that they benefit from a tailored participation model. For example, the Pumped-Storage Hydro Unit model recognizes that those resources can operate in the mode of Generating Unit or Participating Load and can submit bid components for both modes, and they need to reflect their unique shut-down costs, pumping levels, and

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<sup>56</sup> *Id.* P 63.

<sup>57</sup> *Id.* P 64.

<sup>58</sup> Transmittal at 7 (citing CAISO Tariff, Appendix A (defining "Non-Generator Resource")).

<sup>59</sup> *Id.* at 10 (citing CAISO Tariff, § 4.6).

<sup>60</sup> *Id.* (citing CAISO Tariff, § 4.6).

pumping costs through bids.<sup>61</sup> CAISO states that it has no qualification criteria for this model beyond the capability to produce electricity and the ability to pump water between reservoirs at different elevations to store such water for the production of electricity.

**ii. Commission Determination**

38. We find that the qualification criteria provided in CAISO's Tariff for the NGR and Pumped-Storage Hydro Unit models comply with the requirements of Order No. 841. CAISO's qualification criteria are based on the physical and operational characteristics of electric storage resources because they are based on the ability of such resources to both receive and inject electric energy and allow any resource satisfying the NGR or Pumped-Storage Hydro Unit definitions to participate in CAISO's markets. We therefore find that CAISO's qualification criteria do not limit participation under the electric storage resource participation model to any particular type of electric storage resource or other technology and that the qualification criteria ensure that CAISO is able to dispatch an electric storage resource in a way that recognizes its physical and operational characteristics. We also find that CAISO's qualification criteria do not create barriers to the participation of any electric storage resource in the CAISO markets.

**c. Relationship between Electric Storage Participation Model and Existing Market Rules**

39. To provide certainty to resources using the electric storage resource participation model about the market rules that will govern their participation in each RTO/ISO market, and to implement the new requirement in section 35.28(g)(9)(i) of the Commission's regulations, Order No. 841 requires each RTO/ISO to propose any necessary additions or modifications to its existing tariff provisions to specify: (1) whether resources that qualify to use the participation model will participate in the RTO/ISO markets through existing or new market participation agreements; and (2) whether particular existing market rules apply to resources participating under the electric storage resource participation model.<sup>62</sup> Order No. 841 allows the use of one or more existing market participation agreements so long as the agreement(s) complies(y) with the terms of Order No. 841.<sup>63</sup>

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<sup>61</sup> *Id.* (citing CAISO Business Practices Manual for Market Instruments, § 5.1.1.2.4).

<sup>62</sup> Order No. 841, 162 FERC ¶ 61,127 at P 68.

<sup>63</sup> *Id.* P 69.

**i. CAISO's Filing**

40. CAISO states that its Tariff includes rules for electric storage resources to enter into market participation agreements, and provides for the use of existing market participation agreements depending on the electric storage resource type and participation model selected by the resource.<sup>64</sup> Specifically, owners or operators of NGRs and Pumped-Storage Hydro Units must execute both a Participating Generator Agreement and a Participating Load Agreement.<sup>65</sup> CAISO explains that these agreements bind electric storage resources to existing terms and conditions of the Tariff that apply to the participation model the resource elects to use.<sup>66</sup> CAISO requests that the Commission find that its existing market participation agreements for electric storage resources comply with the requirements of Order No. 841.

**ii. Commission Determination**

41. CAISO has appropriately explained how its existing market rules, including the use of its existing market participation agreement construct, apply to electric storage resources using its NGR and Pumped-Storage Hydro Unit participation models. As CAISO explains, its Tariff specifies that resources qualifying to use the NGR and Pumped-Storage Hydro Unit participation models will participate in its markets through existing participation agreements and that existing market rules apply to resources participating under those participation models. Therefore, we find that CAISO has complied with the requirement of Order No. 841 to specify how resources that qualify to use the participation model will participate in the RTO/ISO markets through existing or new market participation agreements and whether particular existing market rules apply to them.

**2. Eligibility of Electric Storage Resources to Participate in the RTO/ISO Markets**

**a. Eligibility to Provide all Capacity, Energy, and Ancillary Services**

42. Order No. 841 adds section 35.28(g)(9)(i)(A) to the Commission's regulations to require that each RTO/ISO have tariff provisions allowing a resource using the participation model for electric storage resources to be eligible to provide all capacity,

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<sup>64</sup> Transmittal at 11.

<sup>65</sup> *Id.* (citing CAISO Tariff, §§ 4.6, 4.7, 4.13.1, 8.4.1.2).

<sup>66</sup> *Id.*



energy, and ancillary services that it is technically capable of providing, including services that the RTOs/ISOs do not procure through an organized market, such as blackstart, primary frequency response, and reactive power services.<sup>67</sup> Where an RTO/ISO has developed a standard set of technical requirements that all resources must meet to provide a given service, such requirements would also apply to a resource using the electric storage resource participation model if it wants to provide that service.<sup>68</sup>

43. A resource is “technically capable” of providing a service if the resource can meet all of the technical, operational, and/or performance requirements that are necessary to reliably provide that service, such as minimum run-times to provide energy, or the ability to respond to automatic generation control to provide frequency regulation.<sup>69</sup> The Commission is not considering in this proceeding the requirements that determine whether resources are technically capable of providing individual wholesale services. To the extent that an RTO/ISO seeks to revise its tariff provisions setting forth the technical requirements for providing any specific wholesale service, the RTO/ISO may propose such revisions to its tariff through a separate FPA section 205 filing.<sup>70</sup> Each individual electric storage resource must still meet the technical requirements of providing any specific service, which would be determined by the RTO/ISO on a case-by-case basis.<sup>71</sup> In Order No. 841, the Commission encouraged each RTO/ISO to consider whether any modifications or additions to the existing technical requirements, testing protocols, or other qualification procedures are necessary to facilitate the participation of electric storage resources in its markets.<sup>72</sup>

44. Order No. 841-A clarifies that an RTO/ISO that does not have a capacity product in its markets is not required to create such a product to comply with Order No. 841. To the extent that an RTO/ISO has a resource adequacy construct, the RTO/ISO must demonstrate on compliance that the existing market rules governing its resource

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<sup>67</sup> Order No. 841, 162 FERC ¶ 61,127 at PP 76, 80.

<sup>68</sup> *Id.* P 77.

<sup>69</sup> *Id.* P 78.

<sup>70</sup> *Id.* P 78 n.106.

<sup>71</sup> *Id.* P 79.

<sup>72</sup> *Id.* P 81.

adequacy construct provide a means for electric storage resources to participate in that construct if electric storage resources are technically capable of doing so.<sup>73</sup>

**i. CAISO's Filing**

45. CAISO states that it does not preclude any resources from providing capacity, energy, or ancillary services because its market eligibility rules are “technology-neutral.” Instead, its Tariff includes general rules for participating in its energy and ancillary service markets based on the technical requirements required for those services.<sup>74</sup> CAISO explains that supply resources (which include electric storage resources) must be able to comply with all CAISO operating dispatches,<sup>75</sup> provide telemetry,<sup>76</sup> and have a scheduling coordinator.<sup>77</sup> CAISO states that while its Tariff also includes rules for participants in its resource adequacy program—including must-offer obligations and the resource adequacy availability incentive mechanism—these eligibility requirements are not based on the resource’s participation model.<sup>78</sup>

46. With respect to providing ancillary services, CAISO reiterates that its “technology-agnostic” requirements dictate eligibility. It states that Appendix K of the CAISO Tariff sets forth the general eligibility requirements that resources must meet, depending on the ancillary services offered.<sup>79</sup> For example, it states that all resources seeking to provide ancillary services must meet the same continuous energy requirements, and may de-rate their capacity to do so. Further, CAISO asserts that a resource’s provision of headroom or footroom requires only the availability of a 60-minute window in the day-ahead market and a 30-minute window in the real-time market; similarly, for spinning and non-spinning reserve provision, a resource must be capable of offering real power within 10 minutes and maintaining that output for half an

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<sup>73</sup> Order No. 841-A, 167 FERC ¶ 61,154 at P 68 (citing Order No. 841, 162 FERC ¶ 61,127 at PP 76, 100).

<sup>74</sup> Transmittal at 12 (citing CAISO Tariff, Appendix K).

<sup>75</sup> *Id.* (citing CAISO Tariff, § 4.6.1.1).

<sup>76</sup> *Id.* (citing CAISO Tariff, § 7.6.1).

<sup>77</sup> *Id.* (citing CAISO Tariff, § 4.6).

<sup>78</sup> *Id.* (citing CAISO Tariff, § 40.4 (listing eligibility requirements to provide resource adequacy)).

<sup>79</sup> *Id.* (citing CAISO Tariff, Appendix K).

hour.<sup>80</sup> CAISO states that, likewise, resources seeking to provide black start capacity must be capable of meeting technical criteria set forth in the Tariff, regardless of resource type.<sup>81</sup>

47. CAISO asserts that electric storage resources using the NGR or Pumped-Storage Hydro Unit models are eligible to provide all capacity, energy, and ancillary services that they can technically provide. Similarly, electric storage resources are also eligible to provide other services CAISO procures on behalf of its market, including capacity procured through CAISO's backstop capacity procurement mechanism, provided they satisfy the basic requirements for these services. CAISO contends that this Tariff language has not only been previously approved by the Commission, but that it has not proven a barrier to the participation of electric storage resources in its markets.<sup>82</sup>

48. With respect to bid cost recovery and make-whole payments, CAISO states that it does not distinguish among participation models.<sup>83</sup> CAISO explains that resources participating as NGRs or Pumped-Storage Hydro Units are treated like other supply and demand resources subject to manual dispatch or real-time price differences. CAISO also states that, under its tariff, NGRs are eligible to recover energy bid, residual unit commitment, or ancillary service bid costs.<sup>84</sup> CAISO states that NGRs may also qualify for opportunity cost adders, although NGRs can reflect all costs in energy bids within the current market horizon.

## ii. Protests/Comments

49. Calpine states that electric storage resources will need to be able to provide energy for a minimum of four hours to be eligible to provide resource adequacy

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<sup>80</sup> *Id.* at 12-13 (citing CAISO Tariff, Appendix K).

<sup>81</sup> *Id.* at 13 (citing CAISO Tariff, Appendix D (listing eligibility requirements to be a black start unit)).

<sup>82</sup> *Id.*

<sup>83</sup> *Id.* at 17.

<sup>84</sup> *Id.* (citing CAISO Tariff, § 11.8). CAISO notes that NGRs do not recover pumping costs or transition costs because they are not pumping resources or gas fired multi-stage resources. CAISO also states NGRs are ineligible for bid costs associated with start-up and minimum load because the participation model for NGRs treats them as if they are always operational.

capacity.<sup>85</sup> According to Calpine, this criterion was originally developed for non-storage resources. Calpine states that, as demonstrated by recent effective load carrying capability analyses in New York, the way that electric storage resources should count towards resource adequacy requirements depends on the load shape and generation mix in a particular system, as well as the level of saturation of electric storage resources.<sup>86</sup> Calpine asserts that it is important for CAISO and other RTOs/ISOs to develop analytically-based resource adequacy counting qualification criteria for electric storage resources that reflect these types of factors.<sup>87</sup>

50. Calpine notes that CAISO already has begun to examine appropriate duration criteria for electric storage resources to count for local resource adequacy requirements as part of its Resource Adequacy Enhancements stakeholder initiative.<sup>88</sup> According to Calpine, these requirements depend on local area contingencies as well as generation mix and load shape, and may be significantly more stringent than requirements to meet system level resource adequacy requirements.<sup>89</sup> It urges the Commission to direct CAISO to ensure that counting methods are based on sound analysis and appropriately reflect the reliability contributions of duration-limited resources, or otherwise ensure that resource adequacy resources effectively meet CAISO's reliability needs.

51. Advanced Energy Economy states that CAISO does not propose any changes to its market power mitigation provisions associated with its proposed electric storage resource participation model, including any changes to the procedures CAISO uses to calculate resource default energy bids.<sup>90</sup> It asserts that in maintaining the status quo, CAISO ignores that opportunity costs are a key component of an electric storage resource's default energy bid. According to Advanced Energy Economy, failing to

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<sup>85</sup> Calpine Comments at 4 (citing CAISO Tariff, § 40.8.1.16).

<sup>86</sup> *Id.* (citing N.Y. Indep. Sys. Operator, Capacity Value Summary (Dec. 18, 2018), <https://www.nyiso.com/documents/20142/4020230/Capacity+Value+Study+Summary+1218.pdf/02ae9793-44cb-0fb3-c08d-9ee63e69baa6?version=1.1&download=true>).

<sup>87</sup> *Id.*

<sup>88</sup> *Id.* (citing Cal. Indep. Sys. Operator Corp., Resource Adequacy Enhancements Straw Proposal – Part 1, § 4.3 (Dec. 20, 2018), <http://www.caiso.com/Documents/StrawProposalPart1-ResourceAdequacyEnhancements.pdf>).

<sup>89</sup> *Id.*

<sup>90</sup> Advanced Energy Economy Comments at 7.

properly account for an electric storage resource's opportunity costs in its default energy bid could result in CAISO inappropriately mitigating the electric storage resource to a default energy bid below its true short-run marginal cost.

52. Advanced Energy Economy states that CAISO's current procedures to calculate default energy bids account for opportunity costs; however, electric storage resources face opportunity costs, specifically short-run marginal costs, which differ from other resources.<sup>91</sup> According to Advanced Energy Economy, some electric storage resources co-located with load may face opportunity costs associated with demand charge management. It adds that certain electric storage resources are used to ensure that a given customer's demand does not exceed a certain threshold level, which enables the customer to avoid certain demand charges.

53. Advanced Energy Economy states that if an electric storage resource's State of Charge falls below the level that is required to manage that demand charge, then the customer could face significant costs in the form of higher demand charges.<sup>92</sup> Thus, it maintains that the opportunity cost, which is defined as the profit associated with the next best foregone alternative, of such an electric storage resource should be based on the expected increase in demand charges.<sup>93</sup> Advanced Energy Economy asserts that the Commission should direct CAISO to provide greater clarity through Tariff revisions or some other means that electric storage resource default energy bids may include opportunity costs related to demand charge management. Advanced Energy Economy contends that this clarity is necessary to ensure that electric storage resources are treated comparably to other resources.

### iii. Answer

54. CAISO asserts that a number of issues raised by commenters are tangential to Order No. 841 compliance, and asks that the Commission find these concerns to be outside of the scope of this compliance proceeding. With respect to Calpine's concern regarding the way that electric storage resources count towards resource adequacy requirements, CAISO states that it shares Calpine's concern regarding over-reliance on availability-limited resource adequacy resources, but argues that these issues are not relevant to CAISO's compliance with Order No. 841. CAISO also answers that the rules

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<sup>91</sup> *Id.*

<sup>92</sup> *Id.* State of Charge represents the amount of energy stored by an electric storage resource in proportion to the limit on the amount of energy that it can store, typically expressed as a percentage. Order No. 841, 162 FERC ¶ 61,127 at P 213.

<sup>93</sup> Advanced Energy Economy Comments at 7.

of resource adequacy eligibility are under state jurisdiction and CAISO can only establish counting rules if local regulatory authorities fail to do so.<sup>94</sup>

55. Additionally, CAISO contends that Advanced Energy Economy's argument that CAISO does not propose changes to its market power mitigation, including any changes to procedures to calculate resource default energy bids, is misleading. CAISO states that NGRs are not currently required to have default energy bids, and therefore CAISO cannot inappropriately mitigate an electric storage resource because it does not mitigate NGR bids. Additionally, CAISO states that Order No. 841 allows, but does not require, each RTO/ISO to change its current practice regarding market power mitigation of electric storage resources.<sup>95</sup> CAISO states that it did not deem it appropriate to make such changes through its compliance filing. Instead, CAISO states that it has included this matter for consideration in phase four of its Energy Storage and Distributed Energy Resource stakeholder initiative.<sup>96</sup>

#### iv. Data Request Response

56. In the Data Request, Commission staff asked CAISO to explain and provide citations to the relevant Tariff language demonstrating the eligibility requirements for all "other services CAISO procures on behalf of its market," including CAISO's backstop capacity procurement mechanism, as referenced in CAISO's compliance filing.<sup>97</sup> In response, CAISO explains that its Tariff does not expressly call for specific technologies or participation models where it describes eligibility requirements to provide services, including services CAISO procures.

57. CAISO states that, in the case of energy, all participating resources may submit energy bids or self-schedules into CAISO's day-ahead and real-time markets.<sup>98</sup> CAISO states that, likewise, all participating resources that meet the minimum technical requirements to provide ancillary services (Regulation Up, Regulation Down, Spinning Reserve and Non-Spinning Reserve) may submit bids or self-provide those services.<sup>99</sup> CAISO further states that nothing in the CAISO tariff prevents CAISO from procuring

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<sup>94</sup> CAISO Answer at 8-9.

<sup>95</sup> *Id.* at 10.

<sup>96</sup> *Id.* at 10-11.

<sup>97</sup> Transmittal at 13.

<sup>98</sup> CAISO Data Request Response at 6 (citing CAISO Tariff, § 30).

<sup>99</sup> *Id.* (citing CAISO Tariff, § 8.4.1, Appendix K).

backstop capacity from electric storage resources, or any technology type.<sup>100</sup> CAISO explains that Section 43A.4.2 of its Tariff sets forth the criteria it uses in identifying effective resources for the capacity procurement mechanism, which could include NGRs, Pumped-Storage Hydro Units, or Demand Resources. CAISO states that it may consider whether use limitations would create a risk that a resource would be unavailable to meet the identified need, but the Tariff expressly provides that, in exercising this discretion, CAISO shall not unduly discriminate against resources with use limitations.<sup>101</sup> According to CAISO, its capacity procurement mechanism procures the most cost-effective resource that can meet reliability needs, and specific technologies are neither prescribed nor proscribed.<sup>102</sup>

**v. Commission Determination**

58. We find that CAISO's existing Tariff provisions comply with the requirement of Order No. 841 to ensure that electric storage resources using the participation model are eligible to provide all capacity, energy, and ancillary services that they are technically capable of providing.<sup>103</sup> As CAISO explains, its Tariff includes technology-neutral eligibility criteria that apply to all resources providing energy and ancillary services as well as resource adequacy. We find that CAISO's application of these same criteria to electric storage resources using the NGR and Pumped-Storage Hydro Unit models meets the requirements of Order No. 841 in this respect.

59. With respect to Calpine's comments, we find that the resource adequacy eligibility requirements are existing technical requirements unmodified by the instant filing, and thus do not conflict with Order No. 841. In Order No. 841, the Commission stated that it was not considering in this proceeding the requirements that determine whether resources are technically capable of providing individual wholesale services.<sup>104</sup> The Commission also did not require RTOs/ISOs to make specific changes to minimum run-time or must-offer requirements associated with providing capacity.<sup>105</sup> As the Commission explained, where an RTO/ISO has developed a standard set of technical

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<sup>100</sup> *Id.*

<sup>101</sup> *Id.* at 7 (citing CAISO Tariff, §§ 43A.4.2.2).

<sup>102</sup> *Id.*

<sup>103</sup> *Id.* at 6-7 (citing CAISO Tariff, §§ 8.4.1, 30, 43A.4.2.1, 43A.4.2.2, Appendix K).

<sup>104</sup> Order No. 841, 162 FERC ¶ 61,127 at P 78.

<sup>105</sup> *Id.* P 100.

requirements that all resources must meet to provide a given service, such requirements would also apply to a resource using the electric storage resource participation model.<sup>106</sup> We find, therefore, that arguments concerning the specifics of CAISO's resource adequacy eligibility requirements are beyond the scope of CAISO's Order No. 841 compliance filing.

60. In response to Advanced Energy Economy, we agree that electric storage resources participating in RTO/ISO markets under the participation models for electric storage resources should be able to reflect relevant opportunity costs in their energy market offers and bids, similar to other market participants, when appropriate. We find that CAISO's existing rules allow energy storage resources to do so, noting that determining whether a resource should be allowed to include opportunity costs in its offers and bids and how such opportunity costs may be calculated can be complex and case specific.<sup>107</sup> Specifically, CAISO has explained that electric storage resources using the NGR participation model may qualify for opportunity cost adders,<sup>108</sup> but NGRs can reflect all costs in energy bids within the current market horizon.<sup>109</sup> Additionally, we note that CAISO allows resources with physical equipment limitations, such as Pumped-Storage Hydro Units with storage capability limits, to establish opportunity cost adders.<sup>110</sup> We find that CAISO's proposal to apply its existing market rules complies with Order No. 841 because its market rules enable electric storage resources to be eligible to provide market services they are technically capable of providing.<sup>111</sup>

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<sup>106</sup> *Id.* P 77.

<sup>107</sup> For example, for electric storage resources to effectively self-manage their State of Charge, an RTO's/ISO's electric storage resource participation model may need to allow electric storage resources to account for opportunity costs associated with services provided to another entity outside the RTO/ISO markets. *Id.* PP 251, 256-57. Order No. 841 recognizes that some RTOs/ISOs rely on opportunity costs in incremental energy offer reference levels, allowing for a resource to reflect its energy-limited nature through high offers in the energy market that make it unlikely to be dispatched. Order No. 841 requires each RTO/ISO to demonstrate how such rules are applicable to resources using the participation model. *Id.* P 101.

<sup>108</sup> CAISO Tariff, § 39.7.1.3 (Negotiated Rate Option).

<sup>109</sup> Transmittal at 17.

<sup>110</sup> CAISO Tariff, § 30.4.1.1.6.1.2 (Establishing Opportunity Cost Adders).

<sup>111</sup> Order No. 841, 162 FERC ¶ 61,127 at PP 76, 80.



b. **Ability to De-Rate Capacity to Meet Minimum Run-Time Requirements**

61. To implement section 35.28(g)(9)(i)(A) of the Commission's regulations, Order No. 841 requires that each RTO/ISO have tariff provisions providing that resources using the participation model for electric storage resources can de-rate their capacity to meet minimum run-time requirements.<sup>112</sup> Electric storage resources that participate in an RTO/ISO capacity market are not exempt from meeting the performance metrics and criteria that apply to all other resources that participate in that market and are not exempt from any applicable penalties for non-performance.<sup>113</sup>

62. Order No. 841 states that an electric storage resource de-rating its capacity to provide capacity or other services is not engaging in physical withholding if it is de-rating to meet minimum run-time requirements. However, each RTO/ISO may request that its market monitor verify whether an electric storage resource de-rated its capacity to meet a minimum run-time requirement to ensure that such resource is not engaging in physical withholding, as defined by the Commission.<sup>114</sup> Additionally, to the extent that market power concerns arise as a result of electric storage resources de-rating capacity to provide capacity or other services, each RTO/ISO may consider whether it is appropriate to update and/or apply existing market power mitigation processes to electric storage resources to alleviate market power concerns.<sup>115</sup> Further, electric storage resources may provide services in RTO/ISO markets without de-rating so long as they meet the requirements to provide the particular service that they seek to provide.<sup>116</sup>

63. Order No. 841 provides each RTO/ISO with flexibility to either use its existing rules for must-offer quantities or to modify its existing rules as necessary to reflect the physical and operational characteristics of electric storage resources.<sup>117</sup> However, if an electric storage resource elects to de-rate its capacity, it must not de-rate its capacity below any capacity obligations that it has assumed, such as any applicable must-offer requirement. Also, the de-rated quantity should be based on the quantity of energy that

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<sup>112</sup> *Id.* P 94.

<sup>113</sup> *Id.* P 95.

<sup>114</sup> *Id.* P 96.

<sup>115</sup> *Id.* P 97.

<sup>116</sup> *Id.* P 98.

<sup>117</sup> *Id.* P 99.

an electric storage resource can discharge continuously over the minimum run-time set by the RTO/ISO.

64. Order No. 841 does not require RTOs/ISOs to make specific changes to minimum run-time or must-offer requirements associated with providing capacity.<sup>118</sup> However, each RTO/ISO must demonstrate on compliance that its market rules provide a means for electric storage resources to provide capacity, including how its capacity market rules are applicable to resources using the participation model.<sup>119</sup> Where an RTO/ISO does not have existing tariff provisions that enable electric storage resources to provide capacity, the RTO/ISO must propose such rules.<sup>120</sup>

**i. CAISO's Filing**

65. CAISO states that it allows all resources, including resources using the NGR and Pumped-Storage Hydro Unit models, to “elect to de-rate their capacity to meet resource adequacy and ancillary service run-time requirements.”<sup>121</sup> CAISO adds that its practice is cited in Order No. 841 as consistent with the Commission’s mandate.<sup>122</sup> CAISO also highlights that the NGR model’s regulation energy management function specifically addresses the ability of MWh-constrained resources to satisfy the continuous energy requirements of regulation provision. CAISO explains that, with the use of a real-time energy offset, the regulation energy management function allows the resource to bid into the day-ahead market for regulation at full capacity—without the necessity to de-rate.<sup>123</sup>

**ii. Protests/Comments**

66. Tesla recommends that RTOs/ISOs with centralized wholesale capacity markets: (1) calculate the effective load carrying capability<sup>124</sup> of electric storage resources with

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<sup>118</sup> *Id.* P 100.

<sup>119</sup> *Id.* PP 100, 101.

<sup>120</sup> *Id.* P 100.

<sup>121</sup> Transmittal at 13 (citing Order No. 841, 162 FERC ¶ 61,127 at P 94).

<sup>122</sup> *Id.* at 13-14 (citing Order No. 841, 162 FERC ¶ 61,127 at P 101).

<sup>123</sup> *Id.* at 7, 12-13 n.64, 67, 70; for a description of the REM program, *see* CAISO Tariff, § 8.4.1.2.

<sup>124</sup> Tesla states that effective load carrying capability is a method to determine the capacity value of electric storage resources and other energy limited resources and can be defined as the increase in peak load that will give the same system reliability as the

various runtimes at the forecasted level of system load; (2) establish limits on the maximum amount of capacity that electric storage resources can provide, based on resource runtimes and forecasted load; and (3) limit performance penalties to the physical energy capacity in MWh committed to the capacity market by the electric storage resource.<sup>125</sup> Tesla argues that granting this treatment would ensure just and reasonable results from capacity markets by preventing undue discrimination against electric storage resources, allowing electric storage resources to provide all of the capacity service of which they are technically capable, and accounting for electric storage resources' physical and operational characteristics, as required by Order No. 841.<sup>126</sup>

### iii. Data Request Response

67. The Data Request asked CAISO to explain and provide citations to the relevant Tariff language demonstrating that CAISO allows resources using the participation model or models for electric storage resources to de-rate their capacity.<sup>127</sup> In response, CAISO explains that there is no requirement that an electric storage resource offer at its nameplate capacity; instead, CAISO illustrates that it relies on services' minimum technical requirements to determine a resource's eligibility, as well as the registered Minimum Load (PMin) in a resource's Master File.<sup>128</sup> CAISO explains that its Tariff expressly allows a resource to set its capacity level to any amount greater than its registered Minimum Load.<sup>129</sup> According to CAISO, to the extent that a particular service

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original system without the additional resource. Tesla Comments at 9 (citing GE Energy Consulting (March 31, 2014), "PJM Renewable Integration Study: Task 3A Part F Capacity Valuation," Prepared for PJM, p18-19, <https://www.pjm.com/-/media/committees-groups/subcommittees/irs/postings/pjm-pris-task-3a-part-f-capacity-valuation.ashx?la=en>).

<sup>125</sup> *Id.* at 8-12.

<sup>126</sup> *Id.* at 8-9.

<sup>127</sup> Data Request at 3.

<sup>128</sup> *Id.* at 8-9. CAISO explains that Minimum Load is the minimum sustained operating level at which a resource can operate at a continuous sustained level. *Id.*

<sup>129</sup> *Id.* at 8 (citing CAISO Tariff, § 40.4.3). Section 40.4.3 sets forth the qualifications for supplying Net Qualifying Capacity, which is the resource adequacy capacity a resource can provide. CAISO explains that the first qualification is that a resource is available to validate its Qualifying Capacity, which can be no less than the resource's Minimum Load in the Master File. Accordingly, it contends that the CAISO

has a requirement for minimum run-times (e.g., regulation), a scheduling coordinator for an electric storage resource can de-rate its capacity in order to qualify to provide that service. CAISO explains that this occurs through the certification process established through Section 8 and Attachment K of its Tariff. CAISO states that, in addition, an electric storage resource may de-rate its capacity to meet minimum operating requirements to provide resource adequacy capacity in CAISO's markets.<sup>130</sup> CAISO offers the example of a resource seeking to act as a peak ramping resource,<sup>131</sup> which must be able to provide energy for a minimum of three continuous hours up to its full effective flexible capacity including Minimum Load (PMin).<sup>132</sup>

#### iv. Commission Determination

68. We find that CAISO's existing Tariff complies with the requirements of Order No. 841 regarding the ability of electric storage resources to de-rate capacity to meet minimum run-time requirements because its Tariff allows a resource to set its capacity level to any amount greater than its registered Minimum Load.<sup>133</sup> We find that Tesla's recommendations in this proceeding regarding electric storage resource capacity valuation, limits, and performance penalties are beyond the scope of this compliance proceeding. We also note that Tesla's recommendations are inapposite because CAISO does not operate a centralized capacity market.

### 3. Physical and Operational Characteristics of Electric Storage Resources

#### a. Order No. 841

69. Order No. 841 adds section 35.28(g)(9)(i)(C) to the Commission's regulations to require that each RTO/ISO have tariff provisions providing a participation model for electric storage resources that accounts for the following physical and operational characteristics of electric storage resources through bidding parameters or other means: State of Charge, Maximum State of Charge, Minimum State of Charge, Maximum Charge Limit, Minimum Charge Limit, Maximum Discharge Limit, Minimum Discharge

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Tariff expressly allows resources to set their capacity level to any level above their minimum sustained operating level.

<sup>130</sup> Data Request Response at 8.

<sup>131</sup> CAISO Tariff, § 40.10.3.3.(a)(2).

<sup>132</sup> Data Request Response at 8.

<sup>133</sup> See *id.* at 8-9 (citing CAISO Tariff, § 40.4.3).

Limit, Maximum Charge Time, Minimum Charge Time, Maximum Run Time, Minimum Run Time, Discharge Ramp Rate, and Charge Ramp Rate.<sup>134</sup> Each RTO/ISO must demonstrate how its proposed or existing tariff provisions account for each of these specific physical and operational characteristics of electric storage resources, which are described further below. Order No. 841 provides that, to the extent that an RTO/ISO proposes to comply with the requirement to account for any of the physical and operational characteristics of electric storage resources enumerated herein through its existing bidding parameters or other existing market mechanisms, it must demonstrate in its compliance filing how its existing market rules already account for that particular physical and operational characteristic.<sup>135</sup> This requirement will improve the ability of electric storage resources to provide all of the services that they are technically capable of providing and allow RTOs/ISOs to procure these services more efficiently, which will enhance competition and, in turn, help to ensure that RTO/ISO markets produce just and reasonable rates.<sup>136</sup>

70. Order No. 841 does not require RTOs/ISOs to mandate that a resource owner/operator submit any information, but instead, provided flexibility to each RTO/ISO to determine whether resources using the participation model for electric storage resources are required to submit information regarding their physical and operational characteristics, or whether resources using the participation model should be allowed to submit such information at their discretion.<sup>137</sup> This flexibility may help prevent resources using the participation model for electric storage resources from having to submit information that is not applicable given their physical, operational, or commercial circumstances. If an RTO/ISO adopts bidding parameters to account for the physical and operational characteristics set forth in Order No. 841, as specified below, it must permit a resource using the participation model for electric storage resources to submit those bidding parameters in both the day-ahead and the real-time markets.<sup>138</sup>

71. Further, Order No. 841 allows each RTO/ISO to propose, in its compliance filing, bidding parameters or other means to account for physical and operational

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<sup>134</sup> Order No. 841, 162 FERC ¶ 61,127 at P 191.

<sup>135</sup> *Id.* PP 211, 220, 229.

<sup>136</sup> *Id.* PP 211, 220, 230.

<sup>137</sup> *Id.* P 192.

<sup>138</sup> *Id.* P 193.

characteristics of electric storage resources besides those set forth in Order No. 841.<sup>139</sup> To the extent that an RTO/ISO includes such a proposal in its compliance filing, it must demonstrate that such bidding parameters or other mechanisms do not impose barriers to the participation of electric storage resources in its markets.

72. Order No. 841-A clarifies that the requirement that each RTO/ISO establish tariff provisions providing a participation model for electric storage resources that accounts for the physical and operational characteristics of electric storage resources through bidding parameters or other means allows for regional flexibility.<sup>140</sup>

**i. State of Charge**

73. Order No. 841 provides that State of Charge represents the amount of energy stored by an electric storage resource in proportion to the limit on the amount of energy that it can store, typically expressed as a percentage.<sup>141</sup> The State of Charge as a bidding parameter is the level of energy that an electric storage resource is anticipated to have available at the start of the market interval rather than the end. Order No. 841 provides each RTO/ISO the flexibility to propose telemetry requirements for such resources in its compliance filing and allows the RTOs/ISOs to implement the requirements of Order No. 841 consistent with the telemetry requirements for different services and other market participants in each RTO/ISO.<sup>142</sup>

**ii. Maximum State of Charge and Minimum State of Charge**

74. Maximum State of Charge represents the State of Charge that should not be exceeded (i.e., gone above) when the electric storage resource is receiving electric energy from the grid.<sup>143</sup> This value may either be a static value based on manufacturer specifications or a dynamic value depending on the operational characteristics of the resource (e.g., if it is providing multiple services and needs to reserve part of its State of Charge for another service).

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<sup>139</sup> *Id.* P 235.

<sup>140</sup> *Id.* P 93.

<sup>141</sup> *Id.* P 213.

<sup>142</sup> *Id.* P 214.

<sup>143</sup> *Id.* P 215.

75. Minimum State of Charge represents the State of Charge that should not be exceeded (i.e., gone below) when an electric storage resource is injecting electric energy onto the grid.<sup>144</sup> This value may be either a static value based on manufacturer specifications or a dynamic value depending on the operational characteristics of the resource (e.g., if it is providing multiple services and needs to reserve part of its State of Charge for another service).

iii. **Maximum Charge Limit and Minimum Charge Limit**

76. The Maximum Charge Limit for a resource using the electric storage resource participation model is the maximum MW quantity of electric energy that it can receive from the grid.<sup>145</sup>

77. The Minimum Charge Limit represents the minimum MW level that the resource can receive from the grid.<sup>146</sup>

iv. **Maximum Discharge Limit and Minimum Discharge Limit**

78. The Maximum Discharge Limit is the maximum MW quantity that the resource can inject onto the grid.<sup>147</sup> The Maximum Discharge Limit is analogous to, and could be represented by, the economic maximum that traditional generation resources can generally submit with their offers.

79. The Minimum Discharge Limit represents the minimum MW output level that the resource can inject onto the grid.<sup>148</sup>

v. **Maximum Charge Time and Minimum Charge Time**

80. The Maximum Charge Time represents the maximum duration that a resource using the participation model for electric storage resources is able to be dispatched by the

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<sup>144</sup> *Id.* P 215.

<sup>145</sup> *Id.* P 216.

<sup>146</sup> *Id.* P 231.

<sup>147</sup> *Id.* P 216.

<sup>148</sup> *Id.* P 231.

RTO/ISO to receive electric energy from the grid (e.g., for four hours).<sup>149</sup> If the RTO/ISO is not managing the State of Charge of the electric storage resource in real time, then the Maximum Charge Time will prevent it from dispatching the resource to charge for a duration that would exceed the resource's Maximum State of Charge.

81. The Minimum Charge Time represents the shortest duration that a resource using the participation model for electric storage resources is able to be dispatched by the RTO/ISO to receive electric energy from the grid.<sup>150</sup> Minimum Charge Time is similar to the Minimum Run Time for traditional generation resources but represents the minimum time the resource can receive electric energy from the grid, rather than provide electric energy to the grid.

**vi. Maximum Run Time and Minimum Run Time**

82. The Maximum Run Time reflects the maximum amount of time that a resource using the participation model for electric storage resources is able to inject electric energy to the grid due to physical or operational constraints, such as its State of Charge or potential obligations to provide other services.<sup>151</sup>

83. The Minimum Run Time allows the resource to identify the minimum amount of time the resource is physically able to discharge electric energy onto the grid.<sup>152</sup>

**vii. Discharge Ramp Rate and Charge Ramp Rate**

84. The Discharge Ramp Rate represents the speed at which electric storage resources can move from zero output to full output, or Maximum Discharge Limit.<sup>153</sup>

85. The Charge Ramp Rate represents the speed at which electric storage resources can move from zero output to fully charging, or the resource's Maximum Charge Limit.<sup>154</sup>

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<sup>149</sup> *Id.* P 223.

<sup>150</sup> *Id.* P 222.

<sup>151</sup> *Id.* P 224.

<sup>152</sup> *Id.*

<sup>153</sup> *Id.* P 234.

<sup>154</sup> *Id.*



**b. CAISO's Filing**

86. CAISO defines State of Charge as “the Energy available to CAISO Markets from a Non-Generator Resource or storage device.”<sup>155</sup> CAISO offers electric storage resources the flexibility to manage their State of Charge on their own through bidding, or to have the CAISO market optimization process manage the resource’s State of Charge and charging limits through bidding and master file parameters.<sup>156</sup> CAISO requires NGRs to submit the same bid components as other resources seeking to supply energy, demand, or ancillary services; however, CAISO allows NGRs to include their State of Charge in their bid.<sup>157</sup> CAISO states that if NGRs do not provide their State of Charge, CAISO uses the resource’s previous State of Charge.<sup>158</sup> CAISO explains that NGRs providing ancillary services must provide telemetry every four seconds to CAISO that includes, inter alia, the resource’s State of Charge and maximum instantaneous ability to produce or consume energy.

87. CAISO states that it allows NGRs to include MWh constraints, including Maximum State of Charge, Minimum State of Charge, Maximum Charge Limit, and Minimum Charge Limit as master file parameters.<sup>159</sup> According to CAISO, if the NGR elects to provide CAISO such constraints, then the CAISO market optimization process respects them just as it respects Pmax and Pmin for conventional generators.<sup>160</sup> CAISO states that it does not require NGRs to submit these constraints if the NGR prefers to self-manage its State of Charge and charge/discharge limits,<sup>161</sup> and, at any point, an NGR could modify its elections through the CAISO master file modification process.<sup>162</sup>

88. CAISO states that Pumped-Storage Hydro Units may submit equivalents to State of Charge and charging limits as separate bid components or master file parameters. According to CAISO, these components comprise the unit’s pumping level, and its

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<sup>155</sup> CAISO Tariff, Appendix A (defining “State of Charge”).

<sup>156</sup> Transmittal at 18-19.

<sup>157</sup> *Id.* at 19 (citing CAISO Tariff, § 30.5.6).

<sup>158</sup> *Id.*

<sup>159</sup> *Id.*

<sup>160</sup> *Id.* (citing CAISO Tariff, § 27.9).

<sup>161</sup> *Id.*

<sup>162</sup> *Id.* (citing CAISO Tariff, § 30.7.3.2).

maximum and minimum daily energy limits for both their pumping (charging) and generation (discharging) functions over the operating day. CAISO adds that where such components are not included in a bid, the CAISO market optimization process will default to the unit's previous level while respecting master file parameters.<sup>163</sup> It explains that electric storage resources electing to use the NGR model may manage their discharging times through the optional State of Charge parameters discussed above, minimum continuous energy limits, and their bid curve.<sup>164</sup> CAISO states that its NGR bid curve allows electric storage resources to represent their full economic range (both charging and discharging) in a single bid, which gives the resource the flexibility to participate as supply, demand, or both, through one bid. CAISO explains that if an NGR has economic costs or benefits driving a need to continue to discharge, it can include them in its bid curve, subject to any applicable bid cap. CAISO states that this enables it to evaluate NGRs' need to continue to charge or discharge in the market and not as an out-of-market constraint.

89. CAISO states that electric storage resources still have physical constraints on their charging and discharging.<sup>165</sup> Therefore, NGRs may submit the MWh constraints discussed above and maximum continuous energy limits (in MWh). CAISO explains that these additional optional parameters allow for the CAISO market optimization process to manage charging time and discharging time constraints, or allow the resources to self-manage those constraints.

90. CAISO asserts that to address the issue of Pumped-Storage Hydro Units needing charge time and run time limits to account for slow transition speeds, it allows Pumped-Storage Hydro Units to submit master file parameters specifying their Minimum Run Time and Minimum Down Time for both their pumping function and their generating function. CAISO defines Minimum Run Time as the minimum amount of time that a generating unit must stay on-line after being started-up prior to being Shut-Down, due to physical operating constraints, while it defines Minimum Down Time as the minimum amount of time that a generating unit must stay off-line after being shut-down, due to physical operating constraints. CAISO states that where resources have submitted these parameters, its market optimization process will respect how long

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<sup>163</sup> *Id.* (citing CAISO Tariff, § 30.5.2.2).

<sup>164</sup> *Id.* at 20.

<sup>165</sup> *Id.*

Pumped-Storage Hydro Units must “charge,” “discharge,” or stay offline across continuous intervals.<sup>166</sup> CAISO states that it accounts for electric storage resources’ minimum discharge limits, minimum charge limits, discharge ramp rates, and charge ramp rates using analogous master file parameters for conventional supply and demand resources.<sup>167</sup> CAISO states that it allows all supply and demand participation models, including the NGR and Pumped-Storage Hydro Unit models, to submit Pmin or Minimum Load values.<sup>168</sup> The CAISO Tariff defines Minimum Load for resources providing supply as “the minimum sustained operating level at which it can operate at a continuous sustained level, as defined in the Master File,” and for resources providing demand as “the operating level at reduced consumption pursuant to a Dispatch Instruction.”<sup>169</sup> CAISO states that NGRs can submit Minimum Load values in the CAISO master file for both charging and discharging, and Pumped-Storage Hydro Units can submit Minimum Load values for both their pumping and generating functions.<sup>170</sup>

91. CAISO states that it accounts for ramping rates for NGRs just as it does for conventional generators.<sup>171</sup> According to CAISO, NGRs can submit Ramp Rates as bid components and as master file parameters.<sup>172</sup> CAISO explains that, where the resource has submitted a master file parameter but includes no ramp rate as a bid component, the CAISO market optimization process will default to the master file parameter.<sup>173</sup> CAISO states that resources may submit specific Ramp Rates to indicate their Operational Ramp Rate (for supply), Regulation Ramp Rate (for Regulation), and Operating Reserve Ramp Rate (for Spin and Non-spin).<sup>174</sup> To reflect that NGRs’ ramp rates can go below 0 MW

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<sup>166</sup> *Id.* at 21 (citing CAISO Tariff, Appendix A (defining “Minimum Run Time”); Business Practice Manual for Market Instruments, § B.5).

<sup>167</sup> *Id.*

<sup>168</sup> *Id.* (citing CAISO Tariff, Appendix A (defining “Minimum Load”)).

<sup>169</sup> *Id.* at 21-22 (citing CAISO Tariff, Appendix A (defining “Minimum Load”)).

<sup>170</sup> *Id.* at 22.

<sup>171</sup> *Id.*

<sup>172</sup> *Id.* (citing CAISO Tariff, §§ 30.5.2.2, 30.5.2.3, 30.7.7).

<sup>173</sup> *Id.* (citing CAISO Tariff, Appendix A (defining “Ramp Rate”)).

<sup>174</sup> *Id.* (citing CAISO Tariff, § 30.5.2.7, Appendix A (defining “Ramp Rate”)).

when discharging, CAISO allows NGRs to submit two segments for their ramp rates – one for discharging (above 0) and one for charging (below 0).<sup>175</sup>

92. CAISO states that ramping can be especially complex for Pumped-Storage Hydro Units. CAISO explains that to address this complexity, it allows Pumped-Storage Hydro Units to submit the same bid components and master file parameters described for NGRs (for their pumping function and generating function), and an additional master file parameter called the Pump Ramping Conversion Factor. CAISO defines the Pump Ramping Conversion Factor as a Master File entry submitted by Scheduling Coordinators that allows the Scheduling Coordinator to indicate the ratio of Energy expended to pump water into storage that can be used to produce Energy. CAISO states that a zero percent Pump Ramping Conversion Factor implies that no amount of energy production capability is produced because of pumping water, such that there is no energy available in its markets. According to CAISO, a hundred percent Pump Ramping Conversion Factor indicates all the energy expended to pump water is available for generation in the CAISO markets. It states that resources may adjust this factor as needed to account for their ramp rate to pump.<sup>176</sup>

**c. Protests/Comments**

93. Tesla requests that the Commission require RTOs/ISOs to allow electric storage resources to submit separate round-trip efficiency (i.e., the amount of energy lost from charge to discharge) parameters for summer and winter, for purposes of market registration or offers, because round-trip efficiency can be highly dependent on temperature.<sup>177</sup> Tesla states that seasonal round-trip efficiency levels are sufficient for all uses, including planning processes and determination of cost bases, so requiring more granular updates would not improve RTO/ISO processes.

**d. Data Request Response**

94. In its Data Request, Commission staff asked CAISO to explain and provide citations to the relevant Tariff language demonstrating that electric storage resources are permitted to submit their biddable parameters in both the day-ahead and real-time markets. Commission staff also sought confirmation that the State of Charge value in CAISO is the level of energy that an electric storage resource is anticipated to have

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<sup>175</sup> *Id.* (citing CAISO Business Practice Manual for Market Instruments, Ex. 4-3).

<sup>176</sup> *Id.* at 22-23 (citing CAISO Tariff, Appendix A (defining “Pump Ramping Conversion Factor”); *id.* § 4.6.4).

<sup>177</sup> Tesla Comments at 23.

available at the start of the market interval, and that CAISO's participation models account for the physical and operational characteristics and the charge and run times defined in Order No. 841. CAISO states that Sections 30.1, 31.1, and 34.1.3 of its Tariff provide that, because electric storage resources submit general supply and demand bids like other resources, their scheduling coordinators may submit bids or self-schedules in both the day-ahead and real-time markets.<sup>178</sup> CAISO further asserts that Section 30.5.6 of its Tariff provides that electric storage resources may submit bids including the State of Charge for the day-ahead market to indicate the forecasted starting physical position.<sup>179</sup> CAISO adds that, where electric storage resources do not submit a State of Charge, CAISO's market optimization process uses the electric storage resource's previous State of Charge. It further explains that Pumped-Storage Hydro Units likewise submit a Pumping Level in MW as a biddable parameter.<sup>180</sup>

95. CAISO states that it captures the relatively more static physical parameters of electric storage resources through Master File entries submitted by each resource. CAISO explains that Section 4.6.4 of the CAISO Tariff requires Scheduling Coordinators to submit Master File parameters that accurately reflect resources' operational and technical constraints, and resources are required to submit any changes to their technical information through the Master File modification process. CAISO asserts that it describes the Bid components and Master File parameters for NGRs in sections 4.1.1 and 5.1.1.4 of CAISO's Business Practice Manual for Market Instruments, and section 5.1.1.2.4 of the same Business Practice Manual for Pumped-Storage Hydro Units.<sup>181</sup> For both NGRs and Pumped-Storage Hydro Units, CAISO asserts that it captures minimum/maximum states of charge as the resource's minimum/maximum continuous energy limits, and the minimum/maximum charge limits as the resource's minimum/maximum generation capacity limits.<sup>182</sup> Additionally, Tariff Section 30.5.2.2 for generators (including NGRs) and Tariff Section 30.5.2.3 for Pumped-Storage Hydro Units provide that resources may submit daily minimum/maximum states of charge as biddable parameters for the day in MWh.

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<sup>178</sup> CAISO Data Request Response at 14.

<sup>179</sup> *Id.* at 15.

<sup>180</sup> *Id.* (citing CAISO Tariff, § 30.5.3, Appendix A (defining "Pumping Level")).

<sup>181</sup> *Id.* at 16 (citing CAISO Tariff, § 30.7.3.2, Appendix B2, Appendix B4).

<sup>182</sup> *Id.*

96. CAISO explains that the batteries currently participating under the NGR model can transition from charging to discharging and vice versa near instantaneously.<sup>183</sup> As such, CAISO states that it does not account for Minimum Charge Time, Maximum Charge Time, Minimum Run Time, and Maximum Run Time as Master File parameters for NGRs. CAISO states that the CAISO Resource Data Template in section B.2.1 of the CAISO Business Practice Manual for Market Instruments instructs NGRs to enter “0” for Minimum On Time. It states that electric storage resources electing to use the NGR model may manage their charging and discharging run times through the optional state of charge parameters enumerated above, minimum and maximum continuous energy limits, and their bid curve. According to CAISO, if an NGR has economic costs or benefits driving a need to continue to charge or discharge, it can include them in its bid curve, subject to any applicable bid cap. CAISO states that this enables it to evaluate NGRs’ need to continue to charge or discharge in the market and not as an out-of-market constraint.

97. CAISO explains that, because Pumped-Storage Hydro Units rely on gravity and the flow of water to generate energy or demand, they have physical constraints on how quickly they can transition from charging to discharging and vice versa.<sup>184</sup> To account for these constraints, CAISO states that it allows Pumped-Storage Hydro Units to provide the following Master File parameters: Pump Minimum Up Time – minutes a pump must continue to pump; Pump Minimum Down Time – minutes a pump cannot return to pumping after shutting down; (Gen) Minimum On Time – minutes generator must stay on before shut down due to physical operating constraints; Gen-to-Pump Minimum Down Time – minutes after being de-committed from generation mode before able to be dispatched in pumping mode; Pump-to-Gen Minimum Down Time – minutes after being de-committed from pumping mode before able to be dispatched in generation mode. According to CAISO, pursuant to Section 4.6.4 of its Tariff, these parameters must accurately reflect the resource’s operational and technical constraints.

98. CAISO explains that Tariff Section 30.5.2.2 requires Participating Generators, including NGRs, to include the Ramp Rate in their Bids.<sup>185</sup> CAISO states that electric storage resources participating under the NGR model also must submit Master File values to account for their operational and technical constraints.<sup>186</sup>

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<sup>183</sup> *Id.* at 17.

<sup>184</sup> *Id.*

<sup>185</sup> *Id.* at 18.

<sup>186</sup> *Id.* (citing CAISO Tariff, § 4.6.4).

e. **Commission Determination**

99. We find that CAISO's Tariff partially complies with the requirement of Order No. 841 to account for each of the specific physical and operational characteristics of electric storage resources enumerated in Order No. 841 through bidding parameters or other means.<sup>187</sup> Specifically, we find that CAISO's Tariff complies with the requirement of Order No. 841 to account for the State of Charge of resources using the NGR and Pumped-Storage Hydro Unit models, and that the definition of State of Charge in CAISO's Tariff is consistent with the definition established in Order No. 841.<sup>188</sup> In addition, we find that CAISO's Tariff complies with the requirements of Order No. 841 to account for Minimum Charge Limit and Minimum Discharge Limit.<sup>189</sup>

100. As CAISO explains in its Transmittal and Data Request Response, it currently includes descriptions of certain parameters in its Business Practice Manual for Market Instruments. However, Order No. 841 requires that the Tariff provide for a participation model that accounts for each of the characteristics described in the rule.<sup>190</sup> While CAISO's Business Practice Manual for Market Instruments may define certain parameters in a manner consistent with the Commission's descriptions of Discharge Ramp Rates, Charge Ramp Rates, Maximum/Minimum State of Charge, Maximum Charge Limit, Maximum Discharge Limit, Maximum/Minimum Charge Time, and Maximum/Minimum Run Time in Order No. 841, CAISO does not account for these parameters in its Tariff. Accordingly, we direct CAISO to file, within 60 days of the date of this order, a compliance filing to account for these 10 characteristics through bidding parameters or other means in the Tariff.

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<sup>187</sup> Order No. 841, 162 FERC ¶ 61,127 at P 211.

<sup>188</sup> CAISO Tariff, §§ 30.5.2.2, 30.5.6, Appendix A (defining "State of Charge" and "Energy Limit").

<sup>189</sup> CAISO Tariff, §§ 30.5.2.2, 30.5.2.3. Sections 30.5.2.2 and 30.5.2.3 provide that supply bids for Participating Generators and Participating Loads, respectively, shall include Minimum Load Bids. The definition in CAISO's Tariff of Minimum Load for a generating unit is consistent with the Minimum Discharge Limit as defined in Order No. 841, and likewise Minimum Load for a Participating Load is consistent with the Minimum Charge Limit as defined in Order No. 841. CAISO Tariff, Appendix A (defining "Minimum Load").

<sup>190</sup> Order No. 841, 162 FERC ¶ 61,127 at P 191 (requiring each RTO/ISO to demonstrate how its proposed or existing tariff provisions account for each of these specific physical and operational characteristics of electric storage resources).

101. We find Tesla's request that the Commission require CAISO to allow electric storage resources to submit separate round-trip efficiency levels for summer and winter to be outside the scope of this compliance proceeding. Although Order No. 841 affords the RTOs/ISOs flexibility to propose additional bidding parameters to account for the physical and operational characteristics of electric storage resources, it does not require the RTOs/ISOs to account for any other physical and operational characteristics beyond those identified above.

#### 4. State of Charge Management

102. Order No. 841 requires each RTO/ISO to allow resources using the participation model for electric storage resources to self-manage their State of Charge.<sup>191</sup> Order No. 841 provides that a resource using the participation model for electric storage resources that self-manages its State of Charge will be subject to any applicable penalties for deviating from a dispatch schedule to the extent that the resource deviates from the dispatch schedule in managing its State of Charge. Order No. 841 further provides that, to the extent that the provision of a particular wholesale service, such as frequency regulation, requires a resource providing that service to follow a dispatch signal that has the effect of maintaining the resource's ability to provide the service, an electric storage resource that is managing its own State of Charge would still be required to follow such a dispatch signal, just as all other resources providing that same service.

103. RTOs/ISOs are not required as part of Order No. 841 to manage the State of Charge for resources using the participation model for electric storage resources.<sup>192</sup> While RTOs/ISOs must permit resources to manage their own State of Charge, RTOs/ISOs may provide an option for the RTO/ISO to manage an electric storage resource's State of Charge for any particular service or circumstance as they deem appropriate in their markets with the consent of the electric storage resource.<sup>193</sup> If an RTO/ISO already has a mechanism to manage a resource's State of Charge, then the RTO/ISO must make it optional for the electric storage resource owner/operator to use such mechanism so that the electric storage resource is able to manage its own State of Charge if it elects to do so.<sup>194</sup> Order No. 841 further provides that, where an electric

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<sup>191</sup> *Id.* P 253.

<sup>192</sup> *Id.* P 254.

<sup>193</sup> *Id.* n.300.

<sup>194</sup> *Id.* P 254.



storage resource has the option to allow the RTO/ISO to manage its State of Charge, the electric storage resource is the default manager of the resource's State of Charge.

104. Order No. 841 states that RTO/ISOs should be able to dispatch resources using the participation model for electric storage resources in the same manner as any other market participant to address any reliability challenges and should know that the resources have an adequate State of Charge to perform the service to which they have committed.<sup>195</sup> RTO/ISOs are not precluded from establishing telemetry or other communication requirements necessary to determine the capabilities of an electric storage resource in real time. Self-managing electric storage resources, just like all market participants, are subject to any non-performance penalties in the RTO/ISO tariff.

105. Order No. 841 recognizes that the energy limitations of electric storage resources will need to be factored into their market offers and that misrepresenting those limitations could constitute manipulation if an electric storage resource has an obligation to participate in an RTO/ISO market. However, as discussed in the Ability to De-Rate Capacity to Meet Minimum Run-Time Requirements section above, Order No. 841 requires each RTO/ISO to demonstrate how its existing market rules provide a means for energy-limited resources, including electric storage resources, to provide capacity, including ways to represent their energy limitations through their offer prices, which, if allowed by the RTO/ISO, would not constitute economic withholding.<sup>196</sup> As with other resources, market monitors have the ability to review the bids from electric storage resources to detect economic or physical withholding.<sup>197</sup> If an RTO/ISO determines that additional rules are needed to ensure electric storage resources are not managing their State of Charge in a way that could manipulate market outcomes through withholding, then the RTO/ISO may propose such rules in its compliance filing or through a separate FPA section 205 filing.<sup>198</sup>

**a. CAISO's Filing**

106. As discussed in section IV.B.3.b, above, CAISO explains that it allows electric storage resources to manage their State of Charge on their own through optional bid components or to permit CAISO's market optimization process to manage it through bidding and master file parameters, and if NGRs do not provide their State of Charge,

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<sup>195</sup> *Id.* P 255.

<sup>196</sup> *Id.* P 256.

<sup>197</sup> *Id.* P 257.

<sup>198</sup> *Id.* (citing 16 U.S.C. § 824d).

CAISO will use the resource's State of Charge from the previous day.<sup>199</sup> According to CAISO, if the NGR elects to include MWh constraints, including Maximum State of Charge, Minimum State of Charge, Maximum Charge Limit, and Minimum Charge Limit as master file parameters, then the CAISO market optimization process respects them just as it respects Pmax and Pmin for conventional generators.<sup>200</sup> Likewise, CAISO states that Pumped-Storage Hydro Units may submit equivalents of State of Charge and charging limits as separate bid components, which comprise the unit's pumping level and its maximum and minimum daily energy limits for both their pumping and generation functions over the operating day.<sup>201</sup> As with NGRs, where such components are not included in a Pumped-Storage Hydro Unit's bid, the CAISO market will default to the unit's previous level while respecting master file parameters. In addition, where a CAISO resource receives an award and dispatch but diverges from its dispatch signal to manage its State of Charge (or for any reason), it will be subject to imbalance energy and settled based upon the nodal LMP.<sup>202</sup> CAISO explains that where a wholesale service, such as regulation, "requires a resource providing that service to follow a dispatch signal . . . an electric storage resource that is managing its own State of Charge would still be required to follow such a dispatch signal" like other resources.

**b. Protests/Comments**

107. Tesla argues that energy neutral signals for the provision of frequency regulation represent RTO/ISO management of an electric storage resource's State of Charge, and that Order No. 841 expressly requires that each RTO/ISO allow electric storage resources to self-manage their State of Charge.<sup>203</sup> Tesla argues that electric storage resources should have the option to self-manage their State of Charge when providing frequency regulation, and be allowed to provide an asymmetric offer curve for regulation up and regulation down. Tesla explains that an electric storage resource that is fully charged cannot offer its full capacity for frequency regulation with an energy neutral signal, but that it could provide its full capacity if it were allowed to bid only regulation up. Likewise, Tesla explains that fully discharged electric storage resources cannot provide frequency regulation based on an energy neutral signal, but could provide its full capacity for regulation down service. Tesla states that it does not oppose the option to utilize

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<sup>199</sup> Transmittal at 18-19, 23.

<sup>200</sup> *Id.* at 19 (citing CAISO Tariff, § 27.9).

<sup>201</sup> *Id.*

<sup>202</sup> *Id.* at 23.

<sup>203</sup> Tesla Comments at 22.

energy neutral signals for frequency regulation, but requests that the Commission require the RTOs/ISOs to provide the option for electric storage resources to self-manage their State of Charge during the provision of frequency regulation and allow electric storage resources to submit asymmetrical offer curves for regulation up and regulation down service.<sup>204</sup>

**c. Commission Determination**

108. We find that CAISO's existing Tariff provisions allowing an electric storage resource using the NGR or Pumped-Storage Hydro Unit participation models to self-manage its State of Charge comply with the requirements of Order No. 841. CAISO's Tariff provides electric storage resources with the flexibility to manage their State of Charge on their own through optional bid components, or to have the CAISO market optimization process manage the resources' State of Charge through bidding and master file parameters. Where a resource receives an award and dispatch but diverges from the CAISO dispatch signal to manage its State of Charge, it will be subject to applicable penalties for deviating from such dispatch schedule. Further, CAISO's Tariff complies with the Order No. 841 requirement to establish real time telemetry or other communication between CAISO and electric storage resources.

109. In response to Tesla, the Commission in Order No. 841 found that, to the extent that the provision of a wholesale service such as frequency regulation requires a resource providing that service to follow a dispatch signal in order to provide that service, an electric storage resource that is managing its own state of charge must still follow the dispatch signal, just as all other resources providing that same service.<sup>205</sup> We disagree with Tesla that the Commission must require CAISO to allow electric storage resources to submit asymmetrical offer curves for regulation up and regulation down service. Order No. 841 does not address this issue, and thus, it is outside the scope of this proceeding. As explained above, we find that CAISO's proposal complies with Order No. 841's requirement to allow resources to self-manage their State of Charge.

**5. Minimum Size Requirement**

110. Order No. 841 adds section 35.28(g)(9)(i)(D) to the Commission's regulations to require that each RTO/ISO have tariff provisions providing a participation model for electric storage resources that establishes a minimum size requirement for participation in

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<sup>204</sup> *Id.* at 23.

<sup>205</sup> Order No. 841, 162 FERC ¶ 61,127 at P 253.

the RTO/ISO markets that does not exceed 100 kW.<sup>206</sup> This minimum size requirement includes all minimum capacity requirements, minimum offer to sell requirements, and minimum bid to buy requirements for resources participating in these markets under the participation model for electric storage resources. Under this requirement, an RTO/ISO may allow offer and/or bid quantities smaller than or equal to 100 kW, but an RTO/ISO may not require a resource using the electric storage resource participation model to submit offer and/or bid quantities larger than 100 kW.<sup>207</sup> Order No. 841 finds that minimum size requirements do not need to be resource specific or location-specific.<sup>208</sup>

111. Order No. 841-A denies requests for rehearing regarding the minimum size requirement,<sup>209</sup> including MISO's request for clarification or, in the alternative, rehearing to phase in the implementation of the minimum size requirement.<sup>210</sup> In response to MISO's request for clarification that the 100 kW limit does not apply to the Minimum Charge Limit or Minimum Discharge Limit, Order No. 841-A clarifies that the minimum size requirement does not prohibit an RTO/ISO from establishing a minimum size limit that is lower than 100 kW on any minimum capacity requirements, minimum offer to sell requirements, or minimum bid to buy requirements. Order No. 841-A clarifies further that it is possible that the quantities for the Minimum Charge Limit and Minimum Discharge Limit may be smaller than 100 kW for resources using the participation model for electric storage resources. However, Order No.841-A does not specify how the minimum size requirement may affect the quantities submitted for some of the physical and operational characteristics of electric storage resources, and stated that the Commission would not prejudge how the RTOs/ISOs may propose any such relationships between the minimum size requirement and the physical and operational characteristics of resources using the participation model for electric storage resources.<sup>211</sup>

**a. CAISO's Filing**

112. CAISO currently requires all supply resources to have a minimum capacity of 500 kW, although this requirement can presently be met through aggregated resources. In its compliance filing, CAISO proposes revising its Tariff to permit electric storage

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<sup>206</sup> *Id.* P 270.

<sup>207</sup> *Id.* P 276.

<sup>208</sup> *Id.* P 273.

<sup>209</sup> Order No. 841-A, 167 FERC ¶ 61,154 at PP 102-04.

<sup>210</sup> *Id.* P 105.

<sup>211</sup> *Id.* P 106.

resources to have a minimum capacity of 100 kW to qualify as Participating Generators.<sup>212</sup> CAISO contends that the remainder of its participation and bidding requirements are compliant with Order No. 841, insofar as they impose no minimum requirement for participating loads and a minimum bid of 10 kWh.<sup>213</sup>

**b. Data Request Response**

113. The Data Request asked CAISO to explain or reconcile the difference between CAISO's proposal to comply with the minimum size requirement of Order No. 841, and its 500 kW minimum size requirements in Appendix K to its Tariff for a resource providing Regulation, Spinning Reserve, or Non-Spinning Reserve as an ancillary service. The Data Request also asked CAISO to explain and provide citations to the relevant tariff language demonstrating how an electric storage resource, located on the distribution system or behind-the-meter, with a rated capacity between 100 kW and 500 kW, may participate in the CAISO markets without participating in a Distributed Energy Resource Aggregation, given that CAISO's Tariff requires a distributed energy resource aggregation to be no smaller than 500 kW.<sup>214</sup>

114. In response to Commission staff's Data Request, CAISO states that its 500 kW minimum capacity requirements in Appendix K for Regulation, Spinning Reserves, and Non-spinning Reserves are technical requirements, approved by the Commission as just and reasonable.<sup>215</sup> CAISO asserts that modifying these provisions exceeds the scope of Order No. 841 compliance. CAISO maintains that the Commission has made no findings that CAISO's technical requirements for resources to provide ancillary services are unjust or unreasonable or unduly preferential or discriminatory.

115. CAISO states that Commission staff's question regarding participation of a Distributed Energy Resource Aggregation appears to be based on the inaccurate premise that distribution-level and behind-the-meter resources can only participate in the CAISO markets as Distributed Energy Resource Aggregations. It explains that numerous distribution-level generators participate in the CAISO markets, and that the Distributed

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<sup>212</sup> Transmittal at 24 (citing CAISO Tariff, § 4.6.3.2 Appendix A (defining "Participating Generator")).

<sup>213</sup> *Id.* (citing Order No. 841, 162 FERC ¶ 61,127 at P 276 (noting that an RTO/ISO could allow offer and/or bid quantities smaller than 100 kW); *see also* CAISO Data Request Response at 16.

<sup>214</sup> *See* CAISO Tariff, § 4.17.5.1.

<sup>215</sup> CAISO Data Request Response at 19.

Energy Resource Aggregation model is not the only model available to them. According to CAISO, Section 25.2 of its Tariff states that CAISO will accept the interconnection of any generating unit to the distribution system so long as it has (1) complied with a Wholesale Distribution Access Tariff, Rule 21 of the California Public Utility Commission (CPUC) (for retail distribution interconnections), or any other applicable Local Regulatory Requirements; and (2) mitigated any adverse reliability impacts on the CAISO Controlled Grid (which rarely, if ever, are present).<sup>216</sup> CAISO adds that Section 4.6.3.2 of its Tariff expressly allows distribution-level generators to participate in its markets. It states that previously this provision required such generators to be over 500 kW, but it added an exemption for storage resources of 100 kW or more pursuant to Order No. 841. As such, CAISO explains, distribution-connected storage resources between 100 kW and 500 kW can participate as Participating Generators/Generating Units in the CAISO markets.

**c. Commission Determination**

116. We find that CAISO's proposed Tariff revisions require electric storage resources to have a minimum capacity of 100 kW to qualify as Participating Generators, in compliance with Order No. 841. However, Order No. 841 states that the 100 kW minimum size requirement applies to all minimum capacity requirements, minimum offer to sell requirements, and minimum bid to buy requirements, and that the 100 kW minimum size requirement is not dependent on the service being provided, the location and concentration of electric storage resources, or where the electric storage resources are interconnected.<sup>217</sup> The 500 kW minimum size requirements in Appendix K for Regulation, Spinning Reserves, and Non-spinning Reserves do not comply with the requirements of Order No. 841 because the minimum size exceeds 100 kW. We disagree with CAISO's assertion that the 500 kW minimum size requirements in Appendix K are outside the scope of Order No. 841 compliance. Order No. 841 provides that the minimum size requirement applies to all services an electric storage resource is capable of providing, including ancillary services. Accordingly, we direct CAISO to file, within 60 days of the date of issuance of this order, a further compliance filing that revises Appendix K to institute minimum size requirements for electric storage resources that do not exceed 100 kW.

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<sup>216</sup> *Id.* at 20.

<sup>217</sup> Order No. 841, 162 FERC ¶ 61,127 at P 276.

## 6. Energy Used to Charge Electric Storage Resources

### a. Price for Charging Energy

117. Order No. 841 adds section 35.28(g)(9)(ii) to the Commission's regulations to require that the sale of electric energy from the RTO/ISO markets to an electric storage resource that the resource then resells back to those markets be at the wholesale LMP.<sup>218</sup> This provision applies regardless of whether the electric storage resource is using the electric storage resource participation model or participates in RTO/ISO markets through other means, as long as the resource meets the definition of an electric storage resource set forth in Order No. 841. An electric storage resource's wholesale energy purchases should take place at the applicable nodal LMP, and not the zonal price.<sup>219</sup>

118. Order No. 841 finds that, when an electric storage resource is charging to resell energy at a later time, then its behavior is similar to other load-serving entities and applicable transmission charges should apply.<sup>220</sup> However, Order No. 841 finds that electric storage resources should not be charged transmission charges when they are dispatched by an RTO/ISO to provide a service (such as frequency regulation or a downward ramping service).<sup>221</sup> Order No. 841-A clarifies that the Commission's use of the phrase "applicable transmission charges" was intended to convey that an RTO/ISO may propose to apply its existing rate structure for transmission charges to an electric storage resource that is charging at wholesale but is not being dispatched by the RTO/ISO to provide a service in the RTO/ISO markets.<sup>222</sup> Order No. 841-A further clarifies that, on compliance, each RTO/ISO may propose that any electric storage resource that is charging for the purpose of participating in an RTO/ISO market but is not being dispatched by the RTO/ISO to provide a service should be assessed charges consistent with how the RTO/ISO assesses transmission charges to wholesale load under its existing rate structure. Order No. 841-A also states that if an RTO/ISO proposes not to apply

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<sup>218</sup> *Id.* P 294.

<sup>219</sup> *Id.* P 296.

<sup>220</sup> *Id.* P 297. To the extent that load resources located at a single node pay different transmission charges than load resources located across multiple nodes, each RTO/ISO must apply those transmission charges for single-node resources to electric storage resources that are located at a single pricing node, as long as they are not being dispatched to provide an ancillary service by an RTO/ISO.

<sup>221</sup> *Id.* P 298.

<sup>222</sup> Order No. 841-A, 167 FERC ¶ 61,154 at P 121.

transmission charges to an electric storage resource that is charging at wholesale but is not being dispatched by the RTO/ISO to provide a service, then the RTO/ISO must demonstrate that exempting such a resource from these charges is reasonable given its existing rate structure for transmission charges.

119. With respect to the meaning of a “service,” Order No. 841-A acknowledges that the participation of electric storage resources in RTO/ISO markets may convey a range of benefits, particularly under certain system conditions, but declines to grant clarification that charging pursuant to economic dispatch always qualifies as a service.<sup>223</sup> However, Order No. 841-A does clarify that services do not need to be limited to ancillary services and that they can include any service defined in an RTO/ISO tariff. Order No. 841-A explains that to the extent that an RTO/ISO seeks to create a new service that would involve charging pursuant to economic dispatch under certain system conditions, the RTO/ISO may propose such revisions to its tariff through a separate FPA section 205 filing.

120. Order No. 841 does not require that electric storage resources purchase all electric energy for future use from RTO/ISO markets, and does not address whether they can pay some other rate, such as a retail rate, for charging of co-located generation.<sup>224</sup> Regarding electric storage resources’ use of the distribution system, the Commission found that it may be appropriate, on a case-by-case basis, for distribution utilities to assess a wholesale distribution charge to an electric utility participating in the RTO/ISO markets.<sup>225</sup> Order No. 841-A clarifies that the Commission will consider any proposal to establish a rate for providing wholesale distribution service to an electric storage resource for its charging on a case-by-case basis (e.g., a facility-specific rate, a wholesale distribution service rate that applies to all or some subset of electric storage resources, a generally applicable wholesale distribution service tariff, or any other rate mechanism).<sup>226</sup>

121. Additionally, Order No. 841 finds that efficiency losses are charging energy and therefore not a component of station power load. Thus, charging energy lost to conversion inefficiencies should be settled at the LMP as long as those efficiency losses are an unavoidable component of the conversion, storage, and discharge process that is used to resell energy back to RTO/ISO markets and are not a component of what an

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<sup>223</sup> *Id.* P 120.

<sup>224</sup> Order No. 841, 162 FERC ¶ 61,127 at P 299.

<sup>225</sup> *Id.* P 301.

<sup>226</sup> Order No. 841-A, 167 FERC ¶ 61,154 at P 123.



RTO/ISO considers onsite load.<sup>227</sup> With respect to directly integrated and other ancillary loads, Order No. 841 provides RTOs/ISOs flexibility to determine whether they are a component of charging energy or a component of station power.

122. Order No. 841-A denies Pacific Gas and Electric's request to clarify that states have jurisdiction to determine how power flowing from the distribution grid into the electric storage resource located behind the customer meter is split between retail consumption and wholesale charging for later discharge into the wholesale markets. Order No. 841-A further reiterates that the Commission's finding regarding charging energy did not address payment of the retail rate for energy and therefore Order No. 841 does not authorize electric storage resources to bypass retail rates for its on-site electricity consumption, as Pacific Gas & Electric suggested.<sup>228</sup>

123. Order No. 841-A denies CAISO's request for clarification that electric storage resources participating as transmission resources, as described in the Commission's Policy Statement,<sup>229</sup> should not incur transmission charges for charging demand and stated that it is appropriate to address CAISO's concerns related to resources that might seek to recover their costs through both regulated transmission rates and the wholesale markets in the context of a specific proposal involving resources that provide multiple services and seek to recover their costs through both cost-based and market-based rates concurrently.

**i. CAISO's Filing**

124. CAISO states that its current Tariff is compliant with the requirement of Order No. 841 that the sale of electric energy from the RTO/ISO markets to an electric storage resource that the resource then resells back to those markets be at the wholesale nodal LMP.<sup>230</sup> Under its current NGR model, CAISO states it treats electric storage resource charging as "negative generation" rather than load or demand, and bills the resource at the wholesale nodal LMP.<sup>231</sup> In support, CAISO cites to the notice of proposed

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<sup>227</sup> Order No. 841, 162 FERC ¶ 61,127 at P 302.

<sup>228</sup> Order No. 841-A, 167 FERC ¶ 61,154 at P 119 (citing Order No. 841, 162 FERC ¶ 61,127 at PP 323-24).

<sup>229</sup> *Id.* P 122 (citing *Utilization of Electric Storage Resources for Multiple Services When Receiving Cost-Based Rate Recovery*, 158 FERC ¶ 61,051 (2017)).

<sup>230</sup> See Order No. 841, 162 FERC ¶ 61,127 at PP 294-96.

<sup>231</sup> Transmittal at 25.

rulemaking that led to Order No. 845, where the Commission stated that CAISO's NGR model could be a best practice in this regard.<sup>232</sup>

125. CAISO explains that under its current Tariff, resources dispatched to charge are not assessed transmission charges. CAISO asserts that this is compliant with Order No. 841's requirement that electric storage resources not pay transmission charges when they are dispatched to consume electricity to provide a service in the RTO/ISO markets (such as frequency regulation or a downward ramping service).<sup>233</sup> CAISO points to its classification of "negative generation" wherein no transmission access charges are assessed to NGRs because only load is charged transmission access charges.<sup>234</sup> CAISO argues that this blanket exemption from transmission access charges is consistent with Order No. 841 because an electric storage resource is providing a service to the grid when it charges in response to a market dispatch, whether for an immediate service like frequency regulation or for later discharge in order to reduce ramping needs. CAISO states further that charging during low-price hours to be able to discharge during high-price hours is the most important service that electric storage resources provide to its system.<sup>235</sup>

126. However, CAISO states that it has historically assessed transmission access charges to Pumped-Storage Hydro Units when they are in pump mode. In order to comply with Order No. 841, CAISO proposes to revise Section 26.1 of its Tariff to exempt electric storage resources from transmission access charges, including NGRs and Pumped-Storage Hydro Units, withdrawing energy for later resale to its markets or to provide ancillary services.<sup>236</sup>

## ii. Protests/Comments

127. Energy Storage Association asserts that instructing electric storage resources to charge for the purposes of assisting with system balancing and ramping issues provides a direct and measurable service to the market.<sup>237</sup> Energy Storage Association states that

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<sup>232</sup> *Id.* at 25-26 (citing *Reform of Generator Interconnection Procedures and Agreements*, 157 FERC ¶ 61,212, at PP 226-30 (2016)).

<sup>233</sup> *See* Order No. 841, 162 FERC ¶ 61,127 at P 298.

<sup>234</sup> Transmittal at 27.

<sup>235</sup> *Id.* at 26-27.

<sup>236</sup> *Id.* at 27.

<sup>237</sup> Energy Storage Association Comments at 2.

such actions distinguish the charging of electric storage from the consumption of energy by load or Load Serving Entities, which Energy Storage Association asserts cannot be instructed by RTO/ISOs to increase load for any reason. Energy Storage Association reasons that charging of storage under RTO/ISO dispatch instruction is clearly distinct from load and, therefore, should not be subject to transmission access charges. However, Energy Storage Association agrees that an electric storage resource that elects to charge for the purpose of reselling energy at a later time without a dispatch instruction by the RTO/ISO would rightfully be subject to transmission charges, consistent with the Commission's rationale in Order No. 841.<sup>238</sup> Therefore, Energy Storage Association requests that the Commission direct CAISO to clarify in its Tariff that the exemption from transmission access charges applies only to charging at CAISO instruction, consistent with the directive of Order No. 841 that exempts electric storage resource charging dispatched by the RTO/ISO to provide a service.<sup>239</sup>

128. PG&E states that CAISO's proposal to exempt charging energy sold to an energy storage device from being assessed transmission access charges, regardless of the use of that charging energy when it is discharged, is inconsistent with Order No. 841.<sup>240</sup> PG&E contends that CAISO's Tariff amendment improperly conflates the categories of charging for later resale and charging pursuant to dispatch to provide ancillary services, and impermissibly exempts all charging energy from transmission charges in direct conflict with Order No. 841.<sup>241</sup> PG&E states that it supports the Commission's policy in Order No. 841 of assessing transmission charges on charging energy used by energy storage resources except when those resources are dispatched in order to provide ancillary services and are providing an essential reliability service for which they may be transparently subsidized.<sup>242</sup> However, PG&E argues, when energy storage resources charge, they place demand on the electric grid and make use of transmission assets in a way that is indistinguishable from other demand. It states that, because an energy storage resource—when charging—utilizes the transmission grid in the same manner as any other load or source of demand, an electric storage resource should pay for the transmission service in a manner that is “at least roughly commensurate” with the benefits that the

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<sup>238</sup> *Id.* at 2-3 (citing Order No. 841, 162 FERC ¶ 61,127 at P 292).

<sup>239</sup> *Id.* at 4.

<sup>240</sup> PG&E Comments at 3.

<sup>241</sup> *Id.* at 4-5.

<sup>242</sup> *Id.* at 6.

resource receives.<sup>243</sup> PG&E asserts that energy storage resources should pay the same transmission access charges as other load resources unless the Commission adopts a subsidy for storage resources, as it did in Order No. 841 when it created a limited exemption from transmission charges when a storage resource is dispatched to provide ancillary services.<sup>244</sup>

129. PG&E further notes that assessing transmission charges on electric storage resources is consistent with the approach that CAISO has historically used with regard to PG&E's Helms Pumped-Storage Hydro Unit.<sup>245</sup> According to PG&E, CAISO itself acknowledges in its Tariff amendment that its new approach will require a change in the treatment of Helms and any other pumped-storage hydro units.<sup>246</sup> PG&E argues that CAISO's decision to take a different approach now, in contravention of the plain language in Order No. 841, suggests an arbitrary approach to decision-making.<sup>247</sup>

### iii. Answer

130. In response to PG&E's comments, CAISO states that Southwest Power Pool, Inc., ISO New England Inc. (ISO-NE), and New York Independent System Operator, Inc. proposed approaches similar to its own, which highlight the benefits of the service provided by electric storage resources dispatched to charge, including the need to mitigate reliability risks presented by a significant evening ramp and to reduce curtailments and negative pricing due to oversupply.<sup>248</sup>

131. Advanced Energy Economy and California Energy Storage Alliance<sup>249</sup> argue

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<sup>243</sup> *Id.* at 6-7 (citing *Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities*, 136 FERC ¶ 61,051, at P 10 (2011)).

<sup>244</sup> *Id.* at 7.

<sup>245</sup> *Id.*

<sup>246</sup> *Id.* (citing Transmittal at 27).

<sup>247</sup> PG&E Comments at 7.

<sup>248</sup> CAISO Answer at 6-7.

<sup>249</sup> Advanced Energy Economy's and California Energy Storage Alliance's initial comments include, *inter alia*, responses to PG&E's protests on this issue. While these comments are not styled as an answer, we include them here due to their responsive nature. We note that other portions of Advanced Energy Economy's and California

that PG&E mischaracterizes Order No. 841's determinations regarding the application of transmission charges, and that the Commission should accept CAISO's proposal to not apply transmission access charges to energy schedules for energy storage devices that involve charging energy that is later resold.<sup>250</sup> They assert that CAISO's proposed approach is consistent with Commission precedent regarding NGRs, and that any reading of Order No. 841 that finds CAISO's transmission access charge allocation as unreasonable could contravene existing rulings on the CAISO Tariff and raise barriers to energy storage resource participation.<sup>251</sup> Advanced Energy Economy argues that PG&E ignores CAISO's argument that assessing transmission access charges to charging energy would create a disincentive for energy storage resources to be dispatched to meet these critical reliability needs, and would impact market prices by forcing storage resources to include those costs when they submit bids.<sup>252</sup> California Energy Storage Alliance further argues that PG&E's comments inappropriately conflate energy storage charging for later wholesale resale as retail end loads. California Energy Storage Alliance explains that energy stored for later wholesale marketing is fungible and still reliant on the transmission system for delivery, unlike retail loads of a load-serving entity, which do pay transmission charges. However, California Energy Storage Alliance asserts, this fundamental difference is not reflected in PG&E's logic.<sup>253</sup>

#### iv. Data Request Response

132. The Data Request asked CAISO to explain and provide citations to the relevant Tariff language demonstrating that: (1) electric storage resources are charged the LMP for purchases of electric energy for later resale back to the market; (2) the LMP used for settlement of electric storage resource purchases is a nodal LMP and not a zonal LMP; and (3) electric storage resources' charging is accounted for as negative generation. In response, CAISO explains that storage resources constitute Generating Units under the CAISO Tariff. Section 11.2.1.1 of its Tariff requires that, for each settlement period for which CAISO clears energy transactions in the Integrated Forward Market, CAISO shall

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Energy Storage Alliance's comments are not responsive to other comments and are therefore discussed in the relevant "Protests/Comments" sections of this order.

<sup>250</sup> Advanced Energy Economy Comments at 8, California Energy Storage Alliance Comments at 6, 8-9.

<sup>251</sup> Advanced Energy Economy Comments at 9; California Energy Storage Alliance Comments at 8.

<sup>252</sup> Advanced Energy Economy Comments at 8.

<sup>253</sup> California Energy Storage Alliance Comments at 8.

pay the relevant Scheduling Coordinator for the MWh quantity of Supply of Energy from all Generating Units, Participating Loads, Proxy Demand Resources, Reliability Demand Response Resources, Distributed Energy Resource Aggregations, and System Resources in an amount equal to the Integrated Forward Market LMP at the applicable PNode or Aggregated PNode multiplied by the MWh quantity specified in the Day-Ahead Schedule for Supply (which consists of the Day-Ahead Scheduled Energy).<sup>254</sup>

133. CAISO also states that Section 11.5.1 of its Tariff provides that real-time market Instructed Imbalance Energy awards (for all resources) are settled by debiting or crediting the resource's Integrated Forward Market award at the applicable real-time LMP (based on the same PNode).<sup>255</sup>

134. Finally, CAISO explains that, for storage resources using the NGR model, Section 11.6.5 of the CAISO Tariff provides that settlements for Energy generated or consumed by an NGR or a resource using NGR Generic Modeling functionality will reflect the applicable PNode or Aggregated PNode.<sup>256</sup> For such resources comprising a single PNode, CAISO states that settlement for Energy transactions will reflect the LMP at that PNode. For such resources comprising multiple PNodes, settlement for Energy transactions will reflect the weighted average LMP of the PNode(s) based on the applicable Generation Distribution Factors submitted through the resources' Bids or as registered in the Master File.<sup>257</sup> Consistent with the provisions of Tariff Section 11.5.2, CAISO asserts that it will impose an Uninstructed Imbalance Energy Settlement Amount on a resource's Scheduling Coordinator if the resource does not follow a Dispatch Instruction.<sup>258</sup> When operating in a negative range between PMin and 0, CAISO will not consider an NGR or a resource using NGR Generic Modeling functionality as Measured Demand so long as the resource can generate Energy.<sup>259</sup> CAISO states that, as such, it

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<sup>254</sup> CAISO Data Request Response at 21.

<sup>255</sup> *Id.*

<sup>256</sup> *Id.*

<sup>257</sup> *Id.* at 21-22.

<sup>258</sup> *Id.* at 22. The Uninstructed Imbalance Energy Settlement Amount is the payment due a scheduling coordinator for positive Uninstructed Imbalance Energy or the charge assessed on a scheduling coordinator for negative Uninstructed Imbalance Energy. CAISO Tariff, Appendix A.

<sup>259</sup> CAISO Data Request Response at 22.

settles charging energy for NGRs as negative Energy rather than Demand, and as explained above, Energy is settled at the LMP at the resource's PNode.

135. CAISO also states that, as discussed above, Pumped-Storage Hydro Units' pumping load constitutes demand from Participating Load under the CAISO Tariff.<sup>260</sup> Section 11.2.1.3 of the CAISO Tariff states that Participating Loads' demand will be settled by LMP at that PNode. CAISO explains that any real-time award would then be settled pursuant to Section 11.5.1 of the Tariff.

v. **Commission Determination**

136. We find that CAISO's existing Tariff complies with the requirements of Order No. 841 regarding the price for charging energy. CAISO's Tariff provides that it uses the wholesale nodal LMP to price sales of energy to electric storage resources.<sup>261</sup> Further, CAISO's Tariff treats charging energy for NGRs as "negative generation" rather than load or demand. Pursuant to CAISO's Tariff, energy, whether positive or negative generation, is settled at the resource's nodal LMP.<sup>262</sup> Further, pumped-storage hydro units' pumping load constitutes demand from participating load, which CAISO's Tariff provides will be settled at the unit's nodal LMP.<sup>263</sup> Consequently, sales of electric energy from the CAISO markets to an electric storage resource that the resource then resells back to those markets are done so at the wholesale LMP. Further, an electric storage resource's wholesale energy purchases in CAISO take place at the applicable nodal LMP, and not the zonal price. Finally, efficiency losses, because they simply comprise the difference between negative generation and positive generation, are also settled at the LMP in CAISO.

137. We also find that CAISO's proposal complies with Order No. 841's requirements regarding the application of transmission charges to electric storage resources. Order No. 841-A clarifies that an RTO/ISO may propose to apply its existing rate structure for transmission charges to an electric storage resource that is charging at wholesale but is not being dispatched by the RTO/ISO to provide a service in the RTO/ISO markets.<sup>264</sup> CAISO's existing rate structure accounts for NGR charging as

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<sup>260</sup> *Id.*

<sup>261</sup> CAISO Tariff, § 27.1, Appendix G.

<sup>262</sup> CAISO Tariff, §§ 11.2.1.1, 11.5.1, 11.6.5.

<sup>263</sup> CAISO Tariff, § 11.2.1.3.

<sup>264</sup> Order No. 841-A, 167 FERC ¶ 61,154 at P 121.

negative generation.<sup>265</sup> As a result, CAISO does not assess transmission access charges, which only apply to load, to NGR charging, regardless of the reason for the NGR's negative generation. CAISO's proposed Tariff revisions further exempt from transmission access charges the pumping load of Pumped-Storage Hydro Units withdrawing energy for later resale or to provide ancillary services.

138. We find that CAISO has demonstrated that its proposal to exempt all electric storage resources from transmission access charges when charging is consistent with its existing rate structure, and thus is consistent with requirements of Order No. 841 as clarified in Order No. 841-A. Specifically, we find that CAISO's Tariff revision<sup>266</sup> to exempt Pumped-Storage Hydro Units from being assessed transmission access charges when charging is consistent with how CAISO currently treats other electric storage resources using the NGR participation model, and accept this revision as compliant with Order No. 841. For this reason, we disagree with Energy Storage Association's and PG&E's contentions that CAISO's proposal not to assess transmission access charges to electric storage resources charging for later resale without a dispatch instruction is inconsistent with Order No. 841, or that acceptance of the proposal would be arbitrary.<sup>267</sup> We agree with Advanced Energy Economy and California Energy Storage Alliance that CAISO's proposal to revise its Tariff to treat Pumped-Storage Hydro Units consistently with NGRs is consistent with Commission precedent regarding NGRs in CAISO, and with the finding in Order No. 841-A.

139. With regard to PG&E's comments concerning CAISO's request for clarification and rehearing of Order No. 841 regarding the application of transmission access charges to wholesale charging energy purchased for resale, we note that the Commission decided this issue in Order No. 841-A,<sup>268</sup> and therefore we will not address it further in this order.

**b. Metering and Accounting Practices for Charging Energy**

140. To help implement the new requirement in section 35.28(g)(9)(ii) of the Commission's regulations,<sup>269</sup> Order No. 841 requires each RTO/ISO to implement

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<sup>265</sup> See *Cal. Indep. Sys. Operator Corp.*, 132 FERC ¶ 61,211 (2010) (conditionally accepting CAISO's NGR framework, which treats NGR demand as negative generation); CAISO Tariff, § 11.6.5.

<sup>266</sup> CAISO, CAISO eTariff, 26.1 Access Charges (4.0.0).

<sup>267</sup> Order No. 841-A, 167 FERC ¶ 61,154 at P 121.

<sup>268</sup> See *id.* PP 120-22.

<sup>269</sup> Order No. 841, 162 FERC ¶ 61,127 at P 294.



metering and accounting practices as needed to address the complexities of implementing the requirement that the sale of electric energy from RTO/ISO markets to an electric storage resource that the resource then resells back to those markets be at the wholesale LMP.<sup>270</sup> Order No. 841 requires each RTO/ISO to directly meter electric storage resources,<sup>271</sup> but offers flexibility for each RTO/ISO to propose alternative approaches that may not entail direct metering but nonetheless address the complexities of implementing the requirement that the sale of electric energy from RTO/ISO markets to an electric storage resource that the resource then resells back to those markets be at the wholesale LMP.<sup>272</sup> Metering and accounting rules may need to differ based on whether the resource is located on the transmission system, the distribution system, or behind the meter.<sup>273</sup> The Commission rejected the suggestion that electric storage resources must choose to participate in either wholesale or retail markets due to the complexity of the metering and accounting practices.<sup>274</sup> The Commission found that it is possible for electric storage resources that are selling retail services also to be technically capable of providing wholesale services, and it would adversely affect competition in the RTO/ISO markets if these technically capable resources were excluded from participation. Some commenters raised a concern that not requiring electric storage resources to choose to participate exclusively in either wholesale or retail markets will allow resources to evade the distribution utility's retail service, or to simultaneously buy electricity at the retail rate and sell it at the wholesale LMP. Order No. 841-A states that each RTO/ISO can address these issues by developing its metering and accounting requirements in cooperation with the distribution utilities and relevant electric retail regulatory authorities in its footprint, as the Commission recognized in Order No. 841.<sup>275</sup> Order No. 841-A also states that, when the Commission found that the sale of electric energy from the RTO/ISO markets to an electric storage resource which the resource then resells back to those markets must be at the wholesale LMP, it was referring to the sale of energy from the grid that is used

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<sup>270</sup> *Id.* P 322.

<sup>271</sup> Order No. 841-A clarifies that the RTO/ISO itself does not need to be the entity that directly meters electric storage resources. Order No. 841-A, 167 FERC ¶ 61,154 at P 138.

<sup>272</sup> Order No. 841, 162 FERC ¶ 61,127 at P 322.

<sup>273</sup> *Id.* P 324.

<sup>274</sup> *Id.* P 325.

<sup>275</sup> Order No. 841-A, 167 FERC ¶ 61,154 at P 142 (citing Order No. 841, 162 FERC ¶ 61,127 at P 324).

to charge electric storage resources for later resale into the energy or ancillary service markets.<sup>276</sup>

141. Order No. 841 also requires RTOs/ISOs to prevent electric storage resources from paying twice for the same charging energy (i.e., they should not have to pay both the wholesale and retail price for the same charging energy).<sup>277</sup> To the extent that the host distribution utility is unable—due to a lack of the necessary metering infrastructure and accounting practices—or unwilling to net out any energy purchases associated with an electric storage resource’s wholesale charging activities from the host customer’s retail bill, the Commission found that RTOs/ISOs would be prevented from charging that resource wholesale rates for the charging energy for which it is already paying retail rates.<sup>278</sup> Order No. 841-A clarifies that an RTO/ISO could require verification from the host distribution utility that it is unable or unwilling to net wholesale demand from retail settlement before the RTO/ISO ceases to settle an electric storage resource’s wholesale demand at the wholesale LMP.<sup>279</sup> Order No. 841-A clarifies further that the Commission would consider on compliance each RTO’s/ISO’s proposal to identify whether a distribution utility is unable or unwilling to net out from a host customer’s retail bill the wholesale energy purchases associated with charging an electric storage resource that is participating in the RTO/ISO market. However, Order No. 841-A denies CAISO’s request for clarification that when an RTO/ISO cannot verify the host distribution utility’s inability or unwillingness to net out wholesale charging energy, the RTO/ISO can require the electric storage resource to use a participation model designed for retail customer participation. Order No. 841-A states that, while Order No. 841 provides flexibility with respect to how each RTO/ISO implements the requirement to prevent electric storage resources from paying twice for the same charging energy, it would be

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<sup>276</sup> *Id.* (citing Order No. 841, 162 FERC ¶ 61,127 at P 294).

<sup>277</sup> Order No. 841, 162 FERC ¶ 61,127 at P 326.

<sup>278</sup> *Id.* P 326. Paragraph 326 of the preamble of Order No. 841 uses the term “resources using the participation model for electric storage resources” with respect to the requirements set forth therein (e.g., “we require each RTO/ISO to prevent resources using the participation model for electric storage resources from paying twice for the same charging energy”). However, section 35.28(g)(9)(ii) of the Commission’s regulations (as modified by Order No. 841), which these requirements are intended to implement, specifies that it applies to electric storage resources. Thus, the Commission used the incorrect term in paragraph 326 of Order No. 841. In this order, we use the correct term throughout.

<sup>279</sup> Order No. 841-A, 167 FERC ¶ 61,154 at P 138.

inappropriate for an RTO/ISO to meet that requirement by requiring an electric storage resource to use a participation model designed for retail customer participation.<sup>280</sup>

**i. CAISO's Filing**

142. In support of its contention that it complies with these requirements, CAISO notes that Order No. 841 cites CAISO practices demonstrating how it has achieved market rules that accurately account for wholesale and retail activities by using direct metering.<sup>281</sup> CAISO states that it obtains settlement quality meter data from two types of market participants: CAISO Metered Entities, and Scheduling Coordinator Metered Entities. For market participants that are CAISO Metered Entities, CAISO directly polls the meters and performs the validation, estimation, and editing procedures to produce settlement quality meter data. For market participants that are Scheduling Coordinator Metered Entities, the scheduling coordinator performs these functions and submits the resulting settlement quality meter data to CAISO. CAISO states that—based on previous Commission approval of proposed tariff changes—it allows generators (including storage resources) and other resources to be either a CAISO Metered Entity or a Scheduling Coordinator Metered Entity.<sup>282</sup>

143. CAISO explains that it can be particularly useful for storage resources, regardless of participation model, to be Scheduling Coordinator Metered Entities. CAISO states that electric storage resources face much more complex accounting issues than traditional generators, including distinguishing between charging energy and station power, and alternating among providing wholesale, distribution, and retail services. CAISO contends that a scheduling coordinator can easily work with CAISO and the local distribution company to ensure that a storage resource complies with all applicable metering standards, and the scheduling coordinator can meter and account for which capacity, energy, and demand is settled by whom and for how much.<sup>283</sup>

144. With regard to the requirement that RTOs/ISOs prevent electric storage resources from paying wholesale and retail rates for the same charging energy that the

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<sup>280</sup> *Id.* P 139 (citing Order No. 841, 162 FERC ¶ 61,127 at P 326).

<sup>281</sup> Transmittal at 28 (citing Order No. 841, 162 FERC ¶ 61,127 at P 323).

<sup>282</sup> *Id.* (citing CAISO Tariff, Appendix A (defining “CAISO Metered Entity” and “Scheduling Coordinator Metered Entity”); *California Independent System Operator Corp.*, Letter Order Approving Tariff Revisions, Docket No. ER17-949-000 (Mar. 31, 2017)).

<sup>283</sup> *Id.* at 28-29.

resources resell back into RTO/ISO markets, CAISO states that the majority of customer- and distribution-sited electric storage resources participate under CAISO's Demand Response model using the metering generator output methodology specifically designed for electric storage resources. CAISO explains that this methodology allows these electric storage resources to establish independent baselines for their typical load curtailment and typical output and then to be settled on performance in response to dispatch that exceeds these baselines.<sup>284</sup> CAISO further explains that, because these resources use a sub-meter in addition to their retail meter, CAISO can independently account for all responses to dispatch—whether in the form of traditional load curtailment, energy production from the electric storage resource, or both—to account for the resource's total performance. CAISO states that, consistent with Order No. 841, it does not charge such resources for their charging because the distribution utility has already done so at a retail rate. It further states that it only awards these resources for their response to wholesale dispatch. CAISO requests that the Commission find that its proposal complies with the requirements of Order No. 841.

## ii. Protests/Comments

145. Several commenters assert that CAISO has not proposed any participation model that would allow electric storage resources located on the distribution grid or behind-the-meter to inject energy onto the grid, while eliminating the potential for duplicative wholesale and retail billing.<sup>285</sup> Tesla adds that CAISO's participation model does not allow behind-the-meter electric storage resources to seamlessly transition between serving onsite load and injecting energy onto the grid.<sup>286</sup> Tesla contends that, because there is no difference in technology between electric storage resources located at any point on the grid, there can be no justification for treating these resources differently. Tesla points to ISO-NE's Common Dispatch Model as a best practice for allowing behind-the-meter electric storage resources to provide their full capacity for wholesale electric service.<sup>287</sup> According to Tesla, CAISO's Proxy Demand Response model does not allow net-export of energy to the CAISO grid, and so limits the participation of

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<sup>284</sup> *Id.* at 29 (citing CAISO Tariff, §§ 4.13.4, 11.6; *Cal. Indep. Sys. Operator Corp.*, 156 FERC ¶ 61,110).

<sup>285</sup> Advanced Energy Economy Comments at 5; California Energy Storage Alliance Comments at 9-10; Tesla Comments at 18, 20.

<sup>286</sup> Tesla Comments at 20, 24.

<sup>287</sup> *Id.* at 18-19.

electric storage resources and does not accommodate their physical attributes.<sup>288</sup> California Energy Storage Alliance states that CAISO's Proxy Demand Response model limits distributed energy resources by not allowing resources to sell Regulation service.<sup>289</sup> Thus, in order to sell Regulation, distributed energy resources must avail themselves of the NGR model.

146. Commenters contend that under CAISO's NGR model, electric storage resources could potentially pay for charging energy both at wholesale and retail rates given that CAISO treats charging energy as negative generation.<sup>290</sup> Advanced Energy Economy holds that this in effect requires electric storage resources located behind the meter to participate in CAISO's markets through the demand response participation model, a situation which Advanced Energy Economy asserts that the Commission found unjust and unreasonable and sought to remedy in Order No. 841.<sup>291</sup> Advanced Energy Economy further argues that failing to integrate electric storage resources into the wholesale markets denies customers the significant cost benefits that can come from greater utilization of these resources for multiple services at wholesale and retail markets.<sup>292</sup>

147. In response to CAISO's discussion of electric storage resources participating in its markets as demand response, Calpine states that it is concerned about treating electric storage resources as demand response, arguing that the combination of wholesale compensation at the LMP and avoided retail payments may lead to excessive total compensation without appropriate netting of wholesale and retail settlements.<sup>293</sup> Calpine urges the Commission to ensure that CAISO's methodology safeguards against over-recovery by behind-the-meter electric storage resources.

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<sup>288</sup> *Id.* at 20.

<sup>289</sup> California Energy Storage Alliance Comments at 10.

<sup>290</sup> Advanced Energy Economy Comments at 6; California Energy Storage Alliance Comments at 9; Tesla Comments at 20.

<sup>291</sup> Advanced Energy Economy Comments at 6 (citing Order No. 841, 162 FERC ¶ 61,127 at PP 11, 32-33, 150).

<sup>292</sup> *Id.* at 5 (citing Advanced Energy Economy, Comments, Docket No. RM16-23-000, at 8-14 (filed Feb. 13, 2017); Advanced Energy Economy, Comments, Docket No. RM18-9-000 (filed June 26, 2018)).

<sup>293</sup> Calpine Comments at 5.

iii. Answer

148. CAISO contends that the arguments of Tesla, California Energy Storage Alliance, and Advanced Energy Economy concerning participation of behind-the-meter electric storage resources suffer from false premises. Specifically, CAISO states that commenters seek to solve a problem that generally does not exist in California.<sup>294</sup> CAISO notes that in 2017, the CPUC directed its jurisdictional utilities to modify their distribution tariffs to conform to the CPUC's determination that all energy drawn from the grid to charge electric storage resources for later resale should be subject to a wholesale tariff.<sup>295</sup> It asserts that, as a result of this CPUC ruling, utility distribution companies serving a significant percentage of the state's load cannot refuse and cannot be unable to extract behind-the-meter charging from retail settlement.<sup>296</sup> CAISO states that a behind-the-meter electric storage resource participating in its markets is therefore settled to charge at wholesale rates only.

149. CAISO further contends that commenters overstate the barriers that behind-the-meter resources face to participate in the CAISO markets using the NGR model, or any model. CAISO states that it does not discriminate based on the location of interconnection, and, to the extent any resource meets the minimum technical criteria to participate in the CAISO energy and ancillary services markets, it can participate.<sup>297</sup> CAISO notes that these criteria do not include a requirement to interconnect to the transmission grid, and that distribution-connected generators may participate as individual resources or as distributed energy resource aggregations.<sup>298</sup>

150. According to CAISO, most behind-the-meter resources elect not to participate in the CAISO markets using the NGR model because it is more economic for them to participate in net energy metering programs that assign retail value to their exports to the grid. Moreover, CAISO explains, behind-the-meter electric storage resources may not in all cases meet CAISO's 100 kW minimum capacity requirement, and may elect to

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<sup>294</sup> CAISO Answer at 2.

<sup>295</sup> *Id.* at 2-3 (citing *Order Instituting Rulemaking to consider policy and implementation refinements to the Energy Storage Procurement Framework and Design Program*, "Decision on Track 2 Energy Storage Issues," at 37, CPUC Docket No. R.15-03-011 (May 8, 2017)).

<sup>296</sup> *Id.* at 3.

<sup>297</sup> *Id.* at 3-4.

<sup>298</sup> *Id.* at 4.

aggregate into demand response resources rather than distributed energy resource aggregations for reasons that are unrelated to the CAISO Tariff.<sup>299</sup>

151. In addition, CAISO perceives commenters to be asking the Commission to require that CAISO create a customized NGR model in response to Order No. 841 that pays resources to discharge, but not to charge.<sup>300</sup> CAISO states that it has met the requirement of Order No. 841 to prevent electric storage resources from paying twice for the same charging energy through the use of the metering generator output methodology, which CAISO states that it developed with the storage community specifically for behind-the-meter electric storage resource participation. CAISO asserts that this methodology and the NGR model provide electric storage resources with options based on how their utility distribution company accounts for charging—including retail metering, accounting, and settlement.

152. CAISO contends that the NGR model is a wholesale market participation model that allows CAISO to optimize, dispatch, meter, and settle electric storage devices. CAISO asserts that the metering generator output methodology—available to behind-the-meter electric storage resources participating in the Demand Response model—complies with Order No. 841 because it is purposely designed for wholesale participation and enabling retail metering, accounting, and settlement. It states that it provides behind-the-meter resources the ability to elect which of these two models is optimal for them.<sup>301</sup>

153. In response to Calpine’s argument that treating electric storage resources as demand response could lead to over-recovery by behind-the-meter electric storage resources, CAISO asserts that Order No. 841 clearly provides no prohibition on continued participation in demand response programs. CAISO states that Calpine’s comments on this issue are not applicable to compliance with Order No. 841.<sup>302</sup>

154. NRECA raises concerns with Tesla’s comments on behind-the-meter electric storage resources and notes that Order No. 841 provides that an electric storage resource must be both physically and contractually able to inject energy onto the wholesale grid before it may participate in wholesale markets.<sup>303</sup> NRECA also states that Order No. 841 does not use the phrase “seamlessly transitioning” or authorize behind-the-meter electric

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<sup>299</sup> *Id.* at 4-5.

<sup>300</sup> *Id.* at 5.

<sup>301</sup> *Id.* at 5-6.

<sup>302</sup> *Id.* at 9-10.

<sup>303</sup> NRECA Answer at 4.

storage resources to operate in contravention of state or local law.<sup>304</sup> It argues that nothing in Order No. 841 disturbs state and local regulation of retail metering, retail net metering, or storage use on local distribution systems, including behind-the-meter storage.<sup>305</sup> Accordingly, NRECA argues that these compliance proceedings should be limited to RTO/ISO market rules and should not become a vehicle for unbundling retail services, asserting jurisdiction over retail net metering, or limiting state and local regulation of distribution and retail storage uses. It asserts that such matters are beyond the scope of this proceeding. NRECA also argues that Tesla's comments regarding behind-the-meter storage are unsupported and beyond the scope of this proceeding.<sup>306</sup>

#### iv. Data Request Response

155. In its Data Request, Commission staff asked CAISO to explain and provide citations to the relevant Tariff language demonstrating whether the NGR and Pumped-Storage Hydro Unit participation models prevent electric storage resources from paying both the wholesale and retail rates for the same charging energy. In response, CAISO explains that all electric storage resources participating under the NGR or Pumped-Storage Hydro Unit models are metered directly by CAISO or their scheduling coordinator, depending on whether they elect to be a CAISO Metered Entity or a Scheduling Coordinator Metered Entity.<sup>307</sup> CAISO states that CAISO Metered Entity rules are set forth in Section 10.2 of its Tariff, and Scheduling Coordinator Metered Entity rules are set forth in Section 10 of its Tariff.<sup>308</sup>

156. CAISO also explains that, because of its role as a wholesale electricity market operator and the Commission's jurisdictional limits regarding retail energy, it cannot direct utility distribution companies to implement retail billing practices.<sup>309</sup> CAISO states that its Tariff can only require that CAISO Metered Entities and Scheduling Coordinator Metered Entities meter energy output for resale and load that may be settled

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<sup>304</sup> *Id.* at 5.

<sup>305</sup> *Id.* at 6.

<sup>306</sup> *Id.* (citing Tesla Comments at 19).

<sup>307</sup> CAISO Data Request Response at 23 (citing CAISO Tariff, Appendix A (defining "CAISO Metered Entity" and "Scheduling Coordinator Metered Entity")).

<sup>308</sup> *Id.* (citing CAISO Tariff, §§ 10, 10.2).

<sup>309</sup> *Id.* (citing *Duke Energy Moss Landing v. Cal. Indep. Sys. Operator Corp.*, 132 FERC ¶ 61,183 (2010), *on remand from S. Cal. Edison Co. v. FERC*, 603 F.3d 996 (D.C. Cir. 2010)).



at wholesale, including charging energy and station power. CAISO states that Section 10.1.3.2 of its Tariff provides that CAISO Metered Entities and Scheduling Coordinator Metered Entities “may not net values for output and Load that is not Station Power.”<sup>310</sup> CAISO states that this prohibits retail demand from being included in wholesale Energy values for all resources, including electric storage resources.<sup>311</sup> CAISO explains that its Tariff prevents any supply resource from including retail load in its wholesale meters.<sup>312</sup>

157. CAISO explains that it worked carefully with the storage community and the CPUC to ensure that retail and wholesale metering did not result in electric storage resources being over- or under-billed. Accordingly, CAISO’s Tariff includes provisions allowing CAISO Metered Entities and Scheduling Coordinator Metered Entities to net station power to the extent allowed by their local regulatory authority.<sup>313</sup> CAISO asserts that it has worked closely with the CPUC to ensure that both CAISO and the CPUC have consistent rules for the metering and settlement of electric storage resources. CAISO states that, as a result, the CPUC has prohibited its jurisdictional retail entities from assessing retail charges on charging energy, pumping energy, and station power that is less than a response to dispatch (positive or negative).<sup>314</sup>

**v. Comments on Data Request Response**

158. California Energy Storage Association contends that CAISO’s response to the Data Request does not adequately describe an accounting methodology that would allow the distribution utility or the metering entities to separate wholesale and retail charging energy for electric storage resources. California Energy Storage Association further asserts that direct metering of electric storage resources does not fully address this issue. Rather, California Energy Storage Association argues that CAISO must work directly with the local regulatory authority or the retail utility to establish an accounting methodology that allows all parties to properly settle charging energy transactions.

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<sup>310</sup> *Id.* (citing CAISO Tariff, § 10.1.3.2).

<sup>311</sup> *Id.*

<sup>312</sup> *Id.* at 24.

<sup>313</sup> *Id.* (citing CAISO Tariff, § 10.1.3.1).

<sup>314</sup> *Id.* at 24-25 (citing *Order Instituting Rulemaking to consider policy and implementation refinements to the Energy Storage Procurement Framework and Design Program*, “Decision on Track 2 Energy Storage Issues,” CPUC Docket No. R. 15-03-011 (May 8, 2017), <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M185/K070/185070054.PDF>).

California Energy Storage Association recommends that the Commission find that CAISO's proposal is not compliant with the requirements of Order No. 841, and that CAISO be directed to address double payment through accounting methodologies.<sup>315</sup>

vi. **Commission Determination**

159. We find that CAISO partially complies with the requirements of Order No. 841 regarding metering and accounting practices. Specifically, CAISO complies with the requirement that electric storage resources be directly metered by describing how electric storage resources may elect to be directly metered by either CAISO or their scheduling coordinator.<sup>316</sup> However, we find it unclear whether CAISO's metering and accounting practices allow for simultaneous participation in both retail and wholesale markets. We agree with California Energy Storage Association that direct metering of electric storage resources does not fully address this issue. In addition, we find that CAISO does not fully comply with the Order No. 841 requirement that RTOs/ISOs prevent electric storage resources from paying both wholesale and retail rates for the same charging energy.

160. Decisions regarding whether an item should be placed in a tariff or in a business practice manual are guided by the Commission's rule of reason policy, under which provisions that "significantly affect rates, terms, and conditions" of service, are readily susceptible of specification, and are not generally understood in a contractual agreement must be included in a tariff, while items better classified as implementation details may be included only in the business practice manual.<sup>317</sup> The unique physical and operational characteristics of electric storage resources require unique metering and accounting practices to ensure that these resources pay the LMP for charging energy and do not double pay, as required by Order No. 841. We find that these practices significantly affect rates, terms, and conditions and should be included in the Tariff.<sup>318</sup> Further, we

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<sup>315</sup> California Energy Storage Association Answer at 4-5.

<sup>316</sup> See CAISO Tariff, §§ 10, 10.2, Appendix A (defining "CAISO Metered Entity" and "Scheduling Coordinator Metered Entity").

<sup>317</sup> *Energy Storage Ass'n v. PJM Interconnection, L.L.C.*, 162 FERC ¶ 61,296, at P 103 (2018); see also *City of Cleveland, Ohio v. FERC*, 773 F.2d 1368, 1376 (1985) (finding that utilities must file "only those practices that affect rates and service significantly, that are reasonably susceptible of specification, and that are not so generally understood in any contractual arrangement as to render recitation superfluous").

<sup>318</sup> *Energy Storage Ass'n v. PJM Interconnection, L.L.C.*, 162 FERC ¶ 61,296 at P 103; *City of Cleveland, Ohio v. FERC*, 773 F.2d at 1376.

find that the Tariff should reference the specific documents that contain the implementation details for CAISO's metering methodology and accounting practices for electric storage resources so that market participants may plan and manage their participation accordingly.

161. CAISO asserts that a scheduling coordinator can easily work with it and the local distribution company to ensure that an electric storage resource complies with all applicable metering standards, and the scheduling coordinator can meter and account for which capacity, energy, and demand is settled by whom and for how much.<sup>319</sup> However, CAISO only points to its metering generating output methodology in its Tariff, which is only available to electric storage resources providing Demand Response. Therefore, we direct CAISO to file, within 60 days of the date of issuance of this order, revisions to its Tariff to include a basic description of CAISO's metering methodology and accounting practices specific to electric storage resources, as well as references to the specific documents in CAISO's business practice manuals or other documents that contain the implementation details.

162. Additionally, we find that it is unclear whether CAISO's metering and accounting practices will allow electric storage resources to participate in CAISO markets if they also participate in retail markets. In Order No. 841, the Commission stated that it was not persuaded by commenters' suggestion that electric storage resources must choose to participate in either wholesale or retail markets due to the complexity of the metering and accounting practices that would be necessary to distinguish between retail and wholesale activity.<sup>320</sup> The Commission found that electric storage resources that provide retail services may also be technically capable of providing wholesale services, and that excluding these resources from wholesale market participation would adversely affect competition in RTO/ISO markets.<sup>321</sup> On rehearing, the Commission stated that, while it agreed with petitioners that appropriate metering and accounting practices will be necessary to distinguish between wholesale and retail activity, it disagreed that these practices would be prohibitively complex or costly to develop and implement given the flexibility provided to the RTOs/ISOs to propose reasonable approaches.<sup>322</sup> Accordingly, we direct CAISO to file, within 60 days of the date of

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<sup>319</sup> Transmittal at 28-29.

<sup>320</sup> Order No. 841, 162 FERC ¶ 61,127 at P 325; *see also* Order No. 841-A, 167 FERC ¶ 61,154 at P 140 (denying rehearing of the decision to decline to require electric storage resources to choose to participate exclusively in either wholesale or retail markets).

<sup>321</sup> Order No. 841, 162 FERC ¶ 61,127 at P 325.

<sup>322</sup> Order No. 841-A, 167 FERC ¶ 61,154 at P 140.

issuance of this order, a further compliance filing to explain how the metering and accounting practices in its Tariff allow for electric storage resources to participate in both wholesale and retail markets, or alternatively, revise its Tariff to allow electric storage resources that provide retail services to also participate in CAISO's markets, as required by Order No. 841.

163. We also find that CAISO does not fully comply with the requirement that it prevent electric storage resources from paying both wholesale and retail rates for the same charging energy. In other words, we find that CAISO has not proposed a participation model for electric storage resources that fully eliminates the potential for duplicative retail and wholesale billing for charging by electric storage resources that later resell that charging energy back to the wholesale markets. In its Data Request Response, CAISO cites existing Tariff provisions that prohibit CAISO Metered Entities and Scheduling Coordinator Metered Entities from including retail load in wholesale meters.<sup>323</sup> In addition, CAISO points to a CPUC decision that, CAISO asserts, prohibits utility distribution companies subject to CPUC jurisdiction “from assessing retail charges on charging energy, pumping energy, and station power that is less than a response to dispatch (positive or negative).”<sup>324</sup>

164. However, we agree with California Energy Storage Association that CAISO's Tariff does not prevent it from charging an electric storage resource wholesale rates for the charging energy for which it is already paying retail rates, as required by Order No. 841.<sup>325</sup> Therefore, we direct CAISO to file, within 60 days of the date of issuance of this order, a further compliance filing that revises CAISO's Tariff to explicitly provide that, if the host utility is unable or unwilling to net out any energy purchases associated with an electric storage resource's wholesale charging activities from the host customer's retail bill, then CAISO would be prevented from charging that resource wholesale rates for the charging energy for which it is already paying retail rates. With regard to CAISO's comment that it cannot direct utility distribution companies to implement retail billing practices, we note that we are not requiring it to do so. Rather, we are requiring CAISO on compliance to modify its Tariff so that it does not charge an electric storage resource

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<sup>323</sup> See CAISO Tariff, §10.1.3.2.

<sup>324</sup> CAISO Data Request Response at 25 (citing *Order Instituting Rulemaking to consider policy and implementation refinements to the Energy Storage Procurement Framework and Design Program*, “Decision on Track 2 Energy Storage Issues,” CPUC Docket No. R.15-03-011 (May 8, 2017)).

<sup>325</sup> Order No. 841, 162 FERC ¶ 61,127 at P 326.

wholesale rates for charging energy for which the electric storage resource is already paying retail rates.

165. As to concerns regarding the ability of electric storage resources located on the distribution system or behind the meter to participate in CAISO's markets, we reiterate that CAISO's definition of NGR is inclusive of resources located on a distribution system or behind the meter.<sup>326</sup> As described above, we find that CAISO has demonstrated that all electric storage resources using the Pumped-Storage Hydro Unit and NGR models, including those located on the distribution system or behind the meter, will be eligible to provide all capacity, energy, and ancillary services that they are technically capable of providing.<sup>327</sup>

166. Further, Order No. 841 does not address the issue, raised by Calpine, of compensation for demand response resources. Therefore, we find these comments to be outside the scope of compliance with Order No. 841. We note that Order No. 841 does not prohibit electric storage resources from using existing demand response participation models, but does not require the RTOs/ISOs to consolidate such existing participation models with the participation model for electric storage resources required by the rule.<sup>328</sup>

The Commission orders:

(A) CAISO's compliance filing is hereby accepted, effective December 3, 2019, subject to a further compliance filing, as discussed in the body of this order.

(B) CAISO is hereby directed to submit a further compliance filing, within 60 days of the date of this order, as discussed in the body of this order.

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

( S E A L )

Nathaniel J. Davis, Sr.,  
Deputy Secretary.

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<sup>326</sup> See *supra* P 12.

<sup>327</sup> See *supra* P 58.

<sup>328</sup> Order No. 841, 162 FERC ¶ 61,127 at PP 55-56.

**Appendix A: Abbreviated Names of Intervenors**

**The following table contains the abbreviated names of intervenors that are used in this Order on Compliance Filings.**

<b>Abbreviation</b>	<b>Intervenor(s)</b>
	Advanced Energy Economy
	American Public Power Association
	California Department of Water Resources State Water Project
	California Energy Storage Alliance
	California Municipal Utilities Association
Calpine	Calpine Corporation
	Cities of Anaheim, Azusa, Banning, Colton, Pasadena, and Riverside, California
	City of Santa Clara, California
	EDF Renewables, Inc.
	Electric Power Supply Association
	Energy Storage Association
	Exelon Corporation
	GlidePath Development LLC
	Imperial Irrigation District
	Lincoln Clean Energy, LLC
	LS Power Associates, L.P.
	Modesto Irrigation District
NRECA	National Rural Electric Cooperative Association
	NextEra Energy Resources, LLC
	Northern California Power Agency
NRG	NRG Power Marketing LLC

PG&E	Pacific Gas and Electric Company Penn Oak Services, LLC
CPUC	Public Utilities Commission of the State of California San Diego Gas & Electric Company Southern California Edison Company
Voith Hydro	Voith Hydro, Inc.

**Appendix B: Tariff Records Filed**

California Independent System Operator Corporation

FERC FPA Electric Tariff

CAISO Tariffs

Docket No. ER19-468-000

[4.6.3, Requirements for Certain Participating Generators, 6.0.0](#)

[26.1, Access Charges, 4.0.0](#)

[-, Participating Generator, 5.0.0](#)



UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

California Independent System Operator Corporation    Docket Nos.    ER19-468-000  
ER19-468-001

(Issued November 21, 2019)

McNAMEE, Commissioner, *concurring*:

1. I concur with today's order insofar as it finds that California Independent System Operator Corporation (CAISO) complies in part with Order Nos. 841<sup>1</sup> and 841-A<sup>2</sup> (together, the Storage Orders) as issued and the Commission's regulations.<sup>3</sup> I write separately, however, to express my continuing concern that the Commission exceeded its statutory authority under the Federal Power Act,<sup>4</sup> and should have, at the very least, provided states the opportunity to opt-out of the participation model created by the Storage Orders.<sup>5</sup>

2. On February 15, 2018,<sup>6</sup> the Commission issued Order No. 841 to remove barriers to the participation of electric energy storage resources (ESRs) in the capacity, energy, and ancillary service markets operated by Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs).<sup>7</sup> In Order No. 841, the Commission denied

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<sup>1</sup> *Elec. Storage Participation in Mkts. Operated by Reg'l Transmission Orgs. & Indep. Sys. Operators*, Order No. 841, 162 FERC ¶ 61,127 (2018) (Order No. 841).

<sup>2</sup> *Elec. Storage Participation in Mkts. Operated by Reg'l Transmission Orgs. & Indep. Sys. Operators*, Order No. 841-A, 167 FERC ¶ 61,154 (2019) (Order No. 841-A).

<sup>3</sup> 18 C.F.R. §§ 35.28(b)(9), 35.28(g)(9) (2019).

<sup>4</sup> 16 U.S.C. §§ 791a-825r (2018).

<sup>5</sup> *See generally* Order No. 841-A, 167 FERC ¶ 61,154 (McNamee, Comm'r concurring in part and dissenting in part) (McNamee Separate Statement).

<sup>6</sup> This order was later amended by an errata issued on February 28, 2018. *Elec. Storage Participation in Mkts. Operated by Reg'l Transmission Orgs. & Indep. Sys. Operators*, Docket Nos. RM16-23-000 and AD16-20-000, Errata Notice (Feb. 28, 2018).

<sup>7</sup> *See generally* Order No. 841, 162 FERC ¶ 61,127.

requests to allow states to decide whether distribution-level ESRs or those resources located behind a retail meter could participate in RTO or ISO markets.<sup>8</sup> On rehearing, in Order No. 841-A, a majority of the Commission affirmed these findings and declined to provide the states with an opt-out.<sup>9</sup>

3. I was not a member of the Commission at the time Order No. 841 was issued, but I concurred in part and dissented in part when Order 841-A was issued. Specifically, I stated my support for ESRs and my belief that they have the potential to transform the electricity industry. But to the extent the Commission's Storage Orders exercised authority over the distribution system and behind-the-meter, I concluded:

[T]he majority has exceeded the Commission's jurisdictional authority by depriving the states of the ability to determine whether distribution-level ESRs may use distribution facilities so as to access the wholesale markets. By doing so, in my view, the Commission claimed jurisdiction over functions and assets reserved by statute to the states. Further, even if the majority thought they could rightly exercise jurisdiction in this matter, I think they should have furthered the path of "cooperative federalism" by permitting the states to choose whether or not behind-the-meter and distribution-connected ESRs may participate in the wholesale markets through an opt-out provision.<sup>10</sup>

4. Therefore, I concluded that the Commission exceeded its statutory authority in the Storage Orders and stated that I would have granted rehearing to reconsider the Commission's assertion of jurisdiction and its failure to provide states the opportunity to opt-out of the participation model created by the Storage Orders.<sup>11</sup>

5. While I approve CAISO's compliance filing today to the extent it complies with the Commission's Storage Orders, I note that the Storage Orders are presently pending judicial review,<sup>12</sup> and I reiterate my concern with the Commission's assertion of

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<sup>8</sup> *Id.* P 35.

<sup>9</sup> Order No. 841-A, 167 FERC ¶ 61,154 at PP 30-56.

<sup>10</sup> McNamee Separate Statement, 167 FERC ¶ 61,154 at P 3 (footnotes & citations omitted).

<sup>11</sup> *Id.* PP 2-24.

<sup>12</sup> *See Nat'l Ass'n of Regulatory Comm'rs v. FERC*, Nos. 19-1142 and 19-114

jurisdiction over ESRs interconnecting either to a distribution system or behind-the-meter. Further, I continue to believe the Commission should have included in the Storage Orders an opt-out provision for states.

For these reasons, I respectfully concur.

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Bernard L. McNamee  
Commissioner

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(D.C. Cir. filed July 11, 2019).