FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, DC 20426

OFFICE OF ENERGY MARKET REGULATION

In Reply Refer To:
California Independent System
Operator Corporation
Docket No. ER19-468-000

Issued: April 1, 2019

California Independent System
Operator Corporation
Attn: Roger E. Collanton
General Counsel
250 Outcropping Way
Folsom, CA 95630

Reference: Compliance Filing for Order No. 841

Dear Mr. Collanton:

On December 3, 2018, the California Independent System Operator Corporation (CAISO) filed tariff revisions to comply with the requirements of Order No. 841.[1] Please be advised that additional information is necessary to process the filing. Please provide complete responses to the following: [2]

1) Creation of a Participation Model for Electric Storage Resources

A. Participation Model for Electric Storage Resources

To identify the set of resources that are eligible to use the required participation model for electric storage resources, Order No. 841 revised section 35.28(b) of the

[1] *Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators*, Order No. 841, 162 FERC ¶ 61,127 (2018).

[2] CAISO may file revised tariff records where appropriate.

Commission's regulations[3] to define an 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, regardless of their storage medium (e.g., batteries, flywheels, compressed air, and pumped-hydro).[4] Order No. 841 added 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, facilitates their participation in the RTO/ISO markets.[5]

a. Please explain whether it is CAISO's position that each of the three participation models - the Non-Generator Resources (NGRs) model, Pumped Storage Hydro Units model, and Demand Response model, considered on its own, complies with all of the requirements of Order No. 841. Please explain and provide citations to the relevant proposed tariff language that demonstrates compliance with this requirement, including tariff provisions that allow for electric storage resources to set the marginal price, be compensated according to the wholesale services they provide in the same manner as other resources that provide those services, and purchase power at the Locational Marginal Price (LMP) to charge. To the extent CAISO intends to comply with Order No. 841 by relying on existing tariff provisions generally applicable to many types of resources, please explain and provide tariff citations to demonstrate that such provisions will apply to electric storage resources as required by Order No. 841.

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

A. Eligibility to Provide all Capacity, Energy, and Ancillary Services

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 providing that a resource using the participation model for electric storage resources is eligible to provide all capacity, 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 black start, primary frequency response, and reactive power services.[6]

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[3] 18 C.F.R § 35.28(b).

[4] Order No. 841, 162 FERC ¶ 61,127 at P 29.

[5] *Id.* P 51.

[6] *Id.* PP 76, 80.

a. Please explain and provide citations to the relevant proposed tariff language that demonstrates the eligibility requirements for all "other services the CAISO procures on behalf of its market," including CAISO's backstop capacity procurement mechanism. To the extent CAISO intends to comply with Order No. 841 by relying on existing tariff provisions generally applicable to many types of resources, please explain and provide tariff citations to demonstrate that such provisions will apply to electric storage resources as required by Order No. 841.

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

To implement section 35.28(g)(9)(i)(A) of the Commission's regulations, Order No. 841 required that each RTO/ISO have tariff provisions ensuring that resources using the participation model for electric storage resources can de-rate their capacity to meet minimum run-time requirements.[7]

a. Please explain and provide citations to the relevant proposed tariff language that demonstrate that CAISO allows resources using the participation model or models for electric storage resources to de-rate their capacity. To the extent CAISO intends to comply with Order No. 841 by relying on existing tariff provisions generally applicable to many types of resources, please explain and provide tariff citations to demonstrate that such provisions will apply to electric storage resources as required by Order No. 841.

3) Participation in the RTO/ISO Markets as Supply and Demand

A. Eligibility to Participate as a Wholesale Seller and Wholesale Buyer

Order No. 841 added section 35.28(g)(9)(i)(B) to the Commission's regulations to require that each RTO/ISO have tariff provisions to 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.[8]

a. To the extent CAISO intends to comply with Order No. 841 by relying on existing tariff provisions generally applicable to many types of resources,

[7] *Id.* P 94.

[8] *Id.* P 142.

please explain and provide tariff citations to demonstrate that such provisions will apply to electric storage resources as required by Order No. 841. Please explain and provide citations to the relevant proposed tariff language that demonstrate the following:

i. that NGRs can be dispatched as supply or demand, set marginal price, self-schedule, and otherwise participate fully in CAISO's markets.

ii. that pumped storage hydro resources can be dispatched as supply and demand, set wholesale market clearing prices, and submit bids and self-schedules.

B. Mechanism to Prevent Conflicting Dispatch Signals

To implement the new requirement in section 35.28(g)(9)(i)(B) of the Commission's regulations, Order No. 841 required each RTO/ISO to either (1) demonstrate that its market design will not allow for conflicting supply offers and demand bids from the same resource for the same market interval or (2) modify its market rules to prevent conflicting supply offers and demand bids from the same resource for the same market interval.[9]

a. To the extent CAISO intends to comply with Order No. 841 by relying on existing tariff provisions generally applicable to many types of resources, please explain and provide tariff citations to demonstrate that such provisions will apply to electric storage resources as required by Order No. 841. Please explain and provide citations to the relevant proposed tariff language that demonstrate the following:

i. whether CAISO uses a single bid curve to comply with the requirement to prevent conflicting dispatch signals.

ii. that in the event a Pumped-Storage Hydro Unit submits conflicting supply offers and demand bids, CAISO's market optimization process will only dispatch one, whichever is more economic in that interval while respecting the unit's operating constraints, to avoid conflicting dispatch signals.

[9] *Id.* P 162.

4) Physical and Operational Characteristics of Electric Storage Resources

A. Incorporating Bidding Parameters

Order No. 841 added 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 physical and operational characteristics of electric storage resources through bidding parameters or other means.[10]

a. Please explain and provide citations to the relevant proposed tariff language that demonstrate that a resource using the participation model or models for electric storage resources is permitted to submit its biddable parameters in both the day-ahead and the real-time markets. To the extent CAISO intends to comply with Order No. 841 by relying on existing tariff provisions generally applicable to many types of resources, please explain and provide tariff citations to demonstrate that such provisions will apply to electric storage resources as required by Order No. 841.

B. State of Charge

Order No. 841 added section 35.28(g)(9)(i)(C) to the Commission's regulations to require each RTO/ISO to have tariff provisions providing a participation model for electric storage resources that accounts for the following physical and operational characteristics of such resources: State of Charge, Minimum State of Charge, Maximum State of Charge, Minimum Charge Limit and Maximum Charge Limit.[11]

a. Please explain and provide citations to the relevant proposed tariff language that demonstrate the following. To the extent CAISO intends to comply with Order No. 841 by relying on existing tariff provisions generally applicable to many types of resources, please explain and provide tariff citations to demonstrate that such provisions will apply to electric storage resources as required by Order No. 841.

i. that the State of Charge value in CAISO is the level of energy that an electric storage resource is anticipated to have available at the *start* of the market interval.

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[10] *Id.* P 191.

[11] *Id.* PP 191, 211, 236.

ii. that CAISO's participation model or models for electric storage resources accounts for Minimum State of Charge, Maximum State of Charge, Minimum Charge Limit and Maximum Charge Limit, as defined in Order No. 841.[12]

C. Charge and Run Times

Order No. 841 added 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 such resources: Minimum Charge Time, Maximum Charge Time, Minimum Run Time, and Maximum Run Time. [13]

a. Please explain and provide citations to the relevant proposed tariff language that demonstrates that CAISO's participation model or models for electric storage resources accounts for Minimum Charge Time, Maximum Charge Time, Minimum Run Time, and Maximum Run Time as defined in Order No. 841. To the extent CAISO intends to comply with Order No. 841 by relying on existing tariff provisions generally applicable to many types of resources, please explain and provide tariff citations to demonstrate that such provisions will apply to electric storage resources as required by Order No. 841.

D. Additional Characteristics

Order No. 841 added 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 Discharge Ramp Rate and Charge Ramp Rate of such resources, whether through bidding parameters or other means.[14]

a. Please explain and provide citations to the relevant proposed tariff language that demonstrate that CAISO accounts for ramping rates for NGRs just as it does for conventional generators, and that NGRs can submit Ramp Rates as both bid components and master file parameters. To the extent CAISO intends to comply with Order No. 841 by relying on existing tariff

[12] Order No. 841, 162 FERC ¶ 61,127 at P 236.

[13] *Id.* P 220.

[14] *Id.* P 229.

provisions generally applicable to many types of resources, please explain and provide tariff citations to demonstrate that such provisions will apply to electric storage resources as required by Order No. 841.

5) Minimum Size Requirement

Order No. 841 added 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 the RTO/ISO markets that does not exceed 100 kW.[15]

a. Please explain or reconcile the difference between CAISO's proposal to comply with the minimum size requirements of Order No. 841, and CAISO's 500 kW minimum size requirements in CAISO Tariff Appendix K (Ancillary Service Requirements Protocol) for a resource providing Regulation, Spinning Reserve, or Non-Spinning Reserve as an ancillary service.

b. The CAISO Tariff requires that a Distributed Energy Resource Aggregation be no smaller than 0.5 MW.[16] Please explain and provide citations to the relevant proposed tariff language that demonstrates how an electric storage resource, located on the distribution system or behind-the-meter, with a rated capacity between 100 kW and 0.5 MW may participate in the CAISO markets without participating in a Distributed Energy Resource Aggregation given the 0.5 MW size requirement for these aggregations. To the extent CAISO intends to comply with Order No. 841 by relying on existing tariff provisions generally applicable to many types of resources, please explain and provide tariff citations to demonstrate that such provisions will apply to electric storage resources as required by Order No. 841.

6) Energy Used to Charge Electric Storage Resources

A. Price for Charging Energy

Order No. 841 added 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

[15] *Id.* P 270.

[16] CAISO Tariff, § 4.17.5.1.

resource that the resource then resells back to those markets be at the wholesale LMP.[17] An electric storage resource's wholesale energy purchases should take place at the applicable nodal LMP, and not the zonal price.[18]

a. To the extent CAISO intends to comply with Order No. 841 by relying on existing tariff provisions generally applicable to many types of resources, please explain and provide tariff citations to demonstrate that such provisions will apply to electric storage resources as required by Order No. 841. Please explain and provide citations to the relevant proposed tariff language that demonstrate the following:

i. that electric storage resources are charged the LMP for purchases of electric energy for later resale back to the market.

ii. that the LMP used for settlement of electric storage resource purchases is a nodal LMP and not a zonal LMP.

iii. that electric storage resources' charging is accounted for as negative generation.

7) Metering and Accounting Practices for Charging Energy

Order No. 841 required 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).[19]

a. Please explain and provide citations to the relevant proposed tariff language that demonstrates whether the NGR and Pumped-Hydro Storage participation models prevent electric storage resources from paying both the wholesale and retail rates for the same charging energy. To the extent CAISO intends to comply with Order No. 841 by relying on existing tariff provisions generally applicable to many types of resources, please explain and provide tariff citations to demonstrate that such provisions will apply to electric storage resources as required by Order No. 841.

This letter is issued pursuant to 18 C.F.R. § 375.307(b)(3)(ii) (2018) and is

[17] Order No. 841, 162 FERC ¶ 61,127 at P 294.

[18] *Id.* P 296.

[19] *Id.* P 325.

interlocutory. This letter is not subject to rehearing pursuant to 18 C.F.R. § 385.713 (2018). A response to this letter must be filed with the Secretary of the Commission within 30 days of the date of this letter. For your response, please use Type of Filing Code 80, Compliance Filing. In addition, submit an electronic version of your response to Franklin Jackson at Franklin.Jackson@ferc.gov.

Failure to respond to this letter order within the time period specified may result in a further order rejecting your filing.

Issued by: Carlos D. Clay, Acting Director, Division of Electric Power Regulation - West