

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, DC 20426

OFFICE OF ENERGY MARKET REGULATION

In Reply Refer To:
PJM Interconnection, L.L.C.
Docket No. ER19-469-000

Issued: April 1, 2019

PJM Interconnection, L.L.C.
Attn: Paul M. Flynn
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Reference: Compliance Filing for Order No. 841

Dear Mr. Flynn:

On December 3, 2018, PJM filed tariff revisions¹ to comply with Commission Order No. 841.² Please be advised that additional information is necessary to process the filing. Please provide complete responses to the following:³

1) Creation of a Participation Model for Electric Storage Resources

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

¹ PJM submitted revisions to its Open Access Transmission Tariff (OATT) and Operating Agreement.

² *Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators*, Order No. 841, 162 FERC ¶ 61,127 (2018).

³ PJM may file revised tariff records where appropriate.

consisting of market rules that, recognizing the physical and operational characteristics of electric storage resources, facilitate their participation in the RTO/ISO markets.⁴

- a. Please describe how PJM's proposed Energy Storage Resource participation model, as applied to pumped storage-hydro resources, complies with the requirements set forth in Order No. 841.
- b. PJM states that its Energy Storage Resource participation model does not need to modify the current requirements for quantifying Capacity Interconnection Rights. PJM states its Tariff defines Capacity Interconnection Rights as "the rights to participate as a Generation Capacity Resource" Please explain how an Energy Storage Resource Model Participant can participate as a Generation Capacity Resource, including whether it can be both a Generation Capacity Resource and a Capacity Storage Resource.

2) **Eligibility to Provide all Capacity, Energy and Ancillary Services**

Order No. 841 added 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 blackstart, primary frequency response, and reactive power services.⁵

- a. Please explain and provide citations to the relevant proposed tariff language that demonstrate the following. To the extent PJM 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. the eligibility for electric storage resources to provide Non-Synchronized Reserves; and how PJM proposes to effectuate the distinction between the portion of an Energy Storage Resource's stored charge eligible to provide Synchronized Reserves versus Non-Synchronized Reserves.
 - ii. the exemption of Energy Storage Resources from the day-ahead Scheduling Reserve process; and the process for Energy Storage

⁴ Order No. 841, 162 FERC ¶ 61,127 at P 51.

⁵ Order 841, 162 FERC ¶ 61,127 at PP 76, 80.

Resources to obtain an exception from PJM to provide day-ahead Scheduling Reserves under the Energy Storage Resource participation model.

- iii. the participation of Energy Storage Resources in Synchronized Reserves, including provisions surrounding the exception process for Energy Storage Resource participation in Tier 1 Synchronized Reserves; and how PJM proposes to include Energy Storage Resource in the co-optimization of energy and ancillary services, and make Energy Storage Resources eligible to provide Synchronized Reserves without an energy offer.
- iv. the eligibility of Energy Storage Resources to provide Reactive Service, including provisions concerning recovery of lost opportunity costs (we note that the cited tariff section relates to Regulation, not Reactive Service); and how PJM's proposal affects the eligibility of Energy Storage Resources to provide and/or receive payment for Reactive Service, if applicable.

3) 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 each RTO/ISO to 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.⁶

- a. PJM cites to the requirement in the Reliability Assurance Agreement, Schedule 9 that PJM develop the rules and procedures "required to determine and demonstrate the capability of Generation Capacity Resources." Please explain whether a Capacity Storage Resource is included in the definition of a Generation Capacity Resource.
- b. The Reliability Assurance Agreement, Schedule 9 states that the rules and procedures "shall recognize the difference in types of generating units and the relative ability of units to maintain output at stated capability over a specified period of time." Please explain how the rules and procedures specifically recognize the unique characteristics and capabilities of Capacity Storage Resources and their relative ability to "maintain output at stated capability over a specified period of time."

⁶ *Id.* P 94.

- c. Please explain why an Energy Storage Resource that is “out of charge” would not be considered an outage for purposes of Equivalent Demand Forced Outage Rate calculations.

4) Eligibility to Participate as a Wholesale Seller and Wholesale Buyer

For a resource using the proposed participation model for electric storage resources to be able to set prices in the RTO/ISO markets as either a wholesale seller or a wholesale buyer, it must be available to the RTO/ISO as a dispatchable resource.⁷

- a. Please explain and provide citations to the relevant proposed tariff language that demonstrate the following. To the extent PJM 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. the process for Energy Storage Resources to be dispatched and to self-schedule (for example, the process through which Energy Storage Resources can specify a single energy offer curve with positive and negative megawatt quantities, the process through which Energy Storage Resources can self-schedule positive and negative megawatt quantities, etc.).
 - ii. the process for Energy Storage Resources to participate as price takers.
- b. Please provide the definitions for Charge, Discharge, and Continuous Mode.

While Order No. 841 did not require RTOs/ISOs to change any participation models that they may already have that apply to pumped-hydro resources,⁸ it did require each RTO/ISO to establish means by which all electric storage resources, including pumped-hydro resources, can participate as wholesale sellers and wholesale buyers in the RTO/ISO markets using a participation model.⁹

- c. Please explain the proposed annual process for Energy Storage Resources to select the participation model in which they prefer to operate and provide

⁷ *Id.* P 142.

⁸ *Id.* P 55.

⁹ *Id.* P 149.

specific citations to the relevant existing and/or proposed tariff sections that effectuate this proposal.

5) **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.¹⁰

- a. Please provide more detail on how conflicting dispatch will be avoided and provide specific citations to all relevant existing and/or proposed tariff sections that ensure conflicting dispatch will not occur.
- b. Please explain how Continuous Mode (i.e., moving between charging and discharging "per market interval") will allow Energy Storage Resources to participate as supply and demand simultaneously (i.e., in the same market interval).

6) **Make-Whole Payments**

Given the unique capability of electric storage resources to serve as both a supply of, and demand for, energy and to implement the new requirement in section 35.28(g)(9)(i)(B) of the Commission's regulations, Order No. 841 required that each RTO/ISO have tariff provisions to 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.¹¹

- a. Please provide specific citations to the relevant existing and/or proposed tariff sections that demonstrate the instances in which Energy Storage Resources are and are not eligible to receive a make-whole payment, including the instance of a resource in charge mode that has been dispatched by PJM to its minimum charge limit entered into the Markets Gateway and how that resource would not be eligible for make-whole payments even though such dispatch may be outside of PJM's economic dispatch.

¹⁰ *Id.* P 162.

¹¹ *Id.* P 174.

7) Physical and Operational Characteristics of Electric Storage Resources

Order No. 841 requires 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, Minimum State of Charge, Maximum State of Charge, Minimum Charge Limit and Maximum Charge Limit, Minimum Charge Time, Maximum Charge Time, Minimum Run Time and Maximum Run Time, Minimum Discharge Limit, Minimum Charge Limit, Discharge Ramp Rate and Charge Ramp Rate.¹²

- a. Please explain how PJM's proposed participation model accounts for Minimum State of Charge, Maximum State of Charge, Minimum Charge Time, Maximum Charge Time, Minimum Run Time, and Maximum Run Time. Specifically, please detail how each of these characteristics are already accounted for in other bidding parameters that market participants will submit to PJM.
- b. Given that PJM states that telemetered State of Charge will *not* be used to optimize Energy Storage Resources across intervals in the energy markets, please explain how PJM operators will use the State of Charge in the day-ahead and real-time markets.
- c. Please explain why PJM believes that it is unnecessary to require market sellers to submit Minimum Charge Time, Maximum Charge Time, Minimum Run Time, and Maximum Run Time—either via telemetry or PJM's Markets Gateway—for the purposes of situational awareness.
- d. Please explain how PJM's proposed participation model will account for an electric storage resource's State of Charge at the start of a future market interval.
- e. Please explain how PJM's proposed participation model would ensure that an electric storage resource is not subject to infeasible schedules in the day-ahead and real-time markets.

8) State of Charge Management

Order No. 841 required each RTO/ISO to allow resources using the participation model for electric storage resources to self-manage their State of Charge.¹³

¹² *Id.* PP 211, 220, 229.

¹³ *Id.* P 253.

- a. Please explain and provide citations to the relevant proposed tariff language that demonstrate the following. To the extent PJM 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. whether resources using the participation model for Energy Storage Resources may self-manage their State of Charge.
 - ii. the definitions for State of Charge or State of Charge Management.
 - iii. the charges for Energy Storage Resources deviating from their dispatch schedules.
- b. Please explain how the referenced metering requirements of Manual 14D are applicable to Energy Storage Resources, as the cited language focuses on telemetry requirements for “generators.” Please provide specific citations to the relevant existing and/or proposed tariff sections that demonstrate this applicability.

9) 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.¹⁴

- a. Please explain and provide citations to the relevant proposed tariff language that demonstrate the following. To the extent PJM intends to rely 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:
 - i. the current 100 kW participation threshold for Energy Storage Resources.
 - ii. whether electric storage resources smaller than 100 kW may be aggregated to meet PJM’s 100 kW participation threshold for Energy Storage Resources.

¹⁴ *Id.* P 270.

10) Energy Used to Charge Electric Storage Resources

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 resource that the resource then resells back to those markets be at the wholesale LMP.¹⁵

- a. Please explain and provide citations to the relevant proposed tariff language that specify whether Energy Storage Resources' wholesale energy purchases will take place at the applicable nodal LMP. To the extent PJM intends to rely 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.
- b. Please explain if and when PJM will make a filing with the Commission regarding the metering and accounting practices that PJM will implement on December 3, 2019. Please specify whether those metering and accounting practices will be located in the PJM tariff.
- c. Please explain whether the metering and accounting practices that PJM is developing will employ the "net excess" and/or "virtual buy all/sell all" constructs that currently exist for behind-the-meter generation in PJM.
- d. Please explain how PJM will prevent electric storage resources from paying twice for the same charging energy.

This letter is issued pursuant to 18 C.F.R. § 375.307(b)(3)(ii) (2018) and is 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 Scotiana Bennett at scotiana.collins@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: Kurt Longo, Director, Division of Electric Power Regulation – East

¹⁵ *Id.* P 294.

Document Content(s)

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