

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

Electric Storage Participation in Regions with Organized Wholesale Electric Markets)) Docket No. AD16-20-000)))

COMMENTS OF THE INDEPENDENT MARKET MONITOR FOR PJM

On May 23, 2016, PJM Interconnection, L.L.C., responded to a formal inquiry in this proceeding from the Director, Office of Energy Policy and Innovation (OEPI), regarding the applicability of Regional Transmission Operator (RTO) and Independent System Operator (ISO) market rules to electric storage resources. Monitoring Analytics, LLC, acting in its capacity as the Independent Market Monitor for PJM (“Market Monitor”), offers these comments for the Commission’s consideration on the question from OEPI and PJM’s response.

I. COMMENTS

The Market Monitor supports the Commission’s staff’s goal to identify artificial barriers to participation of storage resources in wholesale electricity markets. Artificial barriers to market participation create inefficiencies and can result in market failure. Artificial barriers should not be confused with natural barriers, which include product and/or service requirements that form the necessary basis of product definition and unit of measure so that a market can function efficiently. All markets have natural barriers to entry. Market design should not attempt to eliminate such natural barriers to entry. The artificial removal of natural barriers creates inefficiencies in the same way that the addition of artificial barriers to entry creates inefficiencies. Market rules should not artificially favor

specific technologies over others. Market rules should not artificially favor thermal generation over electricity storage or vice versa.¹ Market rules should not artificially favor one type of electricity storage over another, such as pumped hydro storage over chemical storage (battery). Rather, markets should clearly define the requirements of a product or service and remain neutral about how or by whom the service is provided. Such neutrality does not preclude market designs where technological and/or resource specific characteristics may limit the rational economic participation by specific technology or resource type, as such required characteristics represent natural, not artificial barriers to participation. This neutrality should apply regardless of the mechanisms used to acquire new capacity. PJM relies on a capacity market while other RTO/ISOs rely on cost of service regulation and bilateral contracts. The goal should be to define the objective and let market participants provide economic solutions rather than imposing resource planning solutions on the market.

Markets should be designed to recognize and reward the provision of identified, clearly defined, necessary services and they should do so at efficient prices free of subsidies, cross subsidies, and artificial administrative interventions that set quotas for resource participation. Efficient markets have clearly defined characteristics for the product, including clear units of measure and the price per unit provided. Where the units and price are transparent, market participants, whether existing or potential, can make rational and efficient decisions regarding their participation in the market, regardless of technology. Under these conditions, the most economic sources of supply, regardless of technology, are favored over less economic sources. Where the desired characteristics of a product are not

¹ In its inquiry, the Commission defined electric storage resources as “a facility that can receive electric energy from the grid and store it for later injection of electricity back to the grid.” The Commission notes “[t]his includes all types of electric storage technologies, regardless of their size and storage medium, or whether they are interconnected to the transmission system, distribution system, or behind a customer meter.” Commission Inquiry at 1.

well defined, consistent with the actual operational requirements, or artificially distorted to favor the inclusion of specific resource types or technology types, inefficiency is introduced in the best case, and market failure is introduced in the worst case. The inefficiency and market failures may be cumulative as the impacts of the market distortions accumulate. While the inefficiency may appear minor at first, the inefficiency will increase, potentially leading to further inefficient work arounds and additional rule changes to mitigate the inefficiencies.

PJM's market rules are, in general, designed to clearly define the product requirements, the definition of the product's unit of measure and the price per unit sold. That is certainly the goal of the market design. PJM's capacity market was a clear exception, prior to the Capacity Performance (CP) design. PJM's capacity market design prior to CP allowed demand response, with limited obligations to perform during only 60 hours per year and no telemetry, to compete directly against generation resources with strict telemetry and performance requirements covering all hours of the year. In this market, the units of measure, a capacity MW, were not clearly defined and the inferior good, here demand response, could command a price equal to that of the normal good which is capacity from a physical generator. This false equivalency in the market measurement lead to the inferior displacing the normal good, as the cost of entry, and the obligations, of the inferior good were lower than the cost of entry and obligations of the standard good. The result was an inefficient suppression of capacity market prices. The result of this issue and other design issues led to the development of a new capacity market design, which better defined the capacity product and better aligned the obligations and requirements of all resources, regardless of source, associated with providing the product.

At present there are no structural barriers to the entry of storage, whether pumped air, pumped hydro, kinetic or chemical, into the PJM markets. There are no market rules, for example, that explicitly or arbitrarily prevent the participation of a storage resource in the energy, capacity and/or ancillary service markets in PJM. There are no market rules that specifically or arbitrarily preclude resource participation in a market based on technology

type. However, some of PJM's markets have product definitions with specific characteristic requirements which may limit rational economic participation by specific technologies or resource types. Such required characteristics represent natural, not artificial, barriers to supply the defined product.

Commission Questions and PJM IMM responses

The Eligibility of Electric Storage Resources to be Market Participants

- 1. If electric storage resources are eligible to qualify as sellers in the capacity, energy, and/or ancillary service markets, please indicate the resource types (e.g. limited energy resource, generator, demand response, etc.) for which they may qualify in each market. In addition, please list where each applicable resource type is defined in the tariff, as well as the criteria for qualifying as each resource type.**

Electric storage resources can make offers directly into PJM's wholesale markets for energy, capacity and ancillary services and such resources can also participate as demand response resources. There are no market rules that artificially preclude participation by electric storage in any of PJM's markets.

- 2. Are certain types of resources ineligible to participate as sellers in the capacity, energy, or ancillary service markets by definition? If so, please explain which types of resources are ineligible to participate in which markets and why, including citations to any authority for such ineligibility (e.g., NERC standards, etc.).**

No resource types are ineligible to participate as sellers if they can provide the defined product.

- 3. To the extent that electric storage resources are *ineligible* to qualify as sellers in the capacity, energy and ancillary service markets for a resource type, please explain why.**

Electric storage resources can make offers into PJM's wholesale markets for energy, capacity and ancillary services. Electric storage resources can also participate as demand response resources, according to rule governing the participation of demand response resources. There are no market rules that artificially preclude participation by electric storage in any of PJM's markets.

PJM indicates in its response that electric storage, like demand response, cannot provide non-synchronized reserves because they are, by definition, synchronized.² It is not clear however, that a storage device needs be synchronized to the system at all times, and could, therefore, make itself eligible to provide the product.

- 4. When electric storage resources are eligible to participate in the capacity, energy, and ancillary services markets, are there different rules for different types of electric storage resources? For example, are there different qualification or performance requirements for batteries versus pumped storage resources? If so, please state these rules and explain the distinctions they draw for the participation of different types of electric storage resources.**

No.

- 5. Can electric storage resources set the price in the capacity, energy, and ancillary service markets? If not, please explain all circumstances under which electric storage resources are not eligible to set the market-clearing price.**

Yes, electric storage resources have the ability to set market price.

Qualification Criteria and Performance Requirements

- 1. What are the minimum capacity requirements and minimum offer sizes to sell capacity, energy, and ancillary services?**
- 2. What are the technical qualification criteria for each type of resource eligible to participate in the capacity, energy, and ancillary service markets, as applicable?**
- 3. What are the technical performance requirements for providing capacity, energy, and ancillary services in PJM's markets, as applicable?**
- 4. What are the bases for these qualification and performance standards (e.g., North American Electric Reliability Corporation (NERC) reliability standards)? Please provide the technical and operational justifications for these qualification and performance standards, with citations if possible.**

See PJM's response to questions 1–4 at 10--17.

Bid Parameters for Electric Storage Resources

- 1. What are the required bid parameters for each defined resource type to sell in the capacity, energy and ancillary service markets? Are there additional bid**

² PJM Answer at 7

parameters that each defined resource type may submit? Are there any bid parameters unique to electric storage resources in each market?

See PJM's response at 18–19.

Distribution-Connected and Aggregated Electric Storage Resources

- 1. Are there opportunities for electric storage resources connected to the distribution system, or a subsystem thereof, to participate in the capacity, energy, and ancillary service markets? If so, please describe those opportunities (i.e., in which markets, as what type of resource, and subject to what tariff provisions may such electric storage resources participate?).**

There are opportunities for Electric Storage Resources, defined as batteries or flywheels, to interconnect to the distribution system and participate in the energy and ancillary services markets.³ Distribution level electric storage that qualifies as Behind the Meter can participate as part of demand response in the capacity, energy, synchronized reserve, and regulation markets. Distribution level Electric Storage Resources (and other storage devices) that qualify as Small Generation Resources by obtaining energy interconnection service can participate in the energy, synchronized reserve market (if they meet requirements specified in the manuals) and regulation market (if they meet requirements specified in the manuals).⁴ Capacity Storage Resources, defined as “any hydroelectric power plant, flywheel, battery storage, or other such facility solely used for short term storage and injection of energy at a later time,” that can meet the operational and performance requirements of Capacity Performance Resources, can participate in the capacity market.⁵

- 2. Are there opportunities for aggregated electric storage resources to participate in the capacity, energy, and ancillary service markets? If so, please describe those**

³ See OA Schedule 1 § 1.3.1G.

⁴ See OATT § 36.1.1, Schedule 3, Schedule 5.

⁵ See OATT Attachment DD §§ 2.13A, 5.5A(a).

opportunities (i.e., in which markets, as what type of resource, and subject to what tariff provisions may such electric storage resources participate?).

Yes. Electric storage resources can aggregate and make offers into PJM's capacity, energy and ancillary service markets.

- 3. If electric storage resources are providing services to the wholesale market and to another entity (e.g., a distribution utility), and if there are tariff provisions that permit or penalize potential deviation from the RTO/ISO economic dispatch signal in that circumstance, please provide them.**

If a resource owner, regardless of technology, uses the resource to sell a service to the PJM wholesale market, the resource owner is responsible, under the terms of that sale, to follow PJM direction or face deviation charges as appropriate. Unlike some RTOs, PJM does not charge penalties for failure to follow dispatch.

When Electric Storage Resources are Receiving Electricity

- 1. Under what circumstances would an electric storage resource submit bids to buy energy in the wholesale markets (i.e., when would an electric storage resource be a wholesale buyer under PJM's market rules/tariff)?**

See PJM's response at 22.

- 2. If electric storage resources must bid to buy electricity from PJM's market, what are the minimum load obligations, minimum bid sizes, or other minimum parameters to buy electricity in each market? For example, is there a minimum consumption limit to be eligible to pay the locational marginal price (LMP) for energy or a minimum charging duration that must be met to be a wholesale buyer?**

See PJM's response at 22.

- 3. Do electric storage resources participating in the capacity, energy, and ancillary service markets always pay LMP for the electricity they receive, and if not, under what circumstances do they not?**

See PJM's response at 23.

- 4. Are there circumstances when an electric storage resource receives energy but is not considered load and therefore does not pay for its consumption? For example, if an electric storage resource provides frequency regulation and is asked to receive energy (i.e., provide regulation down) is that considered consumption or provision of frequency regulation, and is the resource charged a wholesale rate for this action?**

See PJM's response at 23.

Potential Changes to the Rules Affecting Electric Storage Resources

- 1. Are there any forthcoming or pending proposals or on-going stakeholder processes that could change or contemplate changing the rules by which electric storage resources can sell into PJM's markets? If so, please describe the proposals or stakeholder processes briefly and provide citations to any relevant websites or public documents.**

Yes. The PJM Regulation Market and market rules are currently under review. The current regulation market rules are flawed. The current market rules are not resulting in the correct mixture of regulation resources and are not properly compensating fast response (RegD) resources in the regulation market results. For more details, see Chapter 10 of the 2016 Quarterly State of the Market Report for PJM: January through March. The report can be found at:

http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2016.shtml.

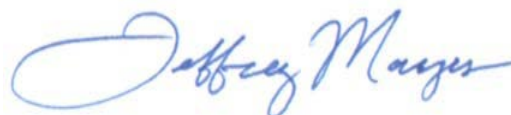
- 2. Are there any forthcoming or pending proposals or on-going stakeholder processes that could change or are contemplating changing the rules by which electric storage resources buy electricity from PJM's market? If so, please describe the proposals or stakeholder processes briefly, and provide citations to any relevant websites or public documents.**

The Market Monitor is not aware of any such proposals.

II. CONCLUSION

The Market Monitor respectfully requests that the Commission afford due consideration to these comments as the Commission resolves the issues raised in this proceeding.

Respectfully submitted,



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Dated: June 6, 2016

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated at Eagleville, Pennsylvania,
this 6th day of June, 2016.



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