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PJM Interconnection, L.L.C.	)	Docket No. ER18-87-000
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MOTION FOR LEAVE TO ANSWER
AND ANSWER OF THE
INDEPENDENT MARKET MONITOR FOR PJM

Pursuant to Rules 212 and 213 of the Commission's Rules and Regulations,[1] Monitoring Analytics, LLC, acting in its capacity as the Independent Market Monitor for PJM Interconnection, L.L.C. ("PJM")[2] ("Market Monitor"), submits this answer to the answer filed May 31, 2018, by the Energy Storage Association ("ESA") in response to the Market Monitor's request for rehearing of the order issued in this proceeding March 30, 2018 ("March 30th Order"). ESA's arguments against rehearing have no merit. The Market Monitor's request for rehearing should be granted.

I. ANSWER

A. The RRTS Converts Resource MW into the Correct Quantity of Frequency Regulation Service Provided.[3]

ESA claims (at 2) that "the RRTS curve is used to discount payments made to RegD resources whether or not the resource is accurately following the dispatch signal." Based on this, ESA asserts (*id*.) that "the RRTS is not consistent with FERC's regulations because the

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[1]   18 CFR §§ 385.212 & 385.213 (2017).

[2]   Capitalized terms used herein and not otherwise defined have the meaning used in the PJM Open Access Transmission Tariff ("OATT"), the PJM Operating Agreement ("OA") or the PJM Reliability Assurance Agreement ("RAA").

[3]   See Attachment A for the definitions of RRTS, MBF and MRTS.

RegD resource would not be compensated even if it accurately followed the dispatch signal."

ESA's argument is based on a confusion between the provision of regulation service and the capability to provide regulation service. ESA incorrectly asserts that the use of the RRTS to convert resources into effective MW results in underpayment of resources for the provision of regulation service.

The RRTS converts resource MW into Effective MW. An Effective MW is the capability to provide regulation service. An effective MW is not a measure of the actual provision of service. The RRTS therefore does not discount payments to resources relative to "the quantity of frequency regulation service provided by a resource when the resource is accurately following the dispatch signal."[4] The RRTS converts resource MW into the correct quantity of Effective MW. The market clearing price, set in terms of $/Effective MW, is based on the provision of regulation service by the Effective MW when the resource is accurately following the dispatch signal. The RRTS conversion therefore guarantees that the market clearing price in the PJM Proposal is determined by the marginal resource's "quantity of frequency regulation service provided by a resource when the resource is accurately following the dispatch signal."[5] The PJM Proposal's use of the RRTS to convert resources into Effective MW results in the payment of resources that therefore matches "the quantity of frequency regulation service provided by a resource when the resource is accurately following the dispatch signal."[6] This result is exactly consistent with Order No. 755.

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[4]   ESA at 3.

[5]   *Id.*

[6]   *Id.*

B. ESA Provides No Evidence that the PJM Proposal Does Not Compensate Regulation Based on the Absolute Amount of Regulation Up and Down.

ESA argues (*id*.) that the "Commission has consistently determined that PJM's 'effective megawatts' concept is not based on the absolute amount of regulation up and regulation down." ESA ignores the role played by Effective MW in the current market design approved by the Commission.

The current Commission approved market design supports the concept of effective MW in every aspect of the PJM Proposal save one, and the March 30th Order leaves all of them undisturbed. The March 30th Order continues to use effective MW as a basis for relative resource valuation, offer determination, clearing price determination for both RegA and RegD resources and the payment of RegA resources. The March 30th Order disapproves of effective MW for one purpose: payment of RegD resources. Prohibiting the use of effective MW for payments of Reg D resources is unsupported, illogical, unreasonable and discriminatory. Such prohibition is inconsistent with the Commission's endorsement of the use of Effective MW in the current market design. Order No. 755 provides no basis for such prohibition. The Market Monitor seeks rehearing on that issue. It is ESA who argues for arbitrary inconsistency. ESA fails to show why rehearing should not be granted.

In approving the current market design, the Commission has explicitly accepted that the price paid to an effective MW, in $/effective MW, compensates regulation for the within hour absolute amount of regulation up and down provided for RegA resources, even when the price is determined by the offer of a RegD resource. The concept of a payment in terms of $/effective MW for RegA provided effective MW, has been accepted by the Commission as consistent with the Commission's regulations and Order No. 755.

The current market design is flawed because the current settlement process does not result in RegD resources being paid the market clearing price in $ per effective MW. This flaw means that RegD resources are not paid on the basis of the absolute amount of regulation up and down provided by the marginal effective MW resource. RegD resources, unlike RegA resources, are not paid in terms of $ per effective MW because the

MBF/MRTS/RRTS is not used in settlements to convert RegD MW into effective MW. Correctly applied, RegD resources would be paid the capability clearing price (RMCCP) times performance adjusted RegD MW times MBF/MRTS/RRTS and the performance clearing price (RMPCP) times performance adjusted RegD MW times MBF/MRTS/RRTS. Instead, the current market design pays RegD MW on the basis of performance adjusted RegD MW for its capability payment and it pays RegD MW on the basis of performance adjusted RegD MW times a scaler that is a ratio of RegD MW miles to RegA MW miles. More specifically, the current market design pays RegD resources the capability clearing price (RMCCP) to every performance adjusted RegD MW and the performance clearing price (RMPCP) to every performance adjusted RegD MW multiplied by the ratio of RegD miles to RegA miles (the mileage ratio).

Because the RMCCP component makes up the majority of the overall clearing price, when the MBF is above 1.0, RegD resources can be underpaid on a per effective MW basis by the current payment method, unless offset by a high mileage ratio. When the MBF is less than 1.0, RegD resources are overpaid on a per effective MW basis. In both cases, the result is an arbitrary treatment of RegD resources. Under the current market design, RegD resources are not paid on the basis of the absolute amount of regulation up and down as reflected in the marginal $/effective MW price being set by the marginal effective MW resource. This means that the resulting payment of RegD under the current market design is inconsistent with Commission's regulations and Order No. 755. This result is clear when the marginal $/effective MW price (an MBF or MRTS adjusted price) is set by an effective MW provided by RegD resource.

Where, for example, the MBF/MRTS is equal to 2.0, the actual within hour mileage for RegD (miles per MW) is 10, the actual within hour mileage of RegA (miles per MW) is 8. In this example the marginal $/effective offer comes from a 1.0 MW RegD resource with a $1/mile offer. The $/effective offer of the marginal RegD resource would be $5 (The $1/mile offer times 10 miles/MW divided by the MBF/MRTS of 2 or (($1/mile x 10 miles)/2). Assuming no capability component of price, the $/effective MW clearing price, set by the

marginal RegD resource would be $5/effective MW. In this example, due to a zero capability price, the price for performance (RMPCP) is equal to the regulation clearing price (RMCP). This $/effective MW price reflects the absolute amount of regulation up and down as reflected in the marginal $/effective MW based on actual within hour, absolute amount of regulation up and down provided by the marginal Effective MW resource.

Every RegA resource is correctly paid $5/effective MW in this example. The RegD resource, however, is not paid $5/effective MW under the current market design. Under the current market design the marginal RegD resource is paid $6.25 per RegD MW (not per effective MW). The $6.25 paid to the RegD resource per RegD MW under the current market rules is the product of the mileage ratio (10/8), times the $/effective MW price for performance ($5), times the RegD MW (1). Paying $6.25 per RegD MW to the marginal RegD resource is equivalent to paying only $3.125 per effective MW. This is an underpayment of the RegD resource on a $/effective MW basis. This is because with an MBF of 2.0, every MW of RegD is equal to 2.0 effective MW. Evidence that this is an underpayment can also be seen in that the payment of $6.25 per RegD MW to the marginal RegD unit does not cover the $10 per MW cost incurred by the marginal RegD based on absolute amount of regulation up and down it provided in the hour (10 miles x $1/mile offer). The resulting payment under the current market rules, in terms of either $/RegD or $/Effective MW, is not consistent with paying regulation on the basis of absolute amount of regulation up and down provided.

The market result is corrected if the mileage ratio is replaced by the MBF/MRTS in settlement so that the RegD resource is paid the $/effective MW price for each of its effective MW provided. Using the MBF of 2.0, each 1.0 MW of RegD is credited with 2.0 effective MW (MBF x 1.0) and the marginal resources will be paid $10 ($5/effective MW x 2.0 x 1 MW) per RegD MW, which is the equivalent of being paid $5 per effective MW. Replacing the mileage ratio with the MBF (the MRTS in the PJM Proposal) results in RegD resources being paid on the basis of the absolute amount of regulation up and down as reflected in the marginal $/effective MW price being set by the marginal effective MW resource.

Market results where RegD resources are underpaid on a $/effective MW basis are not hypothetical. The Market Monitor has reported months were RegD resources were under, rather than over, compensated due to this market flaw.[7]

The inconsistent use of the MBF/MRTS in the current market design causes RegD resources to not receive payments based on the quantity of regulation service they provide. RegD resources are not being compensated on the basis of absolute amount of regulation up and down provided. The PJM Proposal corrects this problem and would result in RegD resources correctly being paid the marginal $/effective MW price, resulting in RegD resources being paid on the basis of the absolute amount of regulation up and down provided by the marginal effective MW resource.

ESA provides no evidence to support its claim that the PJM Proposal does not compensate regulation based on the absolute amount of regulation up and down, as required by Commission's regulations and Order No. 755. ESA cannot prove its argument without also proving that the current market design does not compensate RegA resources on the basis of the absolute amount of regulation up and down. ESA provides no such evidence and ESA cannot provide such evidence.

C. ESA Provides No Evidence that the Commission Understood that Actual Mileage Was Used to Determine Price and Was Therefore Part of Settlement.

ESA states (at 6) that "[t]he March 30 Order is explicit that the Commission understood and considered PJM's proposal in determining that it does not properly compensate resources for mileage." ESA asserts (*id*.) that "[n]either PJM nor the IMM

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[7]   *See* 2018 State of the Market Report for PJM: January through March (May 10, 2018) at 472–473, which can be accessed at:
    <*http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2018.shtml*>; *see also* 2014 State of the Market Report for PJM, Vol. II (March 12, 2014), which can be accessed at:
    <*http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2014.shtml*>.

provide evidence to the contrary, instead repeating arguments already made and considered in this proceeding."

ESA's assertions are incorrect.

The March 30th Order's rejection of the PJM Proposal was based on the incorrect assertion that "the Regulation Proposal is inconsistent with the Commission's regulations and Order No. 755 because it does not account for actual mileage in settlement." The March 30th Order (at P 53) states that nowhere in PJM's proposed offer formula or settlements formula is there a value for the volume of actual mileage a resource—only a historical expectation of that mileage. The March 30th Order states (at P 54) that "Accounting for the dollar per mile cost of resources in the Regulation clearing process only helps determine what the clearing price for regulation should be….Once the price is determined, the resource must also be compensated based on the quantity of Regulation service actually provided."

Both PJM and the IMM provided evidence in the proceeding that the PJM Proposal does not eliminate actual mileage from the settlement calculation.[8] To the contrary, the PJM Proposal specifically includes actual mileage in the determination of actual within hour offers, the within hour marginal offer, the within hour price of regulation and the within hour settlement.

D. PJM's Proposal Is Consistent with Order No. 755.

ESA states (at 8) that in order for PJM's Proposal to be consistent with Order No. 755, (i) "a resource's performance must be measured based on the absolute amount of regulation up and regulation down it provides in response to the system operator's dispatch signal," (ii) "payment must reflect the accuracy with which each resource

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[8]   *See* PJM Proposal at 27–28, PJM Answer (Dec. 6, 2017) at 8; PJM presentation: "Regulation Market Overview" (Nov/ 16, 2015) at 17, which can be accessed at: <*http://www.pjm.com/-/media/committees-groups/task-forces/rmistf/20151016/20151016-item-03-regulation-market-overview.ashx*>; and Market Monitor Answer (Jan. 2, 2018) at 4.

responds to the system operator's dispatch signal" and (iii) "[t]he regulation states: frequency regulation service must provide such compensation based on the actual service provided, including a capacity payment that includes the marginal unit's opportunity costs and a payment for performance that reflects the quantity of frequency regulation service provided by a resource when the resource is accurately following the dispatch signal." ESA then claims (at 8) that PJM's Proposal is inconsistent with these requirements and is, therefore, inconsistent with Order No. 755. ESA claims (*id*.) that the March 30th Order was therefore correct to reject the PJM proposal.

There is no basis for ESA's claim that PJM's Proposal is inconsistent with these requirements and is, therefore, inconsistent with Order No. 755. In PJM's Regulation Proposal (at 20–22) a resource's performance is measured based on the absolute amount of regulation up and regulation down it provides in response to the system operator's dispatch signal. In PJM's Proposal (at 22–29) payment reflects the accuracy with which each resource responds to the system operator's dispatch signal. In PJM's Proposal (*id*.) compensation is based on the actual service provided, including a capacity payment that includes the marginal unit's opportunity costs and a payment for performance that reflects the quantity of frequency regulation service provided by a resource when the resource is accurately following the dispatch signal. PJM's Proposal is consistent with these requirements and is, therefore, consistent with Order No. 755.

E. The Marginal RRTS Is the Correct Way to Convert Nominal to Effective MW.

ESA states (at 8–9) that "because the Regulation Proposal compensates capacity from all RegD resources based on the marginal (i.e., lowest) substitution benefit provided by the last resource cleared, the proposal does not accurately reflect the effective megawatts contribution of RegD resources when they operate in a given hour." ESA argues (at 8–9) that PJM's proposed compensation calculation, which would make use of the "marginal rate of lowest substitution benefit" would result in unjust and unreasonable rates. ESA (at 8–9), citing their protest, claims that it provided extensive examples demonstrating how

PJM's Proposal to use the marginal rate of substitution in settlement "would pay RegD resources less for what, by PJM's and the IMM's own reckoning, are equivalent services." ESA argues (at 9) that the Commission weighed the evidence and correctly sided with ESA on this issue.

There is no basis for ESA assertions. The March 30th Order, and ESA, rely on the argument that using the marginal resource's marginal RRTS from the downward sloping RRTS function in settlement will cause an undervaluing of all RegD MW relative to the effective MW contributed by RegD in that market solution. Such reliance is misplaced. There is no mathematical or economic theorem that supports the premise or the resulting conclusion. The ESA cited section of its protest provides examples that were refuted in the Market Monitor's November 30, 2017, answer.[9] As ESA notes (at 8) "[t]he IMM provides a lengthy argument, based on economic theory, as to why payment based on marginal benefit is correct." Neither the March 30th Order or ESA have provided a mathematical or economic theorem to support their premise or resulting conclusion.

II. MOTION FOR LEAVE TO ANSWER

The Commission's Rules of Practice and Procedure, 18 CFR § 385.213(a)(2), do not permit answers to answers or protests unless otherwise ordered by the decisional authority. The Commission has made exceptions, however, where an answer clarifies the issues or assists in creating a complete record.[10] In this answer, the Market Monitor provides the

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[9]   Market Monitor Answer, Docket No. ER18-87-000 (Nov. 30, 2017) at (6–9).

[10]   *See*, *e.g.*, *PJM Interconnection, L.L.C.*, 119 FERC ¶61,318 at P 36 (2007) (accepted answer to answer that "provided information that assisted … decision-making process"); *California Independent System Operator Corporation*, 110 FERC ¶ 61,007 (2005) (answer to answer permitted to assist Commission in decision-making process); *New Power Company v. PJM Interconnection, L.L.C.*, 98 FERC ¶ 61,208 (2002) (answer accepted to provide new factual and legal material to assist the Commission in decision-making process); *N.Y. Independent System Operator, Inc.*, 121 FERC ¶61,112 at P 4 (2007) (answer to protest accepted because it provided information that assisted the Commission in its decision-making process).

Commission with information useful to the Commission's decision-making process and which provides a more complete record. Accordingly, the Market Monitor respectfully requests that this answer be permitted.

III. CONCLUSION

For the reasons provided above, the Market Monitor respectfully requests that the Commission consider this answer as it resolves the issues raised in this proceeding.

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Respectfully submitted,

Jeffrey W. Mayes

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Date: June 18, 2018

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 18th day of June, 2018.

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Attachment A

The terms Marginal Rate of Technical Substitution (MRTS), Marginal Benefit Factor (MBF) and Regulation Rate of Technical Substitution (RRTS) are used interchangeably in this document, depending on the context. The MBF refers to the MRTS in the current market design and the RRTS as the MRTS in the PJM proposal and MRTS is used when referring to the concept in general. In economic literature, the Marginal Rate of Technical Substitution (MRTS) is the marginal rate of substitution between two or more resources in the production of a good or service, holding total production constant. In the current regulation market design, the MBF is intended to function as the MRTS between RegA and RegD resources. The MBF was not properly defined or implemented, which caused a number of market and related operational issues. In the PJM Proposal the Regulation Rate of Technical Substitution (RRTS) is the MRTS between RegA and RegD resources, holding ACE control constant. In the PJM proposal, the RRTS is a revised, correctly defined and implemented replacement for the MBF.