

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

PJM Interconnection, L.L.C.)))	Docket No. EL18-34-000
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**REPLY BRIEF AND ANSWER OF THE
INDEPENDENT MARKET MONITOR FOR PJM**

Pursuant to the notice of order instituting Section 206 proceeding issued December 21, 2017 (“December 21st Order”),¹ Monitoring Analytics, LLC, acting in its capacity as the Independent Market Monitor for PJM (“Market Monitor”), submits this reply brief. The December 21st Order commenced an investigation of whether PJM’s “practices regarding the pricing of fast-start resources may be unjust and unreasonable because the practices do not allow prices to reflect the marginal cost of serving load.”²

In this pleading, the Market Monitor corrects errors and addresses the flawed arguments included in the briefs filed by PJM (“PJM”), the Nuclear Energy Institute (“NEI”), Exelon, FirstEnergy and East Kentucky Power Cooperative (“FirstEnergy and EKPC”).³

¹ See *PJM Interconnection, L.L.C.*, 161 FERC ¶ 61,295 at P 1 (2017).

² See *id.* at P 1.

³ See Initial Brief of PJM Interconnection, L.L.C., Docket No. EL18-34-000 (February 12, 2018), Comments of the Nuclear Energy Institute, Docket No. EL18-34-000 (February 12, 2018); Initial Brief of Exelon Corporation, Docket No. EL18-34-000 (February 12, 2018); Comments of FirstEnergy Service Company and East Kentucky Power Cooperative, Inc., Docket No. EL18-34-000 (February 12, 2018).

This pleading also responds in opposition to the motion filed by PJM to reject a protest filed by the Department of Market Monitoring (“DMM”) for the California Independent System Operator Corporation (“CAISO”) (“DMM Comments”).⁴

I. ARGUMENT

A. Pricing Principles

PJM argues that its current pricing method results in inefficient prices because some resources committed to meet PJM system needs do not set LMP.⁵ The Commission should not accept this argument, because it implies that any resource that cannot set price due to a parameter restriction, whether physical or financial, creates inefficiency. PJM’s reasoning is flawed.

Some proponents of fast start pricing, and of extended LMP applications generally, argue that numerous combinations of price and uplift payments can be equivalently used to support efficient market commitment and dispatch. This would mean that the RTO can solve the cost minimizing commitment and dispatch problems and then reprice the market in any of a variety of ways, making compensatory uplift payments, without causing any harm to market efficiency. This argument requires strong assumptions. One such assumption is that the market pricing level does not change the sum of consumer and producer surplus generated by the market. A second such assumption is that market participants’ behavior responds equivalently to compensation through prices, make whole payments, and lost opportunity cost payments.

The assumption that repricing the market to include start and no load costs imposes no surplus loss ignores the additional cost imposed on the market by the lost opportunity

⁴ See the Comments of the Department of Market Monitoring for the California Independent System Operator Corporation, Docket No. EL18-34-000 (February 09, 2018).

⁵ PJM at 2.

cost payments. While repricing may reduce uplift, the reduction in existing make whole payments is not a cost savings. Instead, all the reduction in uplift is paid to generators with the higher prices that result from repricing. Repricing creates no funds to pay the new lost opportunity cost payments. Repricing creates no new market surplus. The new payments require that the RTO create new charges, borne by consumers and/or producers. When consumers or producers take on these charges, incentives change and market surplus is reduced. The larger the difference between the market dispatch and pricing, the larger the lost opportunity cost payments will be, and the greater the potential loss to efficiency. Therefore, PJM's fast start pricing proposal reduces market efficiency and fails to meet the Commission's first price formation goal of maximizing consumer and producer surplus.⁶

The assumption that energy market bidding behavior would not change as a result of repricing requires market participant indifference among payment methods. Publicly posted prices provide transparency and assurance of payment for any supply cleared in the Day-Ahead Energy Market and any output generated in the Real-Time Energy Market. Make whole payments and lost opportunity cost payments provide less assurance given that such payments depend on the application of complex rules in the settlement process. Proponents of repricing may argue that the RTO should therefore pay generators more through prices and less through uplift. This argument assumes equivalence between make whole payments and lost opportunity cost payments. Make whole payments support the total cost of a resource commitment, while lost opportunity cost payments support the five minute dispatch level in every market interval. If applied consistent with PJM's logic, lost opportunity cost payments will also be required for load, interface transactions, offline units, and virtuals. Once a generator understands that it has incurred commitment costs, the marginal cost pricing signal is consistent with its profit maximizing behavior. In a

⁶ See *Price Formation in Energy and Ancillary Services Markets Operated by Regional Transmission Organizations and Independent System Operators*, 153 FERC ¶ 61,221 at P 1 (2015).

competitive market, behaving in accordance with the marginal cost price signal is in a market participant's interest and is consistent with efficient dispatch. With repricing, behaving in accordance with the price signal harms both market efficiency and potentially reliability. The lost opportunity cost payment, though unobservable to the participant and unobservable to other market participants, becomes the core market signal. Rules around the payment of and eligibility for lost opportunity cost payments become core to ensuring market efficiency and reliability. If market participants can alter their behavior, either through market power or market manipulation, to increase lost opportunity cost payments, they will. As the California Department of Market Monitoring states, "if you change the rules and incentives people will change their behavior."⁷

B. Tying Start Time to the RTO Look Ahead Interval Will Lead to an Expanding Set of Fast Start Eligible Resources.

The Commission expresses concern that "commitment and dispatch of resources with start-up times in excess of an hour do not appear analogous to a marginal decision."⁸ PJM responds that a start time of two hours aligns with PJM's marginal decisions made by operators committing resources using advisory IT SCED solutions with forward time frames ranging from 15 minutes to two hours.⁹ The configuration of PJM's software does not define what is marginal in the energy market. PJM has the discretion to change the time frame used in IT SCED at any time. Defining what is marginal in the market based on PJM's software configuration would set a precedent that PJM could expand or contract the determination of which unit commitments are considered marginal at its own discretion. It would also set a precedent that software design drives market design rather than the other way around. PJM could develop software with a configurable start-up time for determining

⁷ CAISO DMM at 7.

⁸ December 21st Order at P.28.

⁹ PJM at 14.

which resources' start and no load costs it would include in prices. PJM could then expand the start time, perhaps to include all resources.

C. The Use of Integer Relaxation Rather than Economic Minimum Relaxation Must Be Justified.

PJM proposes to use an integer relaxation approach rather than the current economic minimum relaxation to implement fast start pricing.¹⁰ Integer relaxation and economic minimum relaxation can both be used to calculate fast start prices. However, PJM has proposed to use integer relaxation to implement its approximation of convex hull pricing.¹¹ Because PJM already uses software that relaxes the economic minimum, the Commission should require that PJM demonstrate the benefits and costs of implementing fast start pricing using any alternative approach, including integer relaxation.

D. Uplift Statistics Do Not Support Fast Start Pricing or Provide a Basis for Determining which Units Are Eligible for Fast Start Pricing.

PJM uplift is low, and the percent of uplift paid to units that start in one or two hours does not determine efficient market design.

PJM overstates the portion of uplift that fast start pricing has the potential to reduce. Not all categories of uplift are directly affected by fast start pricing. Lost opportunity cost (LOC) credits to combustion turbines committed in the Day-Ahead Energy Market and reduced or not committed in the Real-Time Energy Market are a significant portion of uplift paid to fast start resources. These lost opportunity cost payments would increase rather than decrease with fast start pricing because clearing prices for fast start commitments would be higher.

¹⁰ PJM at 5.

¹¹ See "Proposed Enhancements to Energy Price Formation," PJM report (November 14, 2017) at 15. <<http://www.pjm.com/-/media/library/reports-notice/special-reports/20171115-proposed-enhancements-to-energy-price-formation.ashx>>.

In 2017, PJM paid \$43.0 million of day-ahead and balancing uplift credits to combustion turbines and diesel generators with a start time and minimum run time of less than two hours, 33.0 percent of total uplift, which was \$128.8. Table 1 shows uplift payments to units with a start and minimum run time of less than two hours by category and unit type for 2017.

Table 1 Uplift credits for units with start and minimum run times less than two hours

Unit Type	Day Ahead Uplift Credits (Millions)	Balancing Uplift Credits (Millions)	LOC Credits (Millions)	Reactive Credits (Millions)	Total Credits (Millions)	Real Time Generation (MWh)	Uplift/MWh	Day Ahead and Balancing Uplift Credits/ MWh
Combined Cycle	\$0.0	\$0.2	\$0.0	\$0.0	\$0.2	11,302	\$15.5	\$14.9
Combustion Turbine	\$0.4	\$42.2	\$4.5	\$0.5	\$48.7	4,961,773	\$9.8	\$8.6
Diesel	\$0.0	\$0.4	\$0.3	\$0.0	\$0.9	168,756	\$5.1	\$2.7
Solar	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	1,298	\$22.6	\$22.6
Steam-Other	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	387	\$0.3	\$0.3
Wind	\$0.0	\$0.2	\$1.7	\$0.0	\$1.9	352,572	\$5.5	\$0.6
Total	\$0.4	\$43.1	\$6.6	\$0.5	\$51.7	5,496,089	\$9.4	\$7.9

In 2017, PJM paid \$13.7 million of day-ahead and balancing uplift credits to combustion turbines and diesel generators with a start and minimum runtime of less than one hour, 10.6 percent of total uplift. Table 2 shows uplift payments to units with a start and minimum run time of less than one hour by category and unit type for 2017.

Table 2 Uplift credits for units with start and minimum run times less than one hour

Unit Type	Day Ahead Uplift Credits (Millions)	Balancing Uplift Credits (Millions)	LOC Credits (Millions)	Reactive Credits (Millions)	Total Credits (Millions)	Real Time Generation (MWh)	Uplift\$/MWh	Day Ahead and Balancing Uplift Credits/ MWh
Combined Cycle	\$0.0	\$0.2	\$0.0	\$0.0	\$0.2	11,302	\$15.5	\$14.9
Combustion Turbine	\$0.3	\$13.0	\$1.9	\$0.4	\$16.8	1,513,761	\$11.1	\$8.8
Diesel	\$0.0	\$0.4	\$0.3	\$0.0	\$0.7	156,097	\$4.7	\$2.3
Solar	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	1,298	\$22.6	\$22.6
Wind	\$0.0	\$0.2	\$1.7	\$0.0	\$1.9	352,572	\$5.5	\$0.6
Total	\$0.3	\$13.8	\$4.0	\$0.5	\$19.7	2,035,030	\$9.7	\$6.9

Due to the larger output of the two hour resources, the day-ahead and balancing uplift credits have a similar magnitude of \$8.6 and \$8.8 per MWh for combustion turbines and \$2.7 and \$2.3 per MWh for diesel generators. With higher output levels and longer minimum run times, the two hour resources would impose greater discrepancies between prices and dispatch under fast start pricing, which create inefficient five minute price signals and impose additional lost opportunity cost payments on the market. The relative differences in uplift between the two groups of resources is not justification for choosing the

applicable start and minimum run times for determining whether a fast start commitment is marginal.

It is not clear why PJM permits combustion turbines to be paid uplift based on two hour start times. Such start times are not physical requirements. Such payments reward inflexibility. There is no reason to make a significant change to PJM pricing to accommodate units with inflexible parameters. Instead of changing pricing, the question of how to provide market incentives for investment in flexible units and for investment in increased flexibility of existing units should be addressed directly. The question of whether inflexible units should be paid uplift should be addressed directly. Units that are actually flexible can start in less than 10 minutes so it is not clear how this definition can be stretched to include two hours.

E. Subsidy Seeking Is not a Valid Motivation for Price Formation Reform.

The comments of the Nuclear Energy Institute (NEI), Exelon, FirstEnergy and East Kentucky Power Cooperative (EKPC) make clear that the discussion of price formation reform in PJM has become another arena for seeking subsidies for nuclear and coal generation. NEI explains that nuclear generation owners await the results of PJM price formation reform, including fast start pricing, in assessing retirement decisions.¹² NEI states that the Commission's "focus should be on minimizing the need for uplift payments in favor of internalizing all system costs in the market price."¹³ FirstEnergy and EKPC argue that market design should not focus on economic efficiency.¹⁴ These arguments are not valid reasons for price formation reforms, like fast start pricing. The Commission's focus should remain on ensuring efficient and competitive markets, which requires that pricing

¹² NEI at 1.

¹³ NEI at 2.

¹⁴ FirstEnergy and EKPC at 11.

reflects short run marginal costs and that inefficient generation receives an accurate retirement signal.

Exelon's and FirstEnergy and EKPC's comments discuss fast-start pricing as part of a broader effort to raise generator revenues. Exelon describes its position that the Commission should consider commitment costs as marginal for all resources, not just fast start resources.¹⁵ Exelon's position would substantially increase energy market prices above efficient levels. FirstEnergy and EKPC describe fast start pricing as a remedy to a PJM market that "has produced artificially lower market clearing prices, which, in turn, has led to inadequate investment signals and has forced loads to incur unhedgeable uplift costs."¹⁶ FirstEnergy and EKPC's motivation for supporting fast start pricing is not related to efficient dispatch signals for fast start resources. Their motivation is the prospect of higher PJM energy prices to support their aging generation fleets.

Since June 2017, PJM has advocated for extending fast start pricing to all resources due entirely or in part to its concern for the "financial stress on all units – particularly large units with high capital costs" due to low energy prices.¹⁷

¹⁵ Exelon at 2.

¹⁶ FirstEnergy and EKPC at 1.

¹⁷ "Energy Price Formation and Valuing Flexibility," PJM report (June 15, 2017). < <http://pjm.com/-/media/library/reports-notice/special-reports/20170615-energy-market-price-formation.ashx?la=en>>.

II. ANSWER

PJM argues for the rejection of the DMM Comments, asserting that the DMM lacks authority to file, has not properly intervened in this proceeding and raises issues beyond the scope of this proceeding.¹⁸ PJM's arguments in support of its motion are incorrect, and the DMM Comments should be accepted.

The DMM, like the Market Monitor, claims no authority to require any rule in any market. The DMM's interest in market rules that promote and protect efficient pricing is plain in Appendix P and in the Commission's rule describing market design as a core function of Market Monitoring Units.¹⁹

The DMM has filed a protest in this docket consistent with the Commission rules, which do not require intervention in order to file a timely protest.²⁰

The market design principles raised by the DMM apply to all forms of repricing that would include commitment costs in LMP, whether fast start pricing or PJM's broader repricing proposal. These market design principles apply to all markets. The fact that the fast start pricing concepts used by New York ISO, Midcontinent ISO, and ISO New England

¹⁸ Motion of PJM Interconnection, L.L.C. to Reject Comments of the Department of Market Monitoring for the California Independent System Operator Corporation, Docket No. EL18-34-000 (February 27, 2018) at 2–3.

¹⁹ See CAISO Tariff, Appendix P § 5.1 (“DMM shall review *existing and proposed market rules, tariff provisions, and market design elements and recommend proposed rule and tariff changes* to the CAISO, the CAISO Governing Board, *FERC staff*, the California Public Utilities Commission, {M}arket {P}articipants, *and other interested entities*” [emphasis added]). The CAISO Tariff (Attachment P § 5.5.1) explicitly avoids limiting the authority of the DMM, as PJM argues: “DMM’s review shall include, *but is not limited to*, identification of flaws in the overall structure of the CAISO Markets that may reveal undue concentrations of market power or other structural flaws” [emphasis added]; 18 CFR § 35.28(g)(3)(ii)(A).

²⁰ See 18 CFR § 385.211(a) (“Any person may file a protest to object to any application, complaint, petition, order to show cause, notice of tariff or rate examination, or tariff or rate filing... The filing of a protest does not make the protestant a party to the proceeding... [T]he Commission will consider protests in determining further appropriate action. Protests will be placed in the public file associated with the proceeding.”).

have proliferated and created precedents for other markets demonstrates that the pricing methods approved by the Commission in one RTO have implications for other RTOs. PJM's argument that the DMM's interest is outside the scope of this proceeding is not convincing.

The Market Monitor strongly agrees with the DMM's Comments in this proceeding. The Market Monitor has previously opposed motions to dismiss when it strongly disagreed with the merits of a position on PJM market rules taken by another Market Monitoring Unit.²¹ The ability to participate in proceedings focused on PJM market rules should not turn on whether PJM or the Market Monitor agrees with the position argued. There is no reason why the Commission cannot evaluate arguments based on their merits. PJM's motion should be denied.

III. CONCLUSION

The Market Monitor respectfully requests that the Commission afford due consideration to the arguments made on brief as the Commission resolves the issues raised in this proceeding.

Respectfully submitted,



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²¹ See Answer of the Independent Market Monitor for PJM, Docket No. ER17-62-000 (June 17, 2016).

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Dated: March 7, 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 7th day of March, 2018.



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