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

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| PJM Interconnection, L.L.C. | ) | Docket No. EL18-34-000 |

# ANSWER AND MOTION FOR LEAVE TO 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[2] ("Market Monitor"), submits this answer primarily to the reply briefs submitted March 13–16, 2018, by PJM Interconnection, L.L.C. ("PJM"); the New York ISO Market Monitoring Unit ("Potomac Economics"); Exelon Corporation ("Exelon"), including Exhibit A, Prepared Testimony of Michael E. Schnitzer ("Witness Schnitzer"); Dominion Energy Services, Inc. ("Dominion"); FirstEnergy Service Company, et al., including Attachment 1, Affidavit of Dr. David Hunger ("Witness Hunger"); and American Municipal Power, Inc. et al. ("Joint Commenters"), including Attachment, Samuel A. Newell et al., "Evaluation of PJM's Fast-Start Pricing Proposal (March 14, 2018) ("Brattle").

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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") or the PJM Operating Agreement ("OA").

## I. ANSWER

### A. The Commission Should Preserve and Defend the Concept of Marginal Cost Pricing.

The replying commenters fall into three groups with respect to views on marginal cost pricing: supporters of short run marginal cost pricing; advocates for any pricing mechanism that moves toward convex hull pricing; and supporters of marginal cost pricing but with commitment costs included in prices for a defined set of fast start resources. As an advocate of convex hull pricing, Exelon states (at 12) that "there is frequently no single set of prices that is consistent with the least cost unit commitment and dispatch." On behalf of the PJM Power Providers, Witness Stoddard states (at 7) that "there is no single 'right' way to price power. Such statements attempt to make the concept of marginal cost pricing arbitrary. These same commenters present the same arguments for redefining prices based on convex hull pricing in the name of grid resilience.[3] PJM's proposal to adopt the broadest possible definition of fast start resources, which is all resources subject to a real-time commitment by PJM, and to set prices using integer relaxation, would move as far as possible toward PJM's convex hull pricing approximation under the Commission's order.[4]

There is a right way to price power. The right way to price power is based on short run marginal costs. The convex hull proponents continue to recognize that this is the efficient outcome as they retain the short run marginal cost result as the basis for dispatch while proposing different prices to meet objectives not related to economic efficiency. The

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[3] *See* Comments and Response of PJM Interconnection, L.L.C, Docket No. AD18-7 (March 9, 2018), Reply Comments of PJM Power Providers, Attachment A: Stoddard Affidavit, Docket No. RM18-1 (November 7, 2017), and Comments of Exelon Corporation, Docket No. RM18-1 (October 23, 2017).

[4] *See Proposed Enhancements to Energy Price Formation*, PJM report (November 15, 2017) ("PJM November 2107 Report"), which can be accessed at: <http://www.pjm.com/-/media/library/reports-notices/special-reports/20171115-proposed-enhancements-to-energy-price-formation.ashx>.

validity of short run marginal cost pricing does not erode with the nonconvexities of supply created by commitment costs.

The Market Monitor and the CAISO DMM support short run marginal cost pricing with make whole payments, a model that recognizes nonconvexities created by commitment costs and respects physical resource constraints when calculating the marginal cost of market dispatch. Economic theory supports the argument that marginal cost pricing is efficient and attainable in markets with nonconvexities. Witness Stoddard is incorrect that the fast start situation is not comparable to markets with economies of scale. Power generation has economies of scale. Witness Stoddard's arguments that the commercially relevant timeframe differs from Coase's example is incorrect. Coase uses "a discrete cost that is incurred in the same time period as the consumption decision is made" as further explained in the DMM's comments in reply to the Commission's fast start NOPR.[5] Quinzii also demonstrates the conditions under which coordination may facilitate maintaining marginal cost prices in the face of increasing returns to scale when consumers are willing to share in the payment of fixed costs that prices do not cover.[6] The allocation of uplift is an acknowledged challenge resulting from marginal cost pricing, but it does not warrant a departure from marginal cost pricing, as Stoddard suggests.[7]

Despite the statement of PJM that the Market Monitor wants "to force the electricity market into a textbook convex model" and by Witness Stoddard that the Market Monitor's argument rests on "core conditions that are simply not met by power markets," it is the approach preferred by PJM (at 7) and Stoddard (35) that pretends the supply curve is convex. Fast start pricing and convex hull pricing assume that the physical resource

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[5] Comments of the Department of Market Monitoring for the California Independent System Operator, Docket RM17-3 (February 28, 2017) at 10.

[6] Quinzii, Martine (1992). *Increasing Returns and Efficiency*, New York: Oxford University Press.

[7] Witness Stoddard at P 37.

constraints are relaxed when they are not and assume that commitment costs vary with output when they do not. PJM and Witness Stoddard create a pricing model that is convex only as a result of counterfactual assumptions. Fast start pricing and convex hull pricing assume away the actual nonconvexities of the real units in the market.

All generating resources have physical restrictions. The Market Monitor defines inflexible parameters as those less flexible than the current state of generating technology. The PJM parameter proxy values developed for Capacity Performance resources represent current technology for resources other than coal units.[8] When resources receive uplift because their inflexible parameters create inefficient dispatch, the payments exceed the competitive level, defined by the current technology of a potential new entrant. This is one of the reasons why only 10 units receive one third of the uplift paid by PJM.[9] Reducing compensation to competitive levels for such units would not drive all inflexible units out of the market, as PJM states. Paying uplift based on flexible parameters will enhance the competitiveness of the market. It is neither arbitrary nor impractical, as PJM states.[10] Paying uplift based on flexible parameters will provide an incentive for existing units to increase flexibility and offer actual flexibility to the market and provide an incentive for new entry by flexible units.

PJM ignores the fact that some of the inflexible units that would be permitted to set price under its proposal are inflexible by choice and not as a function of the generation technology. Generators can define their own parameters in price-based offers. Increasing

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8 *See* Unit-Specific Minimum Operating Parameters for Capacity Performance and Base Capacity Resources, which can be accessed at: <*http://www.pjm.com/~/media/committees-groups/committees/elc/postings/20150612-june-2015-capacity-performance-parameter-limitations-informational-posting.ashx*>.

9 *See* 2017 State of the Market Report for PJM, Vol. 2 ("2017 SOM"), Section 4: Energy Uplift, Figure 4-7.

10 PJM at 7.

uplift payments or increasing prices as a result of inflexible parameters is not consistent with efficiency and provides a mechanism for the exercise of market power which market rules do not address. That is why the Market Monitor recommends that a first step towards improving price formation would be to limit uplift payments to units based on flexible parameters rather than based on generator defined parameters.

In a market with nonconvexities, the price that covers all short run marginal costs is not the same as the price that equates supply and demand. This is an underlying source of tension between the commenters supporting marginal cost pricing and the advocates of convex hull pricing. The advocates of convex hull pricing acknowledge no loss in departing from marginal cost pricing, making statements like Witness Stoddard's (at 7) "there is no single 'right' way to price power." With no "right" price in mind, the advocates of convex hull pricing suggest that a new criterion, minimizing uplift, should determine energy market pricing. While Potomac Economics recognizes that the primary objective of fast start pricing is not minimizing uplift, PJM clearly argues for a long start time definition for fast start resources on the basis that it would reduce uplift more than the time frame recommended by the Commission or the time frames used in other organized markets.[11] PJM applies the convex hull pricing criterion of minimizing uplift as the basis for recommending its approach to fast start pricing.

Only marginal cost pricing equates real-time supply and demand in the five minute energy market, sending a transparent uniform price signal for efficient behavior on the margin. Potomac Economics (at 2) and Brattle (at 1) support fast start pricing from the perspective of expanding the concept of marginal costs. Under that view, market behavior should change, based on a different definition of what is marginal and thus efficient in the energy market. PJM supports a broad implementation of fast start pricing to create higher generator revenues, using lost opportunity cost payments in an attempt to maintain the

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[11] PJM Initial Reply Brief (February 12, 2018) at 15–16.

market behavior consistent with the cost minimizing dispatch because PJM acknowledges that the price signals it would send are inconsistent with efficient behavior.[12] These are two fundamentally different rationales for fast start pricing, with different implications for how to implement it.

The Market Monitor disagrees with both rationales. Efficient prices result from the model that produces the efficient dispatch. Replacing the efficient price signal with higher prices that then require penalties or lost opportunity cost payments in order to incent units to produce output consistent with efficient dispatch will not induce the same efficient behavior for several reasons: not all market participants receive lost opportunity cost payments; the magnitude of the payment is not known in real time; the payment structure may produce altered incentives; and the method for allocating charges to pay the lost opportunity costs would alter market incentives.

PJM also argues (at 7) that by increasing revenues available to generators, it will increase competition in the market. This does not follow. Setting prices above the competitive level does not increase competition. Competition results in reducing prices to a level consistent with the short run marginal cost of production. Higher revenues can attract competition from new entry, but that new entry would reduce prices to a competitive level in a competitive market. Higher revenues also produce a windfall to incumbent generation, prolonging the life of inefficient generators in the market, which reduces competition from new entry. Rather than promoting competition and new entry, PJM's approach would result in paying inflexible units to remain in service, suppressing prices in the long run.

PJM also argues (at 10) that resources "compete to set prices." This is a misunderstanding of market competition. Sellers do not compete to set prices. They compete to sell at the market price and earn inframarginal rents, which they do by

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[12] *See* PJM Initial Reply Brief (February 12, 2018) at 17.

producing according to their short run marginal cost. PJM's arguments about competition resulting from higher prices are not sound, and, therefore, do not support their proposal.

The Commission should dismiss the arguments made in support of fast start pricing and the proposals to implement fast start pricing made by the advocates of convex hull pricing, including those of PJM, as inconsistent with the Commission's goal to maintain a competitive market based on marginal cost pricing.[13]

### B. Five Minutes Is the Established Short Run Time Frame for Real-Time Energy Markets.

The Commission recognized in Order No. 825 that market participants make marginal decisions in a time frame of five minutes or less and that an efficient market sends price signals signaling behavior on the margin in that time frame.[14] Stoddard argues (at 34) that five minutes is not a "commercially relevant timeframe." He bases his argument on a discussion of infinitesimally small changes in load ($\partial D$) for infinitesimally small time frames ($\partial t$). He argues (at 35) that using infinitesimally small changes in load and time imply a marginal price for energy of zero. Witness Stoddard's discussion is mathematically incorrect. The field of calculus is based on defining the ratio of two changes, in the limit. That definition, the slope, could be zero but is not zero by definition. The limit, as the change in system load gets smaller and smaller, of the associated change in system costs is certainly not zero. It is the nonzero system LMP. Witness Stoddard states (at 35) that "when the commercially relevant time step proposed by PJM of two hours is used, more costs become variable and should, therefore, be included in the price." This argument could be made about any time frame. The argument proves too much. In a long enough time frame, all costs are variable.

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[13] *See Price Formation in Energy and Ancillary Services Markets Operated by Regional Transmission Organizations and Independent System Operators,* 153 FERC ¶ 61,221 at P 2 (2015).

[14] Order No. 825 at P 13.

American Municipal Power, Inc., the American Wind Energy Association, the Delaware Public Service Commission, the Division of the Public Advocate for the State of Delaware, the Natural Resources Defense Council, Sustainable FERC Project, NextEra Energy Resources, LLC, the People's Counsel for the District of Columbia, the PJM Industrial Customer Coalition, (Joint Commenters (at 6)) and Dominion (at 3) point out that PJM's proposed two hours is an excessively long timeframe for defining fast start resources. Brattle demonstrates (at 3–4) that the real-time commitment process using IT SCED does not justify the proposed two hour timeframe. Dominion states (at 3) that the two hour timeframe includes resources that "are arguably not 'fast-start' or flexible." PJM itself has established that start and notification times for flexible CTs need are six minutes, or 18 minutes if frame CTs are included.[15]

Witness Stoddard ignores the relevance of the fact that PJM and other system operators are using, or will soon use, five minute pricing precisely because it is commercially relevant. System operators want units to follow five minute dispatch signals. It is clear from PJM's experience that units would not respond to five minute dispatch signals if the units are only paid on a one hour or a two hour basis.

Witness Stoddard's description (at 13–14) of a longer commercially relevant time frame focuses on the unit commitment process and emergency demand response resources. While demand response resource rules are not the standard for economic efficiency or for generating units, Witness Stoddard is incorrect about emergency demand response resources. The default lead time since June 1, 2015, is 30 minutes.[16] His focus is backward looking. With advancing technologies such as energy storage, real-time price responsive

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[15] *See* Unit-Specific Minimum Operating Parameters for Capacity Performance and Base Capacity Resources, which can be accessed at: <*http://www.pjm.com/~/media/committees-groups/committees/elc/postings/20150612-june-2015-capacity-performance-parameter-limitations-informational-posting.ashx*>.

[16] *See* "PJM Manual 18: Capacity Market," Rev. 38 (July 27, 2017) at 62.

load, renewable generation, aero-derivative combustion turbines, and modern reciprocating engines, the commercially relevant timeframe for the market grows shorter and shorter. PJM has not experienced the penetration rates of other regions for these new technologies, but it should look forward, not backward in advancing market design. With its experience operating with higher renewable penetration rates, CAISO has found that "resources committed in the fifteen-minute real-time unit commitment process to provide energy often do not provide sufficient flexible ramping capability in the five-minute real-time dispatch to meet the actual changes in net load that occur over every successive five-minute period."[17] Based on this example, a lack of precise five minute pricing would not support PJM's advancement as markets evolve.

**C. PJM Incorrectly Defines Fast Start Resources.**

PJM incorrectly defines fast start resources as units with a maximum two hour start time and a maximum two hour minimum run time. Such resources are neither fast start nor flexible. IMG's characterization of such start times as glacial is apt.[18] PJM's own parameters for the capacity performance capacity market rules include start times of 6.0 minutes for aero derivative CTs and 18.0 minutes for frame CTs. PJM states that the shorter the start time and minimum run time, the less uplift will be reduced and the fewer units will be able to set price based on commitment costs rather than marginal costs. PJM's response to IMG reveals that PJM's actual purpose is not to implement fast start pricing as the Commission has defined it, but to take a large step towards PJM's convex hull pricing goal.

If applied only to fast start units, fast start pricing in PJM would have a negligible effect. Implementing fast start pricing would not be cost effective, even if fast start pricing were desirable.

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[17] CAISO Fast Start NOPR comments at 5, which can be accessed at: <*http://www.caiso.com/Documents/Feb28_2017_Comments-Fast-StartPricingNOPR_RM17-3.pdf*>.

[18] Initial Brief of IMG Midstream, LLC ("IMG") Docket No EL18-34 (February 12, 2018) at 5.

The total uplift in 2017 associated with units with start times of less than or equal to 10 minutes and minimum run times of less than or equal to one hour was $1.2 million, or less than 1.0 percent of total uplift. Using a start time not consistent with a reasonable definition of fast start, the total uplift in 2017, associated with units with start times of less than or equal to one hour and minimum run times of less than or equal to one hour was $16.4 million, 12.7 percent of total uplift. This ignores the fact that not all of this uplift would necessarily disappear and that additional uplift would have to be paid to units to reduce output. Total uplift in 2017 was $129.1 million.[19]

The fact that fast start pricing will have a minimal effect in the PJM markets is not a reason to implement fast start pricing for slow start units. It is a reason to reject PJM's fast start pricing proposal and encourage PJM to pursue reforms that are consistent with efficient locational marginal pricing.

### D. Efficient Prices for Interchange Scheduling Result from the Cost Minimizing Dispatch.

Currently, PJM's interchange transactions self schedule based on real-time pricing, as PJM has not cleared a dispatchable import or export since 2012.[20] The Market Monitor provided an example in its initial brief demonstrating that fast start pricing would attract an inefficient $60 per MWh import in a situation where PJM had committed a $100 per MWh fast start resource with ample excess generation that PJM must reduce output from a less expensive $50 per MWh resource.[21] Potomac Economics argues (at 9) that the price

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[19] PJM's uplift numbers are incorrect. PJM included intermittent resources like solar and wind and used an example day rather than calculating actual uplift for the entire year. (PJM at 16). The Market Monitor's results include combustion turbines, combined cycle units, steam turbines, and diesel units clearing in 2017 with an offer meeting the minimum run time and start time parameter criteria.

[20] *See* 2012 State of the Market Report for PJM, Vol. 2, Section 8: Interchange Transactions, pp 263-264..

[21] *See* Initial Brief of the Independent Market Monitor for PJM, (Feb. 12, 2018) at 6.

should be $100 per MWh.[22] Exelon argues (at 18) that the price should be $60 per MWh. Both Potomac Economics and Exelon agree that the import should clear the market. The import should not clear. PJM has already solved a cost minimizing unit commitment. Any market response at a cost greater than $50 per MWh is inefficient in that it increases the cost of serving load. PJM has stated that it would "apply fast-start pricing logic in a way that would not change the dispatch of resources away from the cost-minimizing dispatch."[23] PJM would pay lost opportunity costs to the marginal $50 per MWh resource. The inefficient import would disrupt the cost minimizing dispatch, causing PJM to pay greater lost opportunity costs to the marginal resource. Pricing based on the resources' short run marginal costs in the five minute dispatch would result in the efficient price signal, consistent with the efficient commitment and dispatch, of $50 per MWh.

**E. PJM's Proposal Relies Heavily on Lost Opportunity Cost Payments.**

PJM's proposal to maintain cost minimizing commitment and dispatch while including the commitment costs of two hour resources in prices relies on lost opportunity cost payments to correct the market incentives created by pricing above marginal cost. PJM argues (at 6) that the lost opportunity cost payments have the additional function of increasing energy market payments to flexible generation that PJM reduces to accommodate fast start resources. PJM's argument is misleading and incorrect, because PJM's fast start proposal would provide the same windfall increase in revenues to all inframarginal generation, whether flexible or not. The payment is made directly through prices for MW produced and through lost opportunity cost payments for MW not produced. Paying higher revenues to resources for the same dispatch and commitment they

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[22] In Potomac Economics' example the fast start resource offer is $75 per MWh instead of $100 per MWh.

[23] PJM Initial Brief at 12.

provide now provides no incentive to enhance flexibility or behave more competitively in any other way.

PJM further justifies (at 12–13) the lost opportunity cost payments as a reduction in uplift. PJM's response to IMG emphasizes uplift reduction as a primary goal of fast start pricing. PJM uses the quantity of uplift reduced to defend its two hour fast start definition, but it could make the same argument to defend any longer and longer time frame.[24] The proposal is consistent with PJM's prior position that "PJM believes that the right locational prices should minimize the need for uplift payments."[25] Potomac Economics argues (at 4) that reducing uplift is a secondary objective of fast start pricing. However, according to the rationale "that there is no single 'right' way to price power," uplift minimization is the only criteria "used to score different options" in the convex hull pricing literature.[26] In fact, convex hull pricing is sometimes called "minimum uplift pricing" with the explicit goal of generating prices that cover both incremental energy and commitment costs.[27] The different perspectives presented in the reply comments again emphasize the differing rationales of the commenters that lead to different conclusions among the supporters of fast start pricing.

With the exception of Dominion (at 4), all the commenters and PJM ignore the issue of uplift allocation. PJM has not discussed the allocation of lost opportunity costs in its stakeholder process. Brattle correctly points out (at 8–9) that payment of lost opportunity costs as an incentive to follow dispatch is illogical in the Day-Ahead Energy Market. The payment and allocation of uplift affects market incentives and so would further undermine market efficiency.

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24 *See* PJM Initial Brief at 15–16.

25 PJM November 2017 report at 15.

26 *See* Stoddard at 39.

27 Hogan, William W. and Brendan J. Ring, "On Minimum-Uplift Pricing in Electricity Markets" (2003).

### F. Including Commitment Costs in Both Day-Ahead and Real-Time Prices Results in Over Payment.

The Market Monitor agrees with PJM (at 9) that it is critical to eliminate the possibility that a resource that has already received its commitment costs in the Day-Ahead Energy Market, either through uplift or prices, would receive payment for the same costs again in the Real-Time Energy Market. Brattle's argument (at 8–9) that fast start resources start near real time does not change the potential excess recovery of costs. Exelon makes a similarly irrelevant argument (at 14) that fast start resources are not physically committed until real time. Exelon is correct in stating (at 16) that "persistent price differences between the markets will occur and costs to consumers will rise with no corresponding benefit" if PJM includes commitment costs in only the market that committed the resource.

Witness Schnitzer states (at 18) that including commitment costs in both day-ahead and real-time prices does not result in over recovery. He is correct that the prices themselves do not result in over recovery. However, the combination of prices and uplift payments do result in over recovery. PJM provides an integer relaxation example in its March 5, 2018, presentation to the Energy Price Formation Senior Task Force of a resource that clears at its economic minimum.[28] In Example 1, Resource Y receives a dispatch of 50 MW. Its economic maximum output is 150 MW. With the application of integer relaxation, the price equals its $200 per MWh incremental energy cost plus 1/150 of its $5,000 start and no load costs, which is $233 per MWh. With the 50 MW dispatch Resource Y receives 50/150, or one third, of its commitment costs through the price. PJM would provide an uplift payment to cover the rest of the commitment costs, so the combination of prices and uplift would fully cover the commitment costs. Suppose the 50 MW dispatch resulted from

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[28] "Single Period Integer Relaxation Examples," PJM Presentation to the Energy Price Formation Senior Task Force (March 5, 2018) at 4–12, which can be accessed at: <*http://pjm.com/-/media/committees-groups/task-forces/epfstf/20180305/20180305-item-10-single-period-integer-relaxation-examples.ashx*>.

the day-ahead market, and the real-time market dispatched Resource Y to 100 MW. The real-time price with integer relaxation would still include 1/150 of the commitment costs per MW dispatched. Resource Y would receive another 50/150 of the commitment costs from the real-time price. Resource Y would over recover its commitment costs by one third.

Over recovery of commitment costs bid at competitive levels for units setting the price is not consistent with an efficient market design. The inability of the proposed market design to eliminate this issue illustrates the fact that including commitment costs in prices is not efficient market design. Another of the Market Monitor's recommendations would resolve the issue: the elimination of day-ahead uplift payments.[29]

**G. PJM Relies on Fast Start Resources When the Market Is Tight.**

PJM has failed to demonstrate or even to make a credible argument that reforms to scarcity pricing, the definition of reserves and the pricing of operator actions would not address any identified issues with price formation. PJM agrees that a disproportionate level of uplift occurs on high load days but emphasizes that the majority of uplift occurs on all the other days. PJM leaps to the conclusion that therefore fast start pricing is necessary. (PJM at 4) PJM ignores the fact that properly defined scarcity would not occur solely on high load days. Locational scarcity through properly defined transmission constraint demand curves would not occur solely on high load days. Similarly, the impact of improving the reserve markets and explicitly pricing operator actions would not be limited to high load days.

**H. Fast Start Pricing Would Create New and Enhanced Opportunities to Exercise Market Power.**

The peaking segment of the supply curve is relevant whenever PJM needs to commit peaking resources to meet high loads or rapid increases in load. When PJM faces conditions that only peaking resources can meet, the peaking segment of the supply curve is the

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[29] *See* 2017 SOM, Section 4: Energy Uplift at 198.

defined relevant market. Measures of market concentration for the defined relevant market are valid. Hunger argues (at 13) that HHI is not a valid calculation over only a segment of the supply curve. The Market Monitor disagrees. Nonetheless, HHI has limitations as a measure of structural market power. When only one or only a small number of suppliers can provide the supply necessary to meet load, the suppliers are pivotal. Pivotal suppliers have market power despite the level of market concentration.

The Market Monitor has found that pivotal suppliers frequently exist in the aggregate PJM Day-Ahead Energy Market. Figure 1 shows the days with pivotal suppliers and the numbers of pivotal suppliers in the PJM Day-Ahead Energy Market in 2017. In the Real-Time Energy Market, the market's options to meet load or rapid increases in load are more limited, so pivotal suppliers are more frequent. PJM asserts (at 10) that the Market Monitor attributes the higher prices calculated with fast start pricing to market power. Of course, there is a difference between the higher prices due to the inclusion of competitively offered commitment costs in prices and even higher prices due to market power. PJM attempts to confuse the issue with its assertions about the nature of the Market Monitor's arguments.[30]

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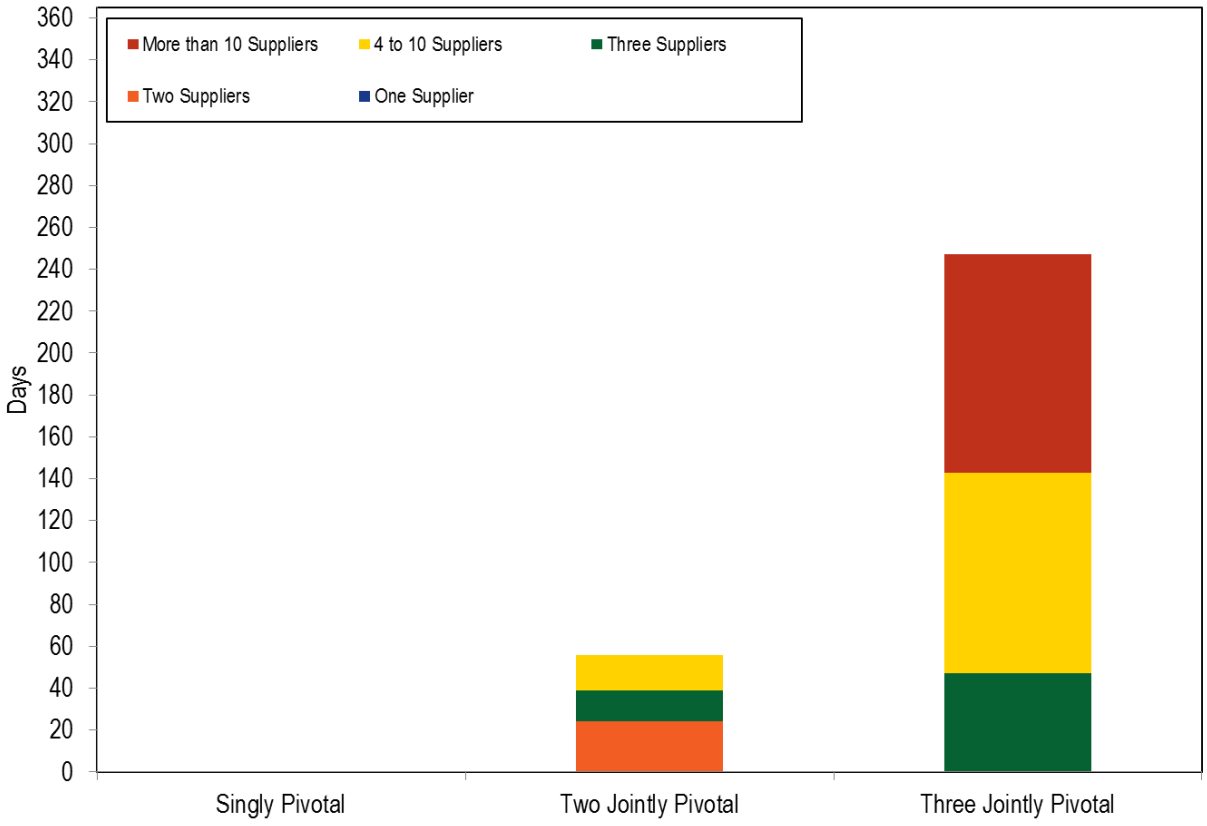
30 *See* PJM at 10. "The IMM's argument regarding aggregate market power appears to be based on an underlying assumption that rules preventing inflexible resources to set the LMP were designed as some form of market power mitigation such that removing such limitation increases the ability for a resource owner to exert market power. Not only is this untrue, it is a new argument that has never been used in the past and it is an argument of convenience designed to distract from the rate design issue in this 206 proceeding."

**Figure 1 Days with pivotal suppliers and numbers of pivotal suppliers in the PJM Day-Ahead Energy Market: 2017** [31]




Consider a 100 MW fast starting combustion turbine with a $20 per MWh incremental energy cost that currently sets prices based on its marginal dispatch to meet load during the morning hours when load rises at a rapid rate. Suppose its start cost is $500 per start, but it offers $10,000 per start in its price-based schedule. With fast start pricing, it sets price at $120 per MWh instead of $20 per MWh. Its markup on its start cost, which previously only affected uplift, now affects prices for all MW on the system, including all of the inframarginal resources owned by the same company. The resource's ability and incentive to exercise market power by using the high markup on the start cost is enhanced by fast start pricing. If the resource is one of a small number of available and economic

[31] *See* 2017 SOM, Section 3: Energy Market at 105–106.

combustion turbines to meet the rapidly increasing load, it has structural market power as a pivotal supplier. PJM's market power mitigation does not address the issue.

PJM applies the Three Pivotal Suppliers (TPS) test upon the commitment of a resource, determining a supplier's pivotal status based on the available online and available offline supply that could resolve a constraint for less than a defined price threshold.[32] Figure 2 depicts the determination of the relevant market for the TPS test. In the current TPS application, which PJM proposes to use with fast start pricing, only the incremental energy cost determines the supply available (*S* in Figure 2) below the threshold (*1.5* $P_c$ in Figure 2) for online resources. In a fast start pricing run, the relevant supply (*S*) would include commitment costs for online fast start resources and MW below the economic minimum for fast start resources with relaxed integers. Including the commitment costs would raise the available offers of fast start resources (raising $P_c$) and integer relaxation would introduce new supply (shifting *S*), changing the determination of supply available below the price threshold and changing the pivotal status of some suppliers. Furthermore, the TPS test using only the dispatch run could not accurately apply the price threshold, because prices would be determined in the separate fast start pricing run. The determination of market power would differ, and the current TPS test would not fully capture the relevant offers or prices in the fast start pricing solution. PJM proposes to ignore the fact that suppliers would become pivotal to relieve a constraint in the fast start pricing solution when they were not pivotal for the same constraint in the dispatch solution.

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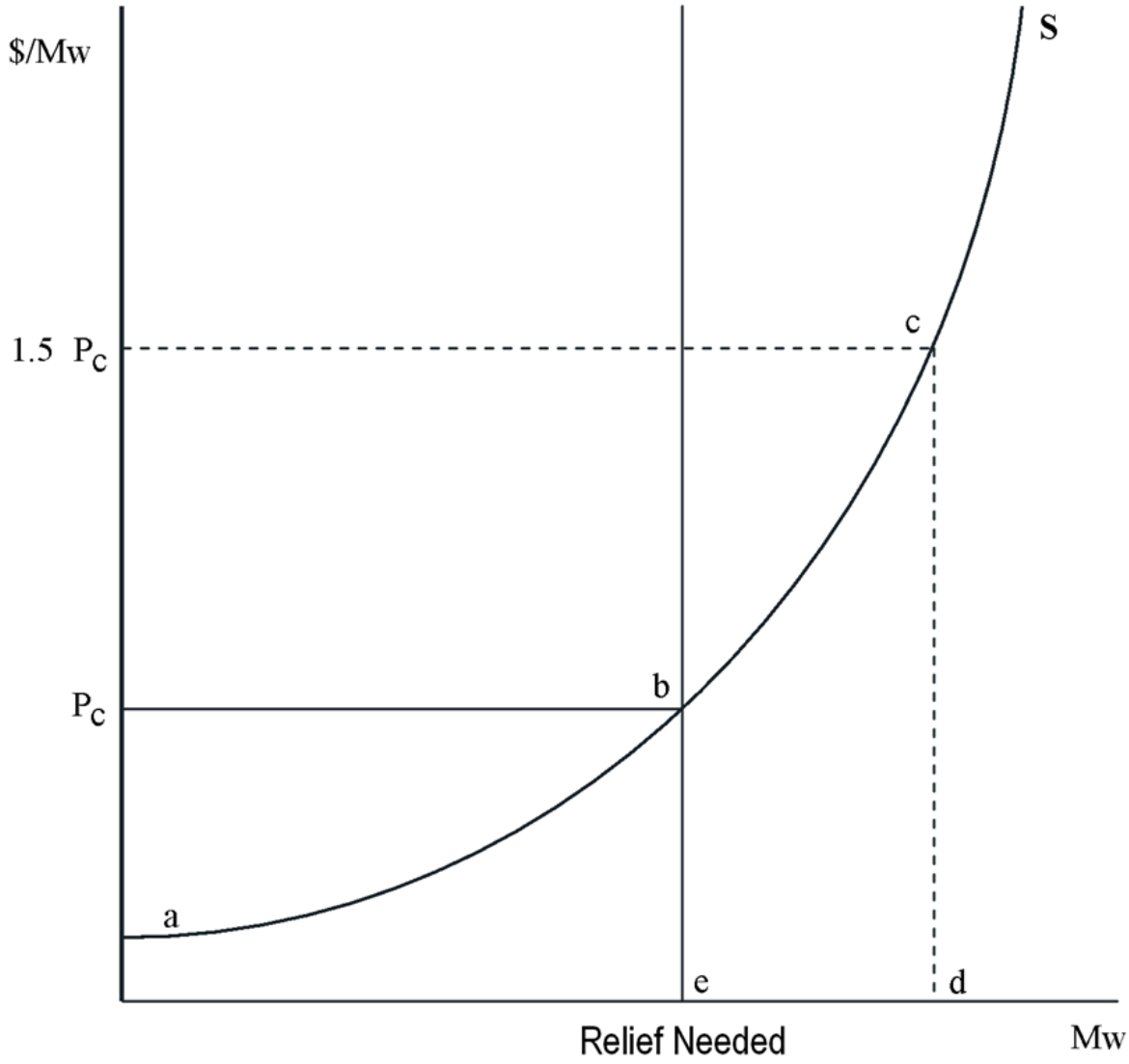
[32] *See 2010 State of the Market Report for PJM*: Technical Reference for PJM Markets at 45–49, which can be accessed: <*http://www.monitoringanalytics.com/reports/Technical_References/docs/2010-som-pjm-technical-reference.pdf*>.

**Figure 2 Definition of the relevant market for the Three Pivotal Suppliers Test**




PJM acknowledges (at 11–12) that constraints would bind differently in the fast start pricing solution and proposes to only apply market power mitigation based on the physical commitment and dispatch. PJM's argument (*id*.) is illogical that "because unit commitment and dispatch runs will continue to be handled in the same manner under fast-start pricing as they are today, the market power condition does not change." PJM simply ignores the local market power created by the differing congestion patterns in the fast start pricing solution. The Market Monitor agrees with the importance of maintaining mitigation based

on physical congestion, but disagrees with PJM's proposal to ignore the local market power created by the different congestion patterns in the fast start pricing run.

## 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.[33] In this answer, the Market Monitor provides the 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.

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[33] *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).

## III. CONCLUSION

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

Respectfully submitted,


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Dated: March 28, 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 28th day of March, 2018.

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