UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

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PJM Interconnection, L.L.C.	)	Docket No. EL21-78-000
	)	

COMMENTS OF THE INDEPENDENT MARKET MONITOR FOR PJM

Pursuant to Rule 211 of the Commission's Rules and Regulations,[1] and the show cause order issued in this proceeding on June 17, 2021 ("June 17th Order"),[2] Monitoring Analytics, LLC, acting in its capacity as the Independent Market Monitor ("Market Monitor") for PJM Interconnection, L.L.C. ("PJM"),[3] submits these comments responding to the Commission's June 17th Order and the response filed by PJM on September 15, 2021 ("September 15th Response").

The June 17th Order invites comments on (at P 21): "(1) whether PJM's existing Tariff remains just and reasonable and not unduly discriminatory or preferential; and (2) if not, what changes to PJM's Tariff should be implemented as a replacement rate."

The PJM tariff provisions that govern the application of operating parameters remain unjust and unreasonable for the reasons cited in the June 17th Order. It is not just and reasonable that market sellers can construct their price and cost-based offer schedules in a way that evades market power mitigation. Evading the requirement to use flexible parameters imposes inflexibility on the market at times when the market most needs a

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1 18 CFR § 385.211 (2021).

2 *PJM Interconnection, L.L.C.*, 175 FERC ¶ 61,231 ("June 17th Order").

3 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").

resource. It is not just and reasonable that PJM rules provide these incentives for inflexibility precisely when incentives for flexibility are required.

The September 15th Response argues that the PJM tariff is just and reasonable in its process for mitigating operating parameters because it asserts that its application of the rules selects the least cost schedule. A schedule is a generator offer that includes prices for defined MW levels and startup and no load costs, linked to physical offer parameters. Under the current rules, generators have two sets of parameters, the flexible parameters required by the capacity performance capacity market design, and the inflexible parameters that many generators prefer. Under the current rules, all cost-based offers must include the flexible parameters, price-based offers may include inflexible parameters, and one set of price-based offers must include the flexible parameters (price based PLS). Schedules with flexible parameters are considered only under defined circumstances. Cost-based offers are considered when the owners of units fail the three pivotal supplier test, and price-based PLS offers are considered when units are committed during hot weather alerts, cold weather alerts and other emergencies. To date, these circumstances have not occurred frequently.[4] [5] But the PJM market design must be resilient to future changes to ensure flexibility cannot be withheld based on market power.

Instead of ensuring that parameter limits apply during these defined circumstances, PJM chooses the lower of the price-based schedule and the price-based parameter limited schedule during hot and cold weather alerts. Instead of ensuring that parameter limits apply, PJM chooses what it incorrectly defines to be the lower of the price-based schedule and the cost-based parameter limited schedule when a resource fails the TPS test. The current

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4 For the historical data on the number of days PJM declared weather and emergency alerts, see Monitoring Analytics, LLC, *2020 State of the Market Report for PJM*, Vol. 2 (March 11, 2021) ("2020 SOM") Section 3, Figure 3-49.

5 For the historical data on the units that are offer capped for failing the TPS test, *see* 2020 SOM, Section 3, at Tables 3-94 through 3-97.

implementation is not consistent with the goal of having parameter limited schedules, which is to prevent the use of inflexible operating parameters to exercise market power and to ensure that capacity resources meet their obligation to provide flexibility to the system. The Commission recognized this flaw in the implementation of market power mitigation in the June 17th Order.

This asserted tradeoff between market power and production costs is artificial and arbitrary and should be eliminated. Contrary to the statements in the September 15th Response, it is not lower cost to permit market power to be exercised. In order to ensure effective market power mitigation and to enforce the flexibility obligations of capacity resources, PJM should always enforce parameter limited values when the TPS test is failed and during high load conditions such as cold and hot weather alerts and emergency conditions.

Such a model will ensure that market power mitigation works as intended. The September 15th Response's arguments are incorrect, and PJM's excuses for not addressing the unjust and unreasonable provisions in its tariff should be rejected. The changes proposed by the Market Monitor will ensure that generators cannot circumvent market power mitigation and that generators will meet their capacity resource flexibility obligations when the system most needs them.

The June 17th Order recognizes that the PJM tariff does not address the situation in which a resource cannot perform to its defined parameter limits in real time. The Commission rejected PJM's filing to add rules for Real-Time Values (RTVs) because they would have allowed resources to avoid their obligation to be flexible, in particular through the use of long notification times.[6] This failure to enforce the flexibility obligations defined by the required parameters is unjust and unreasonable. In the September 15th Response, PJM states (at 1–2) that "PJM agrees that the existing Tariff does not contain a clear process for necessary changes

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[6] June 17th Order at PP 16–17.

to parameter-limited schedules in real-time" and proposes "changes to the Tariff to provide specific provisions governing what happens when a Market Seller is unable to meet its unit-specific parameters in real time." The September 15th Response defines a process for obtaining approved exceptions to parameter limits in real time, but it does not define consequences for failure to meet the required parameters or address the situations where resources are unable to meet unit-specific parameters in real time. The real-time values issue with long notification times is a problem precisely because the PJM tariff does not define consequences for this failure to meet the required parameters. The September 15th Response does not resolve the issue. PJM should be required to develop tariff provisions under which resources that fail to meet their defined parameter limits return to customers a portion of their capacity market payments for failing to provide capacity under the terms of the tariff.

I. COMMENTS

A. PJM's Tariff Remains Unjust and Unreasonable Because it Fails to Mitigate Inflexible Parameters when Market Power Exists And During Expected High Load Days.

The Commission found that the PJM rules appear to be unjust and unreasonable based on the ability of sellers to avoid being subject to parameter limits when it is appropriate for those sellers to be subject to market power mitigation and during extreme weather alerts and other emergencies. In other words, PJM's market power mitigation rules appear to be unjust and unreasonable. Those rules were codified in PJM Operating Agreement, Schedule 1, Section 6.6 (a) and (b) following PJM's February 4, 2020, filing in Docket ER20-995, but had been implemented since 2008. When combined with other rules about offer selection, these rules permit market sellers to structure their offers so as to ensure that their offers are not mitigated and they are not required to provide the flexibility that is part of their capacity market obligation.[7] The current rules require that offers include a combination of offer curves and parameters. In the case of market power mitigation, sellers can structure the price-based offer curve with inflexible parameters so that it appears, under the PJM algorithm, to be lower cost than the cost-based offer with flexible parameters. In the case of extreme conditions, sellers can, by simply increasing the markup, make the price-based offer with flexible parameters much higher than the price-based offer with inflexible parameters. These rules are unjust and unreasonable because they allow market sellers to evade market power mitigation.

The September 15th Response does not contest the finding that sellers can strategically avoid mitigation under the current rules. Instead, PJM ignores the fundamental issue and focuses attention on its rule to commit and dispatch resources based on lower total system production cost. The September 15th Response (at 12) also inexplicably attributes these attempts at evading mitigation to competitive behavior, stating incorrectly that it is rational behavior.

PJM's goal, to achieve the lowest total system production cost, is not in question. What is in question is PJM's process to select the inputs (i.e. energy offers and operating parameters) used in these methods. Currently PJM limits the market to a choice of either a price or a cost schedule when a unit owner fails the TPS test. PJM's current process makes a determination based on lower production cost in the day-ahead energy market and lower total cost at economic minimum in the real-time energy market. But the process unnecessarily ties units' operating parameters (e.g. min run time, start times) to the financial offer parameters (e.g. incremental offer, no load cost). This linkage makes it, in some situations, impossible for PJM to correctly mitigate resources. PJM forced itself into this tradeoff between market power mitigation and minimizing production costs by setting rules which give the

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7 Only generation resources of certain technology types are subject to parameter limits in the PJM tariff. Solar, wind, nuclear, and hydropower resources are not subject to parameter limits.

market no other option.[8] The September 15th Response uses these very rules, that the June 17th Order called into question, as the defense. This circular logic is no response at all.

The September 15th Response argues (at 13) that PJM's current approach results in the lowest possible system production costs and concludes that any changes to the current approach will be detrimental to consumers. The argument and the conclusion are incorrect. The lowest cost schedule is not truly the lowest cost schedule if the market rules create an incentive for resources to mark up the offer prices in parameter limited schedules above the true marginal cost or if the market rules create an incentive to make operating parameters less flexible to compensate for a negative markup that ensures that the price-based schedule is selected.

1. PJM Ignores the Evidence Cited by the Commission

In the September 15th Response, PJM erroneously states that the Commission's June 17th Order "is void of any evidence that market power has in fact been exercised by Market Sellers under the existing rules." This is plainly incorrect. The June 17th Order (at 8) cites to the evidence from the State of the Market reports that shows the percent of day-ahead unit hours from the PJM energy market results in which units with market power (failed the three pivotal supplier (TPS) test) were committed on market-based offers less flexible than their parameter limited schedules.[9] The June 17th Order (at 8) also cites to the evidence from the State of the Market reports that shows the percent of day-ahead unit hours from the PJM energy market results in which units were committed with inflexible parameters on days when PJM declared hot weather and cold weather alerts.[10] The September 15th Response does not recognize, evaluate, or respond to the evidence cited in the June 17th Order. Instead of addressing the facts associated with the issue that the Commission explicitly presented with

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8 This is the implementation that was codified in the February 4, 2020 filing.

9 The Market Monitor updated this information using data for the first nine months of 2021 in Table 3.

10 The Market Monitor updated this information using data for the first nine months of 2021 in Table 5.

evidence, the September 15th Response denies that there is an issue. Instead of addressing the issues raised by the Commission or examining the evidence in its own market data, PJM accuses the Commission of not presenting evidence.

Instead of addressing the underlying market rules that should ensure both goals are achieved (market power mitigation and least cost dispatch), PJM illustrates the artificial tradeoff with simple numerical examples that do not reflect the offers in its energy market. The Commission should reject PJM's arguments as inapposite, and should order PJM to resolve the issues raised in the June 17th Order as recommended by the Market Monitor.

2. PJM's Algorithm for Lowest Production Cost Ignores Market Power Mitigation Issues.

The September 15th Response states (at 6) that PJM's "sophisticated commitment software is designed to commit resources based on the schedule that results in the lowest total system production cost." While the day-ahead commitment process is sophisticated, PJM's definition of the lower cost offer in the real-time market does not meet that standard. Even in the day-ahead market, PJM's sophistication fails to recognize that by allowing offers with crossing curves, its algorithm to choose the lowest production cost does not result in the lowest cost solution. It permits market power and even extreme market power to be exercised. If the price-based offer is less than the cost-based offer for most MW levels but has a high markup for a tail block, selection of the price-based offer will both minimize PJM production cost calculation (area under the offer curve plus start up and no load costs) and permit the exercise of market power. Crossing curves can also allow a resource to evade parameter mitigation, just like a negative markup. The test for the lower cost offer in real time simply compares the offer levels at the lowest MW level, economic minimum, and thus ignores any markup at the end of the price curve. PJM fails to acknowledge that this result is not inevitable, fails to acknowledge that there are other options that would result in even lower production costs, fails to acknowledge that this result permits the exercise of market power and fails to acknowledge that this is a market design problem to be solved.

PJM argues (at 4) that "the goal of picking an offer schedule that results in the lowest total system production cost is to meet expected loads at the lowest cost to consumers." The goal is market efficiency. PJM minimizes production costs to find the efficient commitment and dispatch solutions and sets the efficient price at the marginal cost associated with the efficient dispatch. One of the ways market power is exercised using offers that PJM selects as lower cost is through crossing price-based and cost-based offer curves that include a negative markup at low output levels and positive markup at higher output levels. By failing to recognize that minimizing production costs while allowing crossing curves permits the exercise of market power and actually increases customer payments, PJM is ignoring the issue that the market rules create and that a modification to the market rules could easily solve.

In explaining the results of their examples, the September 15th Response (at 6) failed to explain the impact on prices. Table 1 shows PJM's first example. In the first scenario in this example, the load is 120 MW, and LMP is set by unit 2 at $35 per MWh on cost. Load pays a total of $4,200. If unit 2 had cleared on price, the LMP would have been $40 per MWh and load would have paid $4,800. The production cost and load payments are consistent, both are minimized when unit 2 clears on cost. In the second scenario, load is 150 MW, and the LMP is set by unit 2 at $60 per MWh on price. Load pays a total of $9,000. If unit 2 had cleared on cost, the LMP would have been $100 per MWh and load would have paid $15,000. The production cost and the load payments are consistent, both are minimized when unit 2 clears on price. Table 1 shows the example provided by PJM.

Table 1 PJM crossing curve example

Unit	Segments	MW	Price Offer ($/MWh)	Cost Offer ($/MWh)	Eco Max (MW)	Eco Min (MW)
Unit 1	MW Segment 1	100	$30	$30	100	0
Unit 2	MW Segment 1	40	$40	$35	100	5
	MW Segment 2	60	$60	$100		

This is an example engineered to demonstrate a desired outcome. This is a form of a crossing curve offer, but it is unrealistic offer behavior and PJM does not assert that it is common. Units in the PJM market that offer with crossing curves typically offer price below cost at lower outputs and offer price above cost for higher outputs.

The September 15th Response ignores the situations in which the lowest production cost and the lowest load payments (based on the lowest marginal cost) are not consistent. Figure 1, in the first graph, shows the production cost for the same example at load levels from 105 to 160 MW. At 150 MW, the total production cost when clearing unit 2 on price is lower compared to cost. At 145 MW (denoted by the black circle in Figure 1), PJM is indifferent between clearing unit 2 on cost and price. At output levels from 105 to 145 MW, the total production cost from clearing on the cost offer is lower than on the price offer.

Figure 1 PJM's example production cost and load payments.

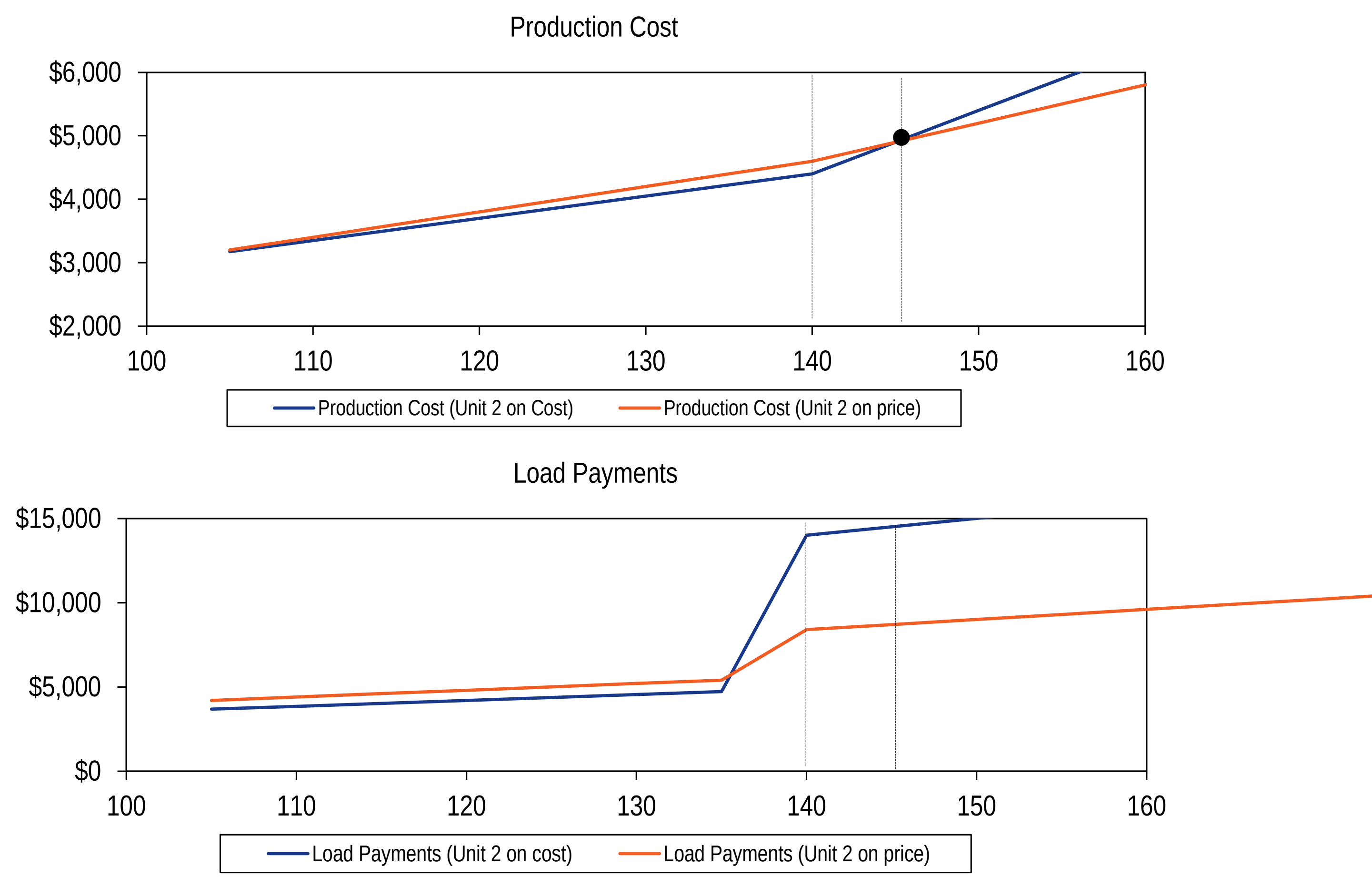

Figure 1, in the second graph, shows the load payments in the same example at load levels from 105 to 160 MW. The September 15th Response failed to explain that at 150 MW, total load payments using the price offer of unit 2 are lower than total load payments using the cost offer. At loads of 140 and 145 MW, PJM's example illustrates that even in this carefully constructed case, the market rules create an inconsistency. If the unit clears on cost, the production cost is lower compared to price, but the load payments are higher. This occurs whenever the marginal unit has both a positive and negative markup on their curve (i.e. crossing curves). It allows market power to be exercised. PJM presents no solution for this. In fact, the September 15th Response completely ignores this problem. The crossing curves case is the actual problem, as repeatedly pointed out by the Market Monitor.[11]

Using PJM's scenario, from the same example, in the September 15th Filing (at 11) where unit 2 has a minimum run time of 2 hours on the cost-based offer, and 24 hours on the price-based offer, the Market Monitor calculated the production cost if PJM were to mitigate the operating parameters and the financial parameters separately. PJM states (at 11) that in its scenario where the price-based offer for unit 2 is $40 per MWh and the cost-based offer is $70 per MWh, it is cheaper to commit the unit on price for 24 hours, instead of committing on cost for 2 hours. PJM explains that the production cost is $68,100 if unit 2 is committed on the price-based offer, and $68,200 if it is committed on the cost-based offer.

PJM's approach again illustrates that is simply ignoring the market power issue that results from permitting the use of inflexible parameters when units have market power. If PJM were to instead mitigate the minimum run time to 2 hours first, and then select the lower of the cost-based and price-based offers, it would result in $67,000 production cost, a significant improvement over both of PJM's suggested outcomes. This is illustrated in Table 2. Once unit 2 fails the TPS test, and its minimum run time is mitigated, PJM's selection of the lower price-based offer offers the real least system production cost outcome.

11 Monitoring Analytics, L.L.C., *2021 State of the Market Report for PJM: January through June* (August 12, 2021) ("2021 Q3 SOM") Section 3: Energy Market at 212–217.

Table 2 Outcome under the Market Monitor's proposal

					Cleared MW		
	Failed TPS Test	Min Run Time	Offer Type	Offer ($/MWh)	HE 1 - HE 17 and HE 20 - HE 24 (Load = 90 MW)	HE 18 - HE 19 (Load = 120 MW)	Production Cost
Unit 1	No	NA	Price Based	$30	90	100	$65,400
Unit 2	Yes	Mitigated to 2 hours	Price Based	$40	0	20	$1,600
Total							$67,000

The September 15th Response also provides no evidence that, even in the day-ahead market, its results are the ones with lowest system production cost when other parameters that affect unit behavior over more than one day are accounted for. For example, PJM's Resource Scheduling and Commitment (RSC) tool, which is the first step in the day-ahead energy market, evaluates resources over multiple days assuming constant offers, while the offers are actually only fixed for one operating day. This could result in RSC choosing the offer that it believes is the least cost offer given the offers for the first day, while in reality, resource owners can update the offers for future dates with no restrictions. Resources with market power can also use long minimum run times, minimum down times, start times, and notification times to create inflexibility over multiday periods over which the day-ahead market cannot minimize production costs. In these cases, the day-ahead market chooses the schedule with the lower costs over only the immediate 24 hour period even if that schedule requires the resource to run for several days instead of only one.

3. Real-Time Criteria for Selecting the Least Cost Offer.

PJM states (at 4):

> The goal of picking an offer schedule that results in the lowest total system production cost is to meet expected loads at the lowest cost to consumers.

PJM uses the system production cost as the metric to select the schedule a unit is committed on only in the day-ahead energy market, and not the real-time market. In the real-time energy market, PJM instead uses the unit's dispatch cost calculated at its economic minimum output regardless of where a unit is dispatched along its dispatchable range. The dispatch cost formula used in the real-time energy market is defined as:[12]

$$Dispatch\ Cost = Startup\ Cost + \sum_{h=1}^{Min\ Run\ Time} Hourly\ Dispatch\ Cost_h$$

Where

$$Hourly\ Dispatch\ Cost_h = Noload\ cost + Economic\ Minimum\ MW * Offer\ at\ Economic\ Minimum$$

In the real-time energy market, units can be dispatched anywhere between their economic minimum MW and economic maximum MW (and emergency minimum MW and emergency maximum MW when PJM declares an emergency action). In the real-time energy market, the offer with the lowest dispatch cost as defined by PJM is not necessarily the least cost offer at output levels greater than the economic minimum MW. If the price-based offer includes a negative markup at the economic minimum MW level and a positive markup at higher output levels (crossing curves), with all else being constant (no load cost, startup cost, and minimum run time), then this resource could avoid parameter mitigation and set prices with market-based offers that include a positive markup even when the offer has been subject to market power mitigation.

PJM does not offer any arguments as to why PJM's real-time energy market definition of the least cost offer selection is not unjust and unreasonable. PJM cannot make such an argument because neither the system production cost nor the cost to load is considered by PJM's algorithm that chooses the lower cost schedule. In the real-time market, the choice is between a resource's market-based offer and cost-based offer evaluated only at economic minimum.

PJM also ignores the real-time uplift paid to generators that are committed on their inflexible price-based schedules. Table 3 shows that the uplift credits paid to generators in

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12 OA Schedule 1 § 6.4.1(g).

the real-time market are nine times higher than the uplift credits paid to generators in the day-ahead market, for the defined time period.

Table 3 Day-ahead and balancing uplift credits to generators: January 2019 through September 2021

Year	Day-Ahead Credits (Millions)	Balancing Credits (Millions)
2019	$15.5	$52.4
2020	$9.3	$58.2
2021 (Jan - Sep)	$10.8	$97.1

The Market Monitor presents evidence in the State of the Market Reports about resources whose owners fail the TPS test in the real-time energy market, but who are allowed to exercise market power under the current PJM rules as shown by the fact that their offers are used to set prices in real-time with a positive markup. Table 4 is a table from the State of the Market reports that categorizes day-ahead and real-time marginal unit intervals by markup level and TPS test status.[13] Table 4 shows that 6.4 percent of real-time marginal unit intervals include a positive markup by units that failed the TPS test.

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13 *See* 2021 Q3 SOM, Table 3-131.

Table 4 Percent of day-ahead and real-time marginal unit intervals with markup and local market power: January through September 2021

	Day-ahead Market			Real-time Market		
Markup Category	Not Failing TPS Test	Failing TPS Test	Percent in Category	Not Failing TPS Test	Failing TPS Test	Percent in Category
Negative Markup	35.4%	5.9%	41.3%	32.3%	8.6%	40.9%
Zero Markup	24.0%	4.3%	28.3%	18.6%	7.4%	26.0%
$0 to $5	19.7%	2.1%	21.8%	21.2%	4.5%	25.7%
$5 to $10	3.6%	0.4%	3.9%	3.0%	0.7%	3.7%
$10 to $15	0.8%	0.2%	1.0%	0.7%	0.2%	0.9%
$15 to $20	1.5%	0.1%	1.6%	0.7%	0.1%	0.8%
$20 to $25	0.2%	0.2%	0.4%	0.3%	0.2%	0.5%
$25 to $50	0.9%	0.3%	1.2%	0.6%	0.3%	1.0%
$50 to $75	0.3%	0.0%	0.3%	0.1%	0.1%	0.2%
$75 to $100	0.1%	0.0%	0.1%	0.1%	0.0%	0.2%
Above $100	0.0%	0.0%	0.0%	0.1%	0.2%	0.3%
Total Positive Markup	27.1%	3.2%	30.3%	26.8%	6.4%	33.1%
Total	86.5%	13.5%	100.0%	77.7%	22.3%	100.0%

Allowing positive markups to affect prices in the presence of market power permits the exercise of market power and has a negative impact on the competitiveness of the PJM energy market. While the Commission pointed to the evidence in the State of the Market reports in its June 17th Order, PJM's response was to ignore and/or deny these facts and instead assert that the Commission did not provide evidence.

4. Some Parameters Do Not Affect the Production Cost Calculation

Another flaw in PJM's approach to market power mitigation rules is that it allows resources to withhold. Resources use inflexible time based parameters in price-based schedules, such as start time, notification time, and minimum down time. The evaluation of the least cost schedule only considers the parameters that affect the cost of running the resource. It does not account for the effect on prices or uplift of withholding the resource. For example, some resources with market power submit long minimum down times in their price-based schedules along with a negative offer markup. This forces PJM to choose to either leave the resource offline when it may be needed or to extend its commitment to avoid turning it off and incurring the long minimum down time when the resource may be needed again. System production costs are not minimized in either case because PJM must use a more expensive resource (if the unit with the long minimum down time is decommitted) or pay unnecessary higher uplift (if the unit with the long minimum down time is allowed to run continuously). The requirement to select the lower cost of these two options illustrates the issue with the market rules. In this example, both of these choices are uneconomic because the rules permit the exercise of market power through the use of inflexible parameters. The least cost option for addressing market power in this case is to enforce the parameter limits on the resource, and to use the lowest cost offer curve.

The failure to fix the market rules and the continued accommodation of these inflexible resources allows the exercise of market power and fails to provide the incentive for the resources to invest in flexibility.

Allowing these outcomes is unjust and unreasonable when PJM can and should mitigate the parameters. The September 15th Response does not address these scenarios.

5. PJM Assumes that Noncompetitive Behavior Does Not Exist.

The September 15th Response argues (at 12) that generators have legitimate and rational reasons to offer inflexible price-based offers below flexible cost-based offers. PJM argues that generators may do this in order to limit their risk of uplift deviation charges and to reduce wear and tear.

But PJM's uplift deviation charges are not assessed based on how well a unit operates compared to its operating parameter limits. Uplift deviation charges are assessed based on how well units follow dispatch.[14] PJM's arguments about avoiding uplift deviation charges are not correct. Providing flexible parameters is an obligation of being a capacity resource. The costs associated with being flexible are part of that obligation. If generators want to avoid being flexible and following dispatch, they have the option to self-schedule. In that case, PJM

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14 OA Schedule 1 § 3.2.3(o).

load would not be subject to the exercise of market power. PJM's assertion that the use of inflexible parameters with price offers below cost offers or with crossing curves is competitive behavior is not supported. Generators should offer their costs and flexibility to the market and let the competitive market select the best resources.

PJM's market power mitigation rules exist because competitive behavior cannot be assumed when the market is not structurally competitive and market sellers fail the market power test.

6. Day-Ahead Uplift

In addition to increasing LMPs with positive markup or physical withholding, units with market power can also exercise it to extract inefficient uplift payments. If a unit is committed on an inflexible price-based offer after its market seller failed the TPS test, and the unit needed to be made whole, it is made whole based on the committed price-based offer. This uplift is passed through to load as an additional cost.

Table 5 shows the significant, 30.4 percent, frequency with which units were committed in the day-ahead market on their inflexible price based offer after they failed the TPS test.

Table 5 Parameter mitigation for units failing TPS test: January through September, 2021.

Day-ahead Commitment For Units That Failed TPS Test	Day-ahead Unit Hours	Percent Day-ahead Unit Hours
Committed on price schedule less flexible than cost	20,812	30.4%
Committed on price schedule as flexible as cost	5,639	8.2%
Total committed on price schedule without parameter limits	26,451	38.7%
Committed on cost (cost capped)	41,347	60.5%
Committed on price PLS	557	0.8%
Total committed on PLS schedules (cost or price PLS)	41,904	61.3%

The majority of day-ahead uplift is paid to generators that were committed on their inflexible price-based offers after they failed the TPS test. Table 6 shows that generators committed on their inflexible price-based offers after failing the TPS test received the largest share of day-ahead uplift. This should not occur, because resources that fail the TPS test should never be committed using inflexible parameters.

Table 6 Day-ahead uplift by offer type: January, 2019 through September, 2021

Offer Category	Day Ahead Uplift (Millions) 2019	2020	2021 (Jan - Sep)
Cost based unit	$0.0	$0.0	$0.0
Committed on cost (cost capped)	$1.0	$0.6	$1.9
Committed on price schedule as flexible as PLS	$0.0	$0.1	$0.1
Committed on price schedule less flexible than PLS	$10.1	$5.1	$4.0
Committed on price PLS	$0.2	$0.1	$0.0
Share committed on price schedule less flexible than PLS	88.8%	87.0%	66.1%

Table 7 shows the frequency with which units were committed on their inflexible price-based offers when hot weather alerts and cold weather alerts were declared in the day-ahead energy market.

Table 7 Parameter mitigation during weather alerts: January through September, 2021.

Day-ahead Commitment During Hot And Cold Weather Alerts	Day-ahead Unit Hours	Percent Day-ahead Unit Hours
Committed on price schedule less flexible than PLS	35,981	32.6%
Committed on price schedule as flexible as PLS	6,186	5.6%
Total committed on price schedule without parameter limits	42,167	38.2%
Committed on cost (cost capped)	2,367	2.1%
Committed on price PLS	65,782	59.6%
Total committed on PLS schedules (cost or price PLS)	68,149	61.8%

Table 8 shows the uplift paid to generators that were committed on their inflexible price-based offers when hot weather alerts and cold weather alerts were declared in the day-ahead energy market. The majority of uplift during weather alerts is paid to resources committed on inflexible schedules, an outcome that should never occur.

Table 8 Day-ahead uplift during weather alerts by offer category: January, 2019 through September, 2021

Offer Category	Day Ahead Uplift (Millions) 2019	2020	2021 (Jan - Sep)
Committed on cost (cost capped)	$0.1	$0.0	$0.0
Committed on price schedule as flexible as PLS	$0.0	$0.1	$0.0
Committed on price schedule less flexible than PLS	$0.9	$0.8	$0.3
Committed on price PLS	$0.4	$0.2	$0.6
Share committed on price schedule less flexible than PLS	60.5%	79.2%	32.2%

In its September 15th Response, PJM does not address the amount of uplift paid to generators as a result of commitment on their inflexible price based schedules. In a design where market power mitigation works as intended, these units would be required to use their parameter limited schedules, and PJM would select the financial offer parameters that result in the lowest cost. This would result in the lowest overall cost to load.

7. PJM Should Implement Market Rules that Both Result in Effective Market Power Mitigation and Lowest Cost to Consumers

In the June 17th order, the Commission invited responses with proposed changes to the PJM Tariff that should be implemented as the replacement rate. The Market Monitor proposes a solution that addresses the unjust and unreasonable outcomes from PJM's current implementation of market power mitigation in the energy market. The proposed solution addresses crossing curves and related issues, and inflexible parameters.

The best solution to the use of inflexible parameters is to require the use of flexible parameters in all offers at all times. Capacity resources are paid to be flexible but that payment does not actually result in flexibility in the energy market, the only place it matters, unless there are explicit requirements that energy offers from capacity resources incorporate that flexibility. To the extent that the Commission is not yet prepared to mandate the use of flexible parameters at all times, the narrower solution is to require the use of flexible parameters whenever a unit fails the TPS test and whenever the system is facing emergency conditions.

The narrower solution to the flexible parameter issue requires that PJM apply the full set of approved unit specific parameters to a resource that offers any inflexible parameter when the TPS test is failed or during high load conditions such as cold and hot weather alerts or more severe emergencies. After mitigating the parameters, PJM would proceed to determine the least cost three part offer from the submitted offer schedules.

The Market Monitor's proposal explicitly recognizes the differences between the operating parameters (such as minimum run time, minimum down time, startup times, notification times, turn down ratio) and the financial offer parameters (no load, startup and incremental energy offer) that are currently treated together in PJM as a schedule. The September 15th Response continues to tie operating parameters to financial offer parameters, allowing market sellers to continue to manipulate the combinations of parameters and prices.

Currently, PJM commits units on either a cost-based or a price-based schedule. For example, selecting a price-based schedule means selecting the combination of all the operating and financial parameters of such schedule. The financial parameters and the operating parameters must be addressed separately. This change will also eliminate the need for a price-based parameter limited schedule. During hot weather alerts, cold weather alerts and maximum emergency alerts, PJM would apply the approved PLS limits to all units.

This approach simplifies the schedule structure implemented in PJM and would allow PJM to effectively mitigate inflexible operating parameters.

The solution to crossing curves and the relative shape of cost-based and price-based offer curves is to require that the cost-based and price-based offer curves never cross

This approach will address the issues that arise in the application of the PJM commitment and dispatch algorithms in both the day-ahead and real-time markets.

Under the current rules, resources can exercise market power by clearing with an offer that has a positive markup even when failing the TPS test, using crossing curves with a negative markup at economic minimum and positive markup at higher output levels. The use of different markups results in PJM not being able to determine whether the cost offer is lower than the price-based offer. This allows generators to exercise market power.

B. Issues with Real-Time Updates to Operating Parameters (RTV Issues)

1. PJM's Proposal Needs Additional Safeguards in the Tariff

The June 17th Order correctly identified flaws in PJM's tariff provisions for resources that cannot perform to their parameter limits in real time. A real-time exception process is needed. The September 15th Response extends the temporary exception process to real time. The Market Monitor agrees with the PJM proposed changes to allow real-time submissions of temporary exceptions as issues arise at generators that lead to them not being able to meet their unit specific parameter limits. However, PJM should add tariff language that clarifies that justifications such as lack of staffing are not a valid basis for submitting temporary exceptions. The September 15th Response also proposes no consequences to market sellers who do not adhere to the tariff defined rules on what is considered a valid justification for temporary exceptions.

There are two options to address the real-time exceptions issue. The immediate option is to clearly define acceptable and unacceptable reasons for requesting a real-time exception. In the case of unacceptable reasons, the unit would not be paid a portion of its otherwise applicable capacity market revenues, e.g. the daily value, if it included the modified parameter values in its offer.

The better option, consistent with the no excuses approach of the capacity performance paradigm and consistent with long term incentives for flexibility, is to not pay any capacity resources an appropriate portion of the daily capacity value of the resource for days when it is not fully available consistent with its parameter limited schedule. If flexibility is valued as a generator attribute, the market design should not provide incentives to be inflexible. An effective market design should reward flexible operation, and ensure that Capacity Performance resources are paid for their capacity only when it meets their required level of flexibility. PJM initially proposed a penalty structure for the use of RTVs, but withdrew its proposal due to stakeholder resistance.[15] Without clearly defined consequences, market sellers will continue to submit inflexible parameters. The Market Monitor recommends that resources not be paid the daily capacity payment when unable to operate to its unit specific parameter limits.[16]

Two specific circumstances that allow for the exercise of market power are unstaffed units that cannot meet their notification times and units without dispatch signal communications processes that ignore PJM's dispatch instructions. Some unstaffed units communicate their status to PJM ahead of time and others do not inform PJM until PJM calls them in real-time on a parameter limited schedule and they cannot perform. In either case, the unstaffed units are withholding in circumstances when they have market power, delaying the time it takes for PJM to resolve a reliability issue or forcing PJM to call on a higher cost resource. Units that override their turn down ratio (economic maximum divided by economic minimum) either use Real Time Values or PJM's fixed gen flag, which functions identically to a real-time value.[17] These resources operate on their parameter limited schedules but override their output limit parameters with no consequence. The only difference between a Real Time Value to override the turn down ratio parameter and the fixed gen flag is that the fixed gen resources receive uplift payments. These resources receive inefficient levels of uplift payments when they have market power. The September 15th Response does not address

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15 *See* "PJM Proposed Solution – Penalty and Charge Structure," presented at the Markets Implementation Committee Special Session (August 13, 2020), *which can be accessed at* <https://www.pjm.com/-/media/committees-groups/committees/mic/2020/20200813-special-real-time/20200813-pjm-proposal-flow-chart-post-meeting.ashx>.

16 *See* Monitoring Analytics LLC, "Real-Time Values," presented at the Markets Implementation Committee Special Session (October 7, 2020) at 12, *which can be accessed at* <https://www.pjm.com/-/media/committees-groups/committees/mic/2020/20201007/20201007-item-06b-real-time-values-imm.ashx>.

17 PJM Markets Gateway User Guide, Section 6.9: Self-schedule a Generating Unit and Ignore PJM Dispatch Instruction at 41, <https://www.pjm.com/~/media/etools/markets-gateway/markets-gateway-user-guide.ashx>.

unstaffed units that refuse to meet their notification time or units that refuse to perform to their turn down ratio parameter by using fixed gen.

If market sellers represent in their parameter limited schedules that they are able to meet the unit specific parameter limits, but the unit is not staffed, the unit is not equipped with remote start capability, the unit does not have dispatch signal communications in place, or the unit is unable to meet its unit specific limits for any reason, there should be a defined consequence. Inflexibility presents a potential reliability risk for PJM operators, it allows for exercises of market power, and it undermines the incentives for flexibility in place in the market design.[18] The Market Monitor recommends that resources not be paid the daily capacity payment when unable to operate to unit specific parameter limits.

C. PJM Should Enforce its Existing Market Rules to Ensure a Flexible System

PJM supports efforts to create greater generator flexibility.[19] PJM filed testimony at the Commission on the need for flexible generation and enhanced performance requirements from capacity resources.[20] In their Technical Conference Comments, PJM states (at 11):

> Given the ongoing evolution of the markets, we believe that we and our stakeholders should evaluate the need for procurement of additional reliability attributes, such as ramping, flexibility and inertia that may be required for a system with increased intermittent and distributed energy resources. Resource adequacy in the future should no longer be measured based solely on the characteristics of the peak day; it must evolve to include the ability to serve load in all hours of the year.

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18 *Id.* at 17.

19 *See* PJM, "Capacity Market Workshop #4 – Next Steps," presented at the Capacity Market Workshop, (March 26, 2021), which can be accessed at <https://www.pjm.com/-/media/committees-groups/committees/mic/2021/20210326-workshop-4/20210326-item-03-capacity-market-workshop-4-next-steps.ashx> at 23.

20 *See* PJM's comments filed for the FERC Technical Conference on Resource Adequacy in the Evolving Electricity Sector, (March 23, 2021), which can be accessed at <https://cms.ferc.gov/sites/default/files/2021-03/Panel1-Asthana.pdf> ("Technical Conference Comments").

PJM states (at 12) that certain market areas need comprehensive reform including whether to require "greater rigor on start-up time and minimum run times for capacity resources based upon their resource class."

PJM's current Capacity Performance design, combined with the energy market rules, would provide strong incentives to flexible resources, if enforced. The capacity market already allows generators to offer costs associated with making investments to improve flexibility in their offers. The energy market currently allows generators to offer the costs associated with maintenance to preserve flexibility, though those costs would be more paid more efficiently in the capacity market and should be paid in the capacity market instead. If the market rules were implemented and enforced, such that all resources were actually required to operate on parameter limited schedules, especially when they have market power and during weather alerts and emergencies, the actual flexibility of the PJM fleet would reveal itself. Capacity Performance resources should be required to operate flexibly all the time. The Commission should, at minimum, require PJM to clarify and enforce the existing rules that require flexibility. Additionally, there are currently no rules governing the standards for ramp rates in the PJM market rules, and PJM continues to make units whole even when they do not operate to PJM's dispatch instructions based on submitted parameters.[21] PJM's current practices reward inflexibility in many cases. The first step toward ensuring flexibility is eliminating the current incentives for inflexibility. The September 15th Response proposes to continue the practice of rewarding inflexibility and permitting the exercise of market power. The arguments and proposals in the September 15th Response should be rejected.

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[21] *See* 2021 Q2 SOM, Section 4, at Uplift Resettlement.

II. CONCLUSION

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

Respectfully submitted,

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Dated: October 15, 2021

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 15th day of October, 2021.

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