UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

PJM Interconnection, L.L.C.	)	Docket No. ER22-1200-000

PROTEST OF THE INDEPENDENT MARKET MONITOR FOR PJM

Pursuant to Rule 211 of the Commission's Rules and Regulations, Monitoring Analytics, LLC, acting in its capacity as the Independent Market Monitor ("Market Monitor") for PJM Interconnection, L.L.C. ("PJM"), submits this protest to the filing submitted by PJM on March 4, 2022 ("March 4th Filing"). The March 4th Filing proposes a new mechanism to deploy synchronized reserves during synchronized reserve events (also referred to as spin events).[1] The March 4th Filing's proposed mechanism, called Intelligent Reserve Deployment ("IRD") is not a reliable, accurate, or efficient way to deploy reserves. The IRD proposal inaccurately models system conditions, deploys a quantity of reserves that is unrelated to the cause of the spin event, results in discriminatory treatment of resources that clear as reserves, requires the immediate replacement of reserves during the event despite NERC rules, and results in inefficient prices during spin events. PJM's proposed tariff language also lacks key details on the process of using the IRD solution in PJM's Locational Pricing Calculator (LPC) program to determine energy and ancillary service prices during and after a spin event.

The March 4th Filing relies on the same argument about spin event response as PJM's March 29, 2019, Complaint ("2019 Complaint") that resulted in the pending reserve market

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[1] PJM initiates a spin event when there is a significant drop in the Area Control Error (ACE) of the PJM system, generally caused by the unplanned loss of one or more generation units.

changes to consolidate tier 1 and tier 2 reserves and will be implemented on October 1, 2022. But the March 4th Filing proposes a different solution than the solution that will be implemented on October 1 and that undermines some of the key benefits of the synchronized reserve product consolidation supported in the 2019 Complaint.[2] [3] The consolidation of tier 1 and tier 2 reserves would treat all synchronized reserves the same but the March 4th Filing would reintroduce differential treatment by discriminating between flexible and inflexible synchronized reserves in the deployment process.[4] [5]

The results of the March 4th Filing would be higher prices and discriminatory treatment of different types of reserves. The IRD proposal should be rejected.

I. BACKGROUND

The current process for deploying reserves during a spin event is the "all call," and the associated compensation structure includes financial incentives for all resources that increase output during an event. But the all call often results in over generation and the Area Control Error (ACE) overshooting the target range in the minutes after a spin event is declared, and requires PJM operators to take manual actions to reduce generation to control ACE and to ensure flows on transmission facilities remain within their defined limits. The over generation occurs because the cause of the disturbance is generally a unit trip that reduces the supply of energy by less than the additional supply that results from the all call. The all call calls on all resources to respond even if they did not clear reserves and pays for all such response. PJM currently pays the reserve clearing price for cleared reserves and

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2 March 4th Filing at 4.

3 *See PJM Interconnection, L.L.C.*, Enhanced Price Formation in Energy and Reserve Markets of PJM Interconnection, L.L.C., Docket EL19-58 (March 29, 2019) at 17-20.

4 March 4th Filing at 6.

5 2019 Complaint at 44.

pays a spin event bonus payment to any additional response to the all call. To reduce the financial incentive for overresponse to the all call, the October 1, 2022, reserve market changes remove the bonus payments and apply the same clearing prices and performance penalties to all reserves. Even with continued use of the all call, beginning October 1, the resources that have not cleared reserves will no longer be paid if they increase generation in response to an all call for a spin event and all cleared reserves will face the same penalty if they do not respond. But PJM did not revise its plans for IRD in response to the Remand Order.

A more efficient approach to managing the over generation issue would be a defined deployment mechanism for reserves that is based on the MW needed to address the cause of the spin event. The PJM manuals currently allow PJM to deploy a subset of the reserves during a spin event.[6] But PJM does not have an actual software mechanism to implement that approach.

The March 4th Filing does not take this more efficient approach. Instead, the March 4th Filing proposes to replace the all call with IRD, which is just a new Real-Time Security Constraint Economic Dispatch ("RT SCED") solution that includes increased load bias and energy dispatch. PJM currently solves five simultaneous RT SCED scenarios with different levels of load bias in each case. In most intervals, one of the five solutions is approved by PJM operators, depending on their view of the accuracy of the inputs to RT SCED, including the load forecast, imports, or output from intermittent resources. When the five scenarios are ranked by the level of load bias used, the third scenario out of the five is called the base scenario. There are two scenarios with load bias greater than the base scenario, and two scenarios with load bias smaller than the base scenario. Load bias can be positive, negative, or zero. IRD would be a sixth RT SCED scenario that would be solved along with

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[6] *See* PJM Manual 11: Energy and Ancillary Services Market Operations, Rev. 118 (March 1, 2022); PJM Manual 12: Balancing Operations, Rev. 44 (March 1, 2022).

the other RT SCED cases, but using modified inputs. As is also the case with the existing five RT SCED scenarios, IRD cannot economically commit or decommit units, it can only dispatch units.

Table 1 shows a sample RT SCED case with the five scenarios and IRD, including the load bias used, the generation and demand resources dispatched, the extended synchronized reserve requirement, and the flexible and inflexible reserves that cleared in each scenario.[7] Table 1 shows that the load bias used in the IRD case is the base scenario load bias of negative 200 MW plus the largest contingency MW of 1,434.8 MW, which equals 1,234.8 MW. The extended reserve requirement in the five RT SCED scenarios is equal to the MW output of the largest contingency plus 190 MW. Table 1 shows that all the inflexible reserves that cleared in the five RT SCED scenarios are reduced to zero MW in the IRD case, because the IRD case assumes these resources convert to energy.

Table 1 Sample RT SCED scenarios

			Flexible Reserves		Inflexible Reserves			
SCED Scenario	Load Bias Used	Total Generation Dispatched	Generation Tier 1 Reserves Estimated	Generation Tier 2 Reserves Cleared	Generation Tier 2 Condenser Reserves Cleared	Demand Response Tier 2 Reserves Cleared	Demand Response Dispatched (Energy)	Extended Synchronized Reserve Requirement
1	(1,200.0)	94,457.6	2,039.4	0.0	116.0	214.3	4.1	1,624.8
2	(700.0)	94,972.5	1,865.7	0.0	116.0	214.3	4.1	1,624.8
Base	(200.0)	95,483.4	1,691.3	0.0	116.0	214.3	4.1	1,624.8
3	300.0	95,994.3	1,515.1	82.5	116.0	214.3	4.1	1,624.8
4	800.0	96,506.0	1,401.9	173.1	116.0	214.3	4.1	1,624.8
IRD	1,234.8	96,730.0	1,386.9	425.6	0.0	0.0	218.4	1,535.1

IRD modifies three inputs to RT SCED relative to the other five scenarios: an increase in load forecast bias; a change to the synchronized and primary reserve requirements; and the conversion of inflexible synchronized reserves (condensing units and demand response) to energy. IRD uses a load forecast bias equal to the sum of the largest

[7] The data shown here is from an actual RT SCED case from March 15, 2022.

contingency on the system and the load bias in the base scenario.[8] The load bias in the base scenario could be positive, negative, or zero. IRD uses the second largest contingency on the system to determine the reserve requirement for synchronized reserves and primary reserves. IRD commits all inflexible synchronized reserves as energy and makes them eligible for dispatch. Inflexible synchronized reserves consist of generators operating in condensing mode and demand response resources. IRD is identical to the other five RT SCED scenarios with respect to other inputs such as the transmission facility limits, generator offers, and scheduled imports.

IRD's modeling of the initial state of generators, and the ramp time in the dispatch solution are not clearly stated. In the stakeholder process where PJM proposed IRD, PJM announced that it plans to model dispatching resources from an initial state that is input from its State Estimator (SE) and use a ramp time of 10 minutes.[9] Both of these key modeling inputs were updated on November 1, 2021. Generator output from SE data is outdated by the time a SCED case is solved and approved because output will have changed after the time of the SE estimate. On November 1, 2021, PJM implemented an enhanced logic that estimates the status of each unit based on the previous approved SCED solution, instead of using outdated SE data.[10] On November 1, 2021, PJM also updated the ramp time used in RT SCED to five minutes in place of the previously used 10 minutes. These reforms significantly aligned the dispatch, pricing, and settlements in the real-time

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[8] The largest contingency is generally the largest unit operating in the PJM system, or a set of units operating on the PJM system at the same site.

[9] *See* PJM, "Intelligent Reserve Deployment Proposed Timeline," presented at the Synchronous Reserve Deployment Senior Task Force, (September 22, 2021) at 4, which can be accessed at: *<https://www.pjm.com/-/media/committees-groups/task-forces/srdtf/2021/20210922/20210922-item-06-intelligent-reserve-deployment-proposed-timeline.ashx>*.

[10] These were Commission approved changes. *See PJM Interconnection, L.L.C.*, 176 FERC ¶ 61,104 (2021).

energy market. The March 4th Filing does not specify these modeling assumptions for IRD. If PJM plans to use the outdated RT SCED logic, the March 4th Filing has not explained, defined or supported why it is reasonable to do so.

II. PROTEST

A. IRD Cannot Accomplish its Stated Objectives.

The March 4th Filing incorrectly states (at 6) that IRD "is a SCED case that simulates the loss of the largest generation contingency." In an accompanying footnote (n.13), the March 4th Filing further explains that "megawatts of the largest contingency will be added to the load forecast at the RTO level, to simulate the unit loss." The IRD does not simulate a unit loss. The IRD increases load but load does not increase when a unit is lost. The IRD case does not model or assume the loss of any unit on the system. It is not possible for IRD to correctly dispatch for an actual unit loss because it is solved before the unit is lost.

The effect of the IRD case is not defined to be an increase in energy dispatched equal to the MW of the largest contingency. The IRD case applies a load forecast bias equal to the MW of the largest contingency plus the load forecast bias from the base SCED scenario.[11] Since PJM operators can approve any of the five RT SCED solutions, the net change to the load forecast of an IRD solution can be lower or higher than the largest contingency MW. When the last approved SCED solution has a load bias greater than the base scenario, the net change in the modified load forecast of the IRD case is lower than the largest contingency. For example, if the last approved SCED solution had a load bias of 1,000 MW and the base scenario has a load bias of zero MW and the largest contingency is 1,500 MW, the net increase in dispatch MW is only 500 MW. This means that IRD will target a net 500

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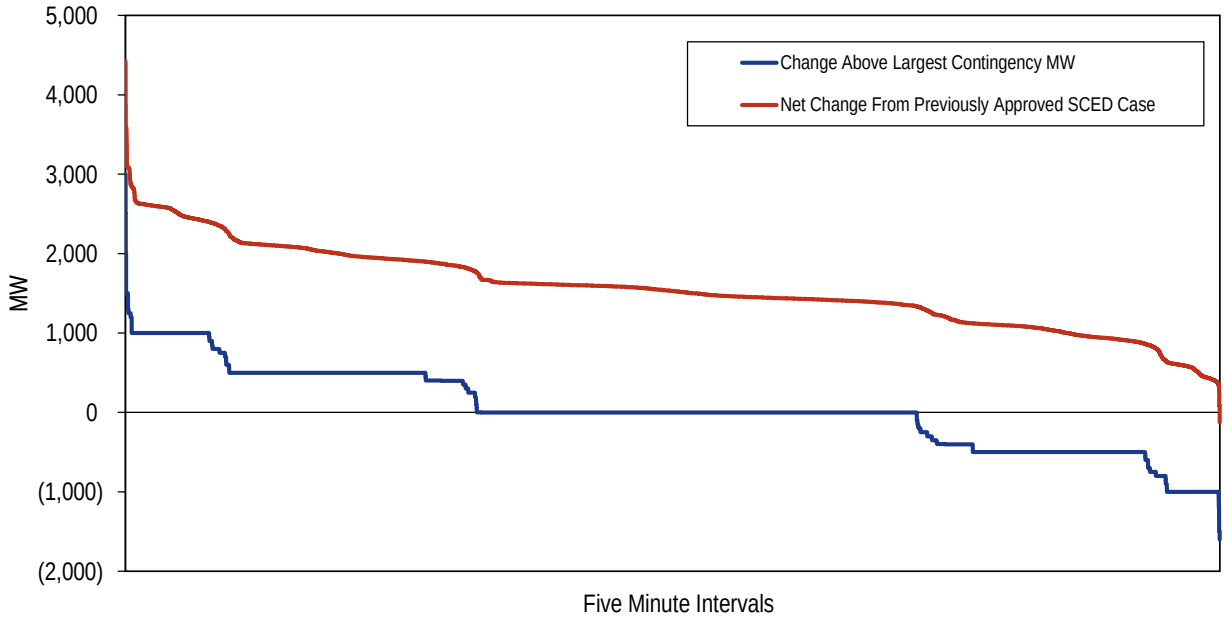
[11] *See* slide 4 of the "Intelligent Reserve Deployment – PJM Package," PJM Presentation to the Synchronous Reserve Deployment Task Force (July 1, 2021), which can be accessed at: <*https://pjm.com/-/media/committees-groups/task-forces/srdtf/2021/20210701/20210701-item-03-pjms-proposed-package-intelligent-reserve-deployment.ashx*>.

MW increase in dispatch MW during a spin event. Or, if the last approved SCED solution had a load bias of zero MW, and the base scenario has a load bias of 1,000 MW, the net incremental load in the IRD case is 2,500 MW. This means that IRD will target a net 2,500 MW increase in dispatch MW, well beyond the largest contingency MW.

PJM acquired the IRD software and has run IRD cases and created IRD solutions in parallel with the actual SCED cases since August 19, 2020, with the exception of November 4, 2021, through February 3, 2022.

The Market Monitor analyzed the data from those IRD solutions to calculate the net increase in the load forecast bias calculated by the IRD solutions relative to the latest approved RT SCED solution. Since July 1, 2021, PJM has executed IRD cases for 49,183 five minute intervals. Figure 1 shows the net change in the load forecast bias calculated for all the IRD cases compared to the last approved SCED solution prior to the IRD solution. The red line shows the difference in the load forecast bias between the IRD case and the previously approved RT SCED solution. The blue line shows the net target dispatch MW increase in the IRD solution relative to the largest contingency on the system. In 32 percent of the cases, the blue line is above zero, which shows that, if used as intended, IRD would have dispatched additional MW above the largest contingency MW. In 28 percent of the cases, the blue line is below zero, which shows that, if used as intended, IRD would have dispatched fewer MW than the largest contingency MW. In 40 percent of the cases, the IRD solution would have dispatched MW equal to the largest contingency MW.

Figure 1 Ranked net change in load forecast bias in IRD cases: July 2021 through February 2022



Even if PJM modifies IRD to only have a net increase in the load forecast equal to the largest contingency MW, it would still be an inaccurate solution. This is because the disturbances that result in spin events in PJM are almost always less than the largest contingency on the system. The March 4th Filing acknowledges this discrepancy (at 12) and the need to modify the proposed IRD based on event experience. PJM already has data from historic spin events. The data clearly shows that using the largest contingency will always result in overestimating the demand on the system compared to the actual disturbance. Despite PJM's assertions, there is no need for additional event experience when PJM has data from all the spin events that have occurred to date. If PJM believes that more data is needed to evaluate IRD, then PJM should not propose to implement IRD until it has the data and can make an informed decision about whether or not to implement.

PJM's assertions (at 6) that the IRD case will generate LMPs that more accurately represent system dispatch during a spin event and will deploy reserves without violating or overloading constraints, are also incorrect. The IRD LMPs are not more accurate than status quo LMPs during a spin event, because the IRD case assumes that the contingency that

resulted in the spin event did not happen. For example, if the spin event was caused by the loss of a particular generation unit, the IRD case models that unit as online and eligible for dispatch. The IRD solution may even dispatch the lost unit to increase its output or convert its reserves into energy even though the unit is actually offline. Assuming an offline unit as online and solving a SCED case with the load forecast increased by a predetermined but inaccurate quantity does not generate accurate LMPs, and does not and cannot accurately model and control the flow on constraints.

The IRD proposal fails to address the spin events that are triggered by low ACE. These events are not triggered by a lost unit, but to address a drop in ACE caused by a load forecast error or a difference between the dispatched output and the actual output from units not following dispatch. It is not clear if PJM will only use IRD cases to trigger spin events caused by lost units or if they will also be used for low ACE events. If IRD is used for low ACE events caused by units not following dispatch, it would result in charging higher prices to load for replacing the output from units not following dispatch.

B. IRD Will Lead to Unjust and Unreasonable Outcomes

1. IRD Will Result in Inflated Prices

a. IRD Does Not Allow for a Contingency Recovery Period.

PJM maintains reserves and a reserve market so that it has the ability to quickly recover from a sudden loss of supply. Reserves are procured and compensated for their availability by PJM customers so that they can be used when a spin event occurs. The NERC reliability rules recognize the need to use reserves to recover from a loss of supply and allow for a recovery period during which existing reserves have been converted to energy and new reserves fall below the standard required MW level. The March 4th Filing does not allow for a recovery period during or after a spin event. The IRD proposal solves for higher load that can use all the assigned reserves, while adding another reserve

requirement for primary and synchronized reserves based on the second largest contingency in the system.[12] Reserves are procured and maintained for the balancing authority to recover from events such as sudden loss of generation or transmission or interchange that may lead to a significant drop in ACE. The NERC standards for determining the quantity of reserves to procure, and recovering reserves after a disturbance, are specified in NERC BAL 002-3.[13] Under NERC BAL 002-3 R3, PJM is required to restore its contingency reserves to at least its "Most Severe Single Contingency" before the end of the "Contingency Reserve Restoration Period." Under PJM's implementation of these standards, both synchronized and nonsynchronized reserves qualify as contingency reserves. The contingency reserve restoration period is defined as a "period not exceeding 90 minutes following the end of the Contingency Event Recovery Period."[14]

The March 4th Filing's proposed implementation allows for no contingency recovery period. If a contingency that triggers a spin event were to occur, the IRD solution would simultaneously attempt to find additional energy to meet the increased load forecast and attempt to find supply to hold back to meet the new reserve requirements. Given that RT SCED is not capable of committing additional units, IRD cannot convert nonsynchronized reserves into synchronized reserves. As a result, IRD will require the market to meet the reserve requirement without deploying all available contingency reserves to cover the loss of supply.

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12 *See* PJM, "Intelligent Reserve Deployment PJM Package –SRDTF," presented at the PJM Operating Committee (November 4, 2021).

13 NERC Reliability Standard BAL-002 – Disturbance Control Performance, Requirement R2 & R3.

14 *See* "Glossary of Terms Used in NERC Reliability Standards," which can be accessed at: <*https://www.nerc.com/pa/Stand/Glossary%20of%20Terms/Glossary_of_Terms.pdf*> .

IRD requires the market to outperform the NERC requirements to recover from the contingency while ignoring a subset of available reserves. This would result in artificially inflated prices. During the short periods when synchronized reserves are deployed for their intended purpose, customers should not be required to incur additional costs for actually using the reserves that they already paid for. PJM customers pay for reserves to maintain the option of deploying them even if the deployment occurs infrequently. During these infrequent times, imposing an additional and simultaneous demand to replace reserves instantaneously will result in inefficiently high prices.

b. The March 4th Filing Ignores Nonsynchronized and 30 Minute Reserves.

PJM clears but never deploys nonsynchronized reserves during or after spin events although they are always available. Moreover, as PJM acknowledges in the March 4th Filing (at 11), the NERC BAL standard for disturbance control requires that reserves be replenished within 90 minutes of an event where reserves are deployed. To attempt to replenish synchronized reserves faster than the 90 minute standard is inefficient while not deploying the nonsynchronized reserves that are capable of responding within 10 minutes. The March 4th Filing's proposal exceeds what is required by the NERC standards, imposing additional costs to load during spin events, despite the fact that load already pays to ensure that reserves are available at all times but only requires performance during the infrequent times they are called upon for spin events. This is inefficient.

Requiring that reserves be replenished simultaneously also creates reliability concerns because the market clearing engine has competing objectives of finding additional energy supply to meet the increased load forecast, and simultaneously holding capacity as reserves to meet the reserve requirement. Following the loss of a unit (a disturbance), allowing time to recover reserves ensures that reliability is prioritized and ensures that load does not have to pay higher prices for actually using reserves that have already been paid for to provide energy.

The March 4th Filing also ignores PJM's October 1, 2022, creation of a real-time 30 minute reserve product. As the March 2019 Complaint's Pilong Affidavit explains, 30 minute reserves restore primary reserves through the commitment of offline generation in real time.[15] Yet the March 4th Filing would add new synchronized reserves for the same purpose, with IRD procuring "additional reserves to meet the new largest contingency."[16] The March 4th Filing has not demonstrated why the current procurement of primary reserves and the pending procurement of secondary reserves are insufficient to recover from a disturbance and replenish reserves to meet the new largest contingency. PJM currently procures 150 percent of the largest contingency as primary reserves and will procure approximately 200 percent of the largest contingency as secondary reserves. PJM has the ability to declare a primary reserve event in order to deploy nonsynchronized reserves. PJM has never declared such an event, yet the March 4th Filing claims that PJM needs to procure additional synchronized reserves to meet the contingency of the second largest unit on the system to restore reserves. The March 4th Filing makes no mention of the role of the other reserve products while proposing to raise prices by procuring additional synchronized reserve. It is not reasonable or economic to require customers to purchase additional synchronized reserve when other reserve products serve the same purpose.

c. The March 4th Filing Incorrectly Evaluates IRD Pricing.

The March 4th Filing incorrectly asserts (at 16) that two events in June 2021, show that IRD does not "arbitrarily inflate prices despite deploying more than the megawatts lost." During the June 21 and 22, 2021, spin events, the IRD cases PJM had in production still had a zero load bias.[17] During the first event (June 21), the SCED case approved prior to

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15 March 29th Complaint, Pilong Affidavit at 30.

16 March 4th Filing at 6.

17 PJM modified this feature of IRD to instead use the base case load bias.

the event had a load bias of 500 MW and the IRD case load bias was equal to the largest contingency (1,412 MW). Therefore, the IRD case had 912 MW of incremental load, which was less than the MW lost. Similarly, during the second event (June 22), the SCED case approved prior to the event had a load bias of 500 MW and the IRD case load bias was equal to the largest contingency (1,456 MW). Therefore, the IRD case had 956 MW of incremental load, which was less than the MW lost. The March 4th Filing's conclusions from these two examples were based on an outdated IRD design that is no longer in production. PJM has since updated IRD to use a load bias value equal to sum of the largest contingency and the base scenario load bias. The conclusions drawn from the IRD data during these events are invalid and do not reflect the outcome if IRD were to be implemented.

2. IRD Will Result in Discriminatory Treatment of Reserves.

The IRD proposal will also result in discriminatory treatment of cleared reserves. Currently, synchronized reserves consist of Tier 1 resources, that have room to ramp above their economic energy dispatch point, Tier 2 flexible resources, which are ramped down from their economic energy dispatch point to maintain reserves, and Tier 2 inflexible resources. Tier 2 inflexible resources consist of demand resources and generation resources operating in condensing mode. Under the status quo all call process for reserve deployment, PJM always calls on all cleared reserves to respond, measures the performance of all cleared reserves, and applies the same penalty structure to all cleared reserves.[18]

Under the IRD proposal, Tier 2 inflexible resources are always deployed and converted to energy. This is programmed into the deployment logic in the IRD solution since the engine cannot commit these resources. The other synchronized reserves (Tier 1

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[18] Under the current reserve market design this means calling on all tier 2 reserves, because those are the only cleared synchronized reserves. Beginning October 1, 2022, all synchronized reserves will be cleared. PJM also estimates Tier 1 reserves, and pays a premium of $50/MWh for performance during spin events of 10 minutes or longer duration, but does not subject them to nonperformance penalties.

and flexible Tier 2) may or may not be converted to energy, because IRD may find it economic to hold some of these as reserves to maintain the level of reserves even during the recovery period. This results in a subset of resources always deployed to produce energy, and subsequently, always subject to the proposed performance evaluation, while another subset of resources may not be deployed, and not be subject to penalties. This would continue to occur despite the fact that, under the proposed reserve market enhancements planned for October 1, 2022, implementation, all the categories (Tier 1 and Tier 2) will be paid a uniform synchronized reserve clearing price. The tier 1 and tier 2 distinction will go away, but the distinction between flexible and inflexible reserves will persist.

Subjecting different classes of reserves that will be part of a uniform defined product, compensated with a single clearing price, to different deployment frequency and potential nonperformance penalties is discriminatory. Ending this type of differential treatment was one of the explicit goals of the 2019 Complaint. The proposed IRD would directly undermine the benefits of consolidating Tier 1 and Tier 2 reserves. The 2019 Complaint states that "consolidation will improve Synchronized Reserve performance by holding all applicable resources accountable for actually providing their assigned reserves."[19] But IRD would not hold all resources accountable for providing their assigned reserves. Inflexible reserves would always be held accountable while flexible reserves may or may not be held accountable.

3. IRD Raises Reliability Concerns by Relying on Disqualified Reserves.

The IRD proposal also raises reliability concerns during events triggered by disturbances. Since the IRD SCED case solves for a load that is forecast to be greater by the largest contingency MW, and simultaneously attempts to meet a reserve requirement set with the second largest contingency, IRD holds back cleared reserves instead of deploying

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[19] March 2019 Complaint at 47.

them as energy to meet the immediate reliability need. In order to procure additional energy to meet the higher load forecast, IRD relies partly on resources that did not clear as reserves to ramp up and produce more energy. Without clearing as reserves, these units are not subject to performance evaluation, and do not have the same incentives as resources that clear as reserves. In many cases, PJM has disqualified these MW from the reserve market or market sellers have asserted that these resources are unreliable in a spin event. The IRD solution relies on resources that do not have the same performance incentives to produce additional energy while holding back some of the reserves that do have the performance incentive. This could result in a reliability issue if the resources without reserve commitments do not follow the dispatch signals to ramp their output as directed by the IRD solution.

The Market Monitor analyzed the available IRD solutions from February 4, 2022, when PJM implemented an updated IRD version, through March 15, 2022, to explain the source of the additional energy that an IRD case deploys. This is calculated by comparing the IRD solution in an RT SCED case to the approved solution in the same RT SCED case. When a disturbance occurs, it is often the case that the latest IRD solution available to operators is from the same case as the currently approved SCED solution. This is because PJM operators are unlikely to wait for a new IRD solution to be available before taking actions to address the imbalance caused by a disturbance. Table 2 shows all the RT SCED cases where PJM operators approved a solution in the period from February 4, 2022, through March 15, 2022, and categorizes the solutions by the quantity of total MW dispatched as energy in the IRD solution compared to the approved RT SCED solution. For SCED cases in each group, the Market Monitor calculated the source for the additional energy dispatched in the IRD case compared to the approved RT SCED case.

For example, in cases where the total MW deployed is between 1,000 and 1,500 MW, only an average of 66.2 percent of the additional generation dispatched as energy are MW that cleared as reserves. These are resources that would be subject to nonperformance

penalties. The remaining 33.8 percent of the additional dispatched energy is sourced from MW that did not clear as reserves. These are often resources that are deselected, and ineligible to clear as reserves, or MW that are beyond a unit's synchronized reserve maximum (Spin Max). IRD relies on units that PJM determined to be not capable of responding within 10 minutes in the event of a spin event for a significant portion of the response.

Table 2 Resources deployed to produce energy by IRD

		Generation Loaded		Demand Response Loaded	
Total Resources Deployed Group (MW)	Number of Cases	Average Percent Loaded From Cleared Reserves	Average Percent Loaded From Non Reserves	Number of Intervals DR Loaded	Percent of DR Loaded
<500	507	72.6%	27.9%	317	100.0%
500 - 1,000	2,188	68.0%	30.5%	1,446	100.0%
1,000 - 1,500	4,437	66.2%	33.8%	2,768	100.0%
1,500 - 2,000	3,848	62.9%	37.4%	2,781	100.0%
2,000 - 2,500	1,481	59.8%	37.7%	1,176	100.0%
2,500 - 3,000	345	58.8%	39.7%	286	100.0%
>3,000	3	53.7%	46.3%	3	100.0%
Total	12,809	64.8%	35.2%	8,777	100.0%

The Market Monitor analyzed the cases with inflexible Tier 2 reserves in the approved solution, to compare the extent to which these resources were dispatched as energy in the IRD case, and compare it to Tier 1 resources dispatched to energy. Table 3 shows that in cases where a total of 1,500 to 2,500 MW of reserves were dispatched as energy, 43.1 percent of Tier 1 reserves were dispatched as energy, 50.5 percent of inflexible Tier 2 generation reserves were dispatched as energy, and 100 percent of Tier 2 demand reserves were dispatched as energy.

Table 3 Reserves dispatched as energy in IRD by reserve category

Total Resources Deployed Group (MW)	Number of Cases Inflexible Tier 2 Dispatched as Energy	Percent Estimated Tier 1 Generation Dispatched as Energy	Percent Inflexible Tier 2 Generation Dispatched as Energy	Percent Tier 2 Demand Reserves Dispatched as Energy
<500	279	10.5%	32.0%	100.0%
500 - 1,000	1,268	22.6%	39.4%	100.0%
1,000 - 1,500	2,335	34.0%	41.4%	100.0%
1,500 - 2,000	2,208	43.1%	50.5%	100.0%
2,000 - 2,500	965	50.9%	52.7%	100.0%
2,500 - 3,000	242	56.3%	52.7%	100.0%
>3,000	3	58.8%	57.5%	100.0%
Total	7,300	36.8%	45.3%	100.0%

4. IRD is Inferior to Methods used by Other RTOs.

In April 2021, PJM presented the reserve deployment methods used by other ISO/RTOs to the PJM Operating Committee.[20] Table 4 summarizes the methods in three categories: the timing of the execution of the method; how the MW to be deployed are determined; and if the method uses a full security economic constrained dispatch (SCED). All other RTOs produce a solution (either using SCED or an alternative reserve deployment tool) after the contingency has occurred and its magnitude and location are known. This allows all other RTOs to deploy MW that represent the disturbance. The PJM IRD proposal is the only one executed and calculated prior to the disturbance, and it is the only one for which the MW intended to be deployed are not based on the actual disturbance. The problems created by the March 4th Filing's proposal to execute IRD prior to any disturbance

[20] *See* "Reserve Deployment – ISO/RTO Education," PJM Presentation to the Synchronous Reserve Deployment Task Force (April 8, 2021), which can be accessed at: <*https://pjm.com/-/media/committees-groups/task-forces/srdtf/2021/20210408/20210408-item-06-reserve-deployment-iso-rto-education.ashx*>.

and based solely on assumptions, are inconsistent with the practices of other ISO/RTOs and are not reasonable.

Table 4 Reserve deployment in other ISO/RTOs.

RTO	Execution Timing	MW Deployment	Full SCED Optimization
CAISO	After contingency occurs	Determined by dispatchers	Yes
ISONE	After contingency occurs	MW lost are removed from tool	Yes
MISO	After contingency occurs	MW lost are reflected in SCED	No
NYISO	After contingency occurs	MW lost are removed from tool	No
SPP	After contingency occurs	Based on MW lost	No
PJM (Status Quo)	After contingency occurs	All available MW from synchronized resources	No
PJM (IRD)	Before contingency occurs	Largest Contingency + Base Case Load Bias - Last Approved Case Load Bias	Yes

C. PJM Should Be Ordered to Provide More Transparency.

The March 4th Filing states (at 6 and 8) that the IRD proposal will better align pricing with the dispatch instructions during a spin event. PJM has not provided any details, or tariff changes, that describe how an approved IRD solution will be used in its pricing software. On November 1, 2021, PJM implemented a set of reforms to its five minute dispatch and pricing process that appropriately resulted in aligning dispatch, pricing and settlements, making PJM a true five minute real-time energy market. Currently, an RT SCED solution is almost always approved near the top of each five minute interval, with the instructions from this solution being effective for the following five minute period. The prices for that five minute period are calculated in LPC using the same approved RT SCED solution, bringing consistency between dispatch and pricing. With the IRD proposal, PJM proposes to override an existing approved RT SCED solution with the IRD solution and asserts that it will be used in pricing, but offers no clear or defined process for how the prices calculated on the basis of an IRD solution will be applied to market pricing intervals. It is unclear how many IRD cases will be used, if a single IRD case would apply to multiple intervals, and if there are defined bounds to this duration. It should be unacceptable for PJM, with no clear direction or rules, to effectively reverse the progress of the last several

years that led to the appropriate alignment of SCED and LPC. Such an outcome would not be efficient, transparent or reasonable

D. PJM Should Be Ordered to Evaluate the Planned Reserve Market Enhancements Before Changing Reserve Deployment.

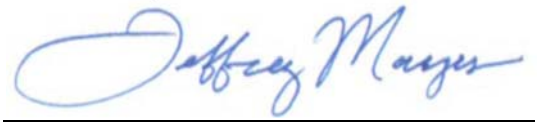
The March 4th Filing does not demonstrate a need to implement a new reserve deployment mechanism, does not demonstrate an immediate need to implement a new reserve deployment mechanism and does not demonstrate that the proposed IRD mechanism is reasonable, efficient or an improvement. The planned reserve market enhancements, scheduled for October 1, 2022, should be allowed to function and their impact on reserve response should be evaluated before making any changes to the deployment mechanism.

But there are actions PJM could take in the near term that would help make the deployment of reserves during spinning events more efficient and effective. PJM should take direct action to improve the visibility to PJM operators of the locational distribution of actual generator responses during a spin event. Each RT SCED solution produces an estimate of generation for all the Tier 1 reserves and the cleared Tier 2 reserves in the system. This data is available at the nodal level and updated every time a new RT SCED solution is approved by PJM. PJM should improve the ability of operators to see the location of response from these reserves if a spin event were to be called at any time. This would help ensure that operators are aware of locational issues including potential transmission constraints that would be exacerbated if identified reserves were converted to generating energy if there were a spin event.

III. CONCLUSION

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

Respectfully submitted,



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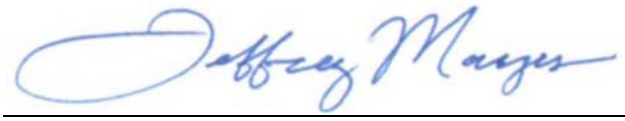
Dated: March 25, 2022

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 25th day of March, 2021.



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