

IMM Proposal: Reserve Deployment and Compensation

RCSTF

March 13, 2024

IMM



Monitoring Analytics

Synchronized Reserve Topics

- **Deployment**
- **Offers**
- **Temporary increase in reserve requirement**
- **Compensation and net revenues**
- **Performance Penalties**

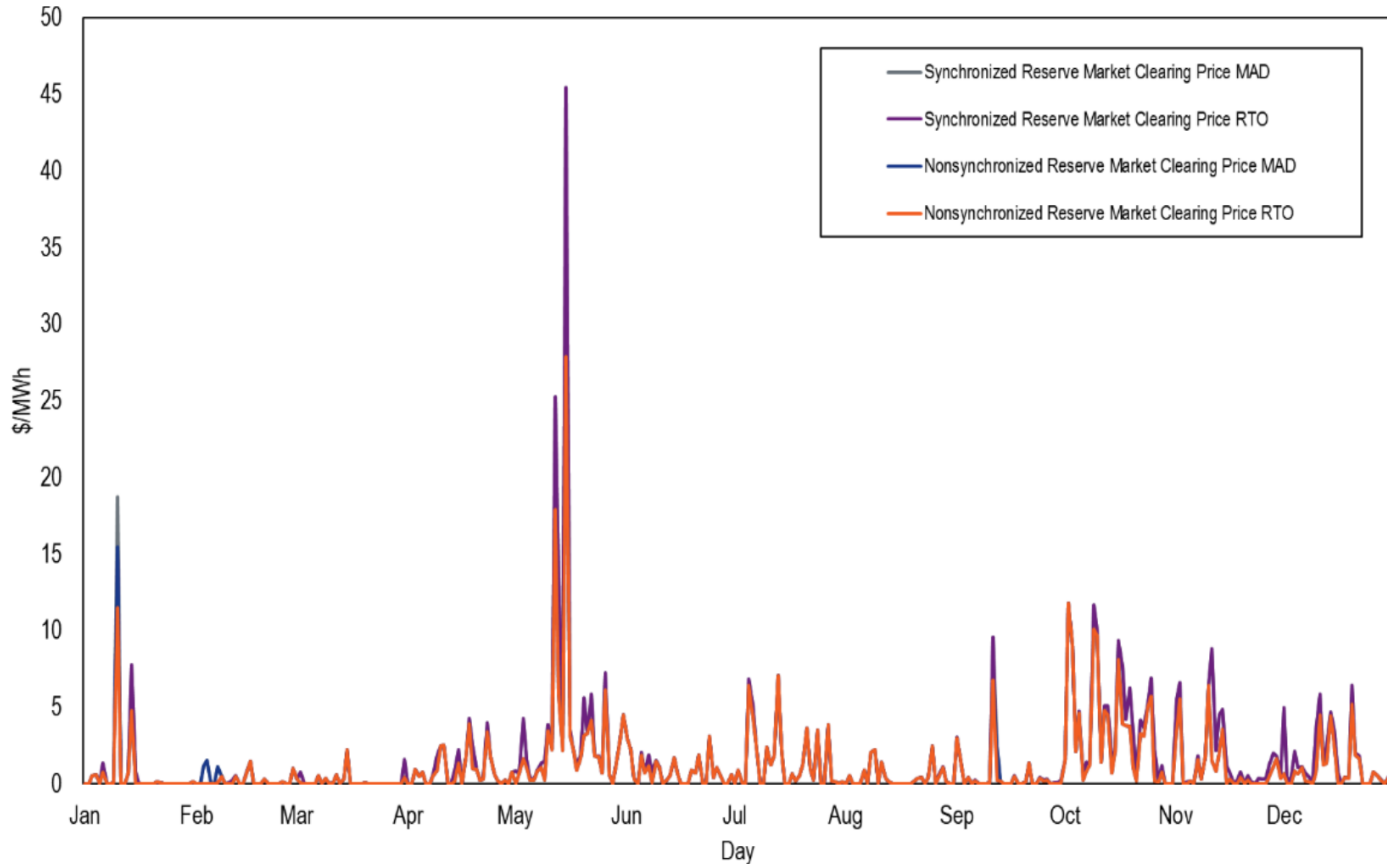
Deployment

- **In synchronized reserve events, all deployment and communications should be electronic.**
 - **Require generation and demand response resources to have electronic signal**
 - **Require PJM to use all electronic communications**
 - **No phone call lags**
- **The initial synchronized reserve deployment MW should be added to the basepoint.**
- **For subsequent RT SCED cases during an event, the deployment MW should be an input to the RT SCED to maintain the deployment in the dispatch MW.**

Temporary Increase in Reserve Requirements

- **In May 2023, PJM increased the reserve requirements by 30 percent without stakeholder or FERC approval.**
 - **The initial changes led to erroneous shortage pricing.**
 - **The changes were expensive through the end of 2023.**
- **PJM has defined no criteria for ending the temporary increase in reserves.**
 - **Increased requirements have not lead to adequate performance from scheduled resources.**
- **Criteria for implementing and ending such a change should be included in both the tariff and manuals.**
- **The temporary increase should be removed.**

Primary Reserve Prices in 2023



Synchronized Reserve Credits in 2023

Year	Month	Total Day-Ahead Credits	Total Balancing MCP Credits	Total LOC Credits	Total Shortfall Charges	Total Credits
2022	Oct	\$661,165	(\$13,520)	\$2,033,877	\$19,273	\$2,662,249
2022	Nov	\$2,275,469	(\$121,387)	\$1,602,415	\$14,882	\$3,741,614
2022	Dec	\$4,874,437	(\$15,512,268)	\$13,178,881	\$11,195,016	(\$8,653,966)
2023	Jan	\$505,429	(\$114,061)	\$977,167	\$336,246	\$1,032,289
2023	Feb	\$735,351	\$99,577	\$493,619	\$0	\$1,328,546
2023	Mar	\$439,364	(\$5,172)	\$744,887	\$0	\$1,179,079
2023	Apr	\$2,088,876	\$55,121	\$702,053	\$0	\$2,846,050
2023	May	\$8,590,787	(\$1,102,233)	\$1,521,756	\$0	\$9,010,310
2023	Jun	\$4,061,466	(\$136,555)	\$503,681	\$0	\$4,428,592
2023	Jul	\$10,125,951	(\$209,684)	\$843,148	\$0	\$10,759,415
2023	Aug	\$2,822,099	(\$101,170)	\$583,173	\$0	\$3,304,101
2023	Sep	\$2,808,344	(\$352,447)	\$761,958	\$0	\$3,217,854
2023	Oct	\$21,150,975	(\$806,826)	\$1,030,298	\$0	\$21,374,447
2023	Nov	\$11,822,028	(\$959,271)	\$635,396	\$0	\$11,498,154
2023	Dec	\$2,843,149	(\$313,929)	\$632,327	\$80,447	\$3,081,100

Offers

- **The synchronized reserve market is not structurally competitive.**
- **Protections need to remain in place to prevent withholding through reserve availability and offer prices.**
 - **Maintain must offer requirement**
 - **Maintain cost-based offer limits**
- **The average performance penalty amount should be removed from the offer.**
- **The PJM calculated lost opportunity costs and the explicit costs of condensers should remain in offers.**

Penalties and Compensation

Penalties

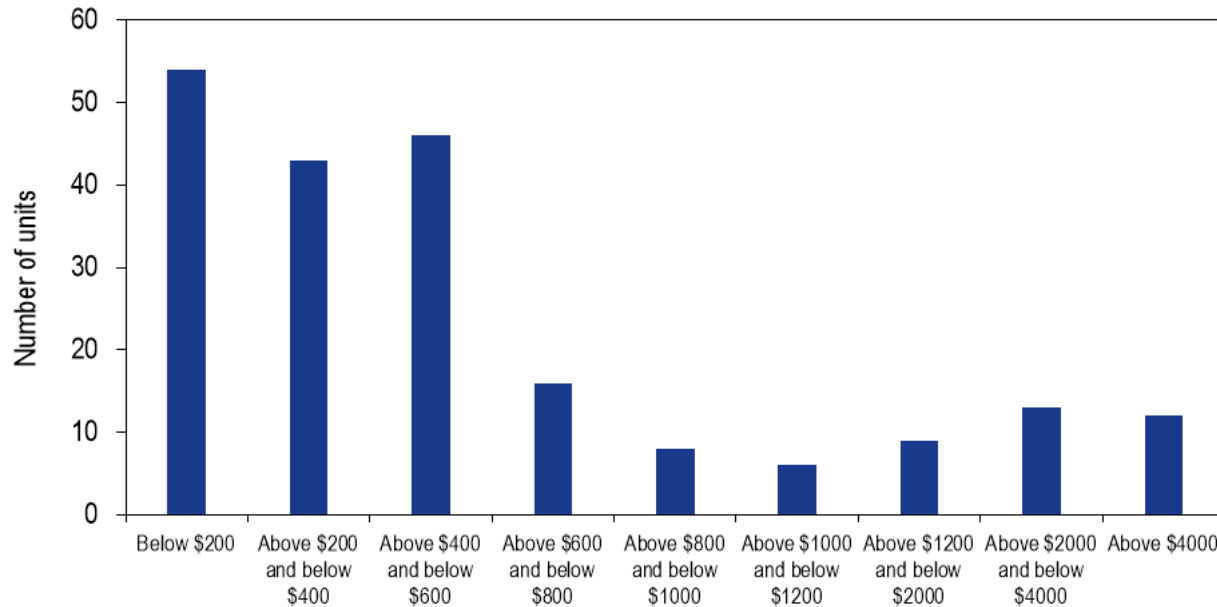
- **PJM calculates two penalties for nonperformance during a synchronized reserve event.**
 - **The penalties are equal to the shortfall MW times the real-time MCP.**
 - **Synchronized Reserve Shortfall Charge: Day of the event (including five minute intervals outside of the event)**
 - **Synchronized Reserve Retroactive Penalty Charge: Over the immediate past interval, which is equal to the lesser of:**
 - The average number of days between events (21 days for 2023) or
 - The number of days since resource's last nonperformance

Penalties

- **In 2023:**
 - **Total penalties were \$2.9M.**
 - **Total shortfall was 3,049 MW.**
 - **Average penalty rate was \$948/MW**
- **There were only three events of 10 minutes or longer in 2023.**
- **The shortfall MW equal all the MW of shortfall during the three events.**
- **In terms of energy over 10 minutes, \$948/MW equates to \$5,688/MWh.**

Penalties

- The penalties differ significantly per unit. Most penalties are below \$600/MW but some reach multiples of \$1,000/MW.



Penalties per event

- Penalties were greater during WS Elliott due to the high MCPs during those days.

Event	Total Penalties	Total Shortfall MW	Average Penalty (\$/MW)
October 29, 2022	\$235,191	1,291	\$182
November 29, 2022	\$84,452	836	\$101
December 23, 2022	\$2,794,635	1,145	\$2,441
December 24, 2022	\$10,152,549	1,725	\$5,885
2022	\$13,266,828	4,998	\$2,655

Event	Total Penalties	Total Shortfall MW	Average Penalty (\$/MW)
January 5, 2023	\$997,119	702	\$1,421
January 10, 2023	\$1,405,475	1,071	\$1,312
December 14, 2023	\$487,630	1,276	\$382
2023	\$2,890,224	3,049	\$948

Penalties Conclusion

- **The observed penalty level is substantial.**
- **In general, the IMM does not observe much financial benefit from nonperforming during events. In general, it is economic to deploy versus paying the penalty.**
- **The IMM is exploring the use of a defined penalty rate in \$/MW of shortfall as a replacement of the two current penalties.**
- **Additional rules may be needed to capture:**
 - **Continuing bad performance.**
 - **Bad data (e.g. overstated capability) resulting in clearing.**

Retroactive Penalty Levels with Recommendations

Description	Total Retroactive Penalty
Status Quo	\$2,477,688
Using only 10-minute events for IPI	\$4,989,616
Including LOC credits in retroactive penalty	\$3,223,001
Disallowing aggregate response	\$2,653,573
All three changes	\$7,582,924

Net Revenues

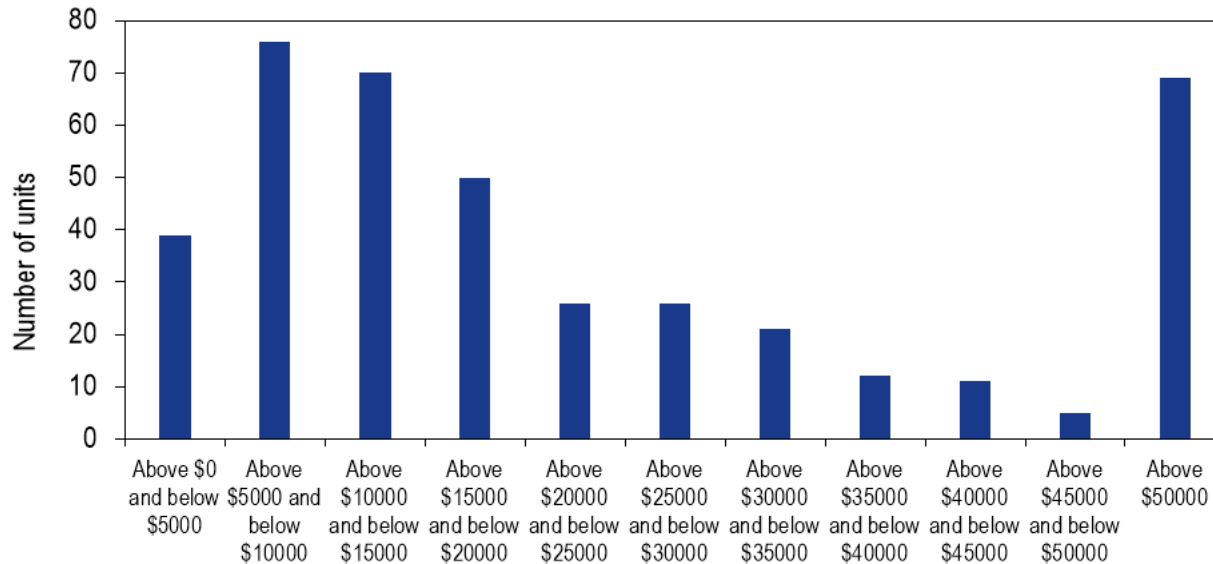
- **In 2023:**
 - **Gross Revenues from the synchronized reserve market totaled \$73.5M.**
 - **Total opportunity cost, as calculated by PJM, were \$5.6M.**
 - **Total net revenues (excluding penalties) were \$67.9M.**
- **Very few units (number is confidential) had negative revenues. The problem appears to be the method used by PJM to calculate opportunity cost for certain types of units, not actual unrealized profits.**

Net Revenues

- **In 2023:**
 - **There were 12 synchronized reserve events. Three equal to or longer than 10 minutes.**
 - **Total energy deployed (estimated) was 3,443 MWh.**
 - Energy assumed to be deployed instantly, for example, 10 MW equates to $10 \text{ MW} \times 10 \text{ minutes} = 1.67 \text{ MWh}$.
 - For events shorter than 10 minutes, 10 minutes was assumed.
 - **The average net revenue per MWh deployed was \$16,237/MWh.**
 - **This is equal to all the net revenue from resources scheduled during events divided by their deployed MWh.**

Net Revenues

- The net revenues per deployed MWh, per unit, differ significantly per unit, but most units receive well in excess of \$1,000/MWh.



Net Revenues Conclusion

- **The observed net revenues are substantial.**
- **The IMM does not observe a need to increase revenues or make units whole for deployment costs.**

Synchronized Reserve Market Costs

- The synchronized reserve market is a small percent of all PJM costs, 0.2 percent in 2023 but an alternative way of evaluating the level of the reserve market compensation is to convert the revenues to \$/MW-day.
- In 2023, PJM procured, on average, 2,133.4 MW of synchronized reserves.
- Total cost was \$73.5M. Same as total revenues.
- The total cost equates to \$94/MW-day.
- This was the daily average cost of having 2,133.4 MW on standby in 2023.

Monitoring Analytics, LLC

2621 Van Buren Avenue

Suite 160

Eagleville, PA

19403

(610) 271-8050

MA@monitoringanalytics.com

www.MonitoringAnalytics.com

