IMM Packages

RCSTF

June 25, 2026

IMM

Monitoring Analytics

IMM RCSTF Proposal

- The IMM proposal addresses immediate RCSTF goals:
  - Reserve performance
  - Reserves to address net load forecast uncertainty
  - Reserves to address BAL-002-03 R3 (Contingency Reserve Restoration)
- Additional reserve changes in the PJM proposal are market design preferences, not operational needs.
- Additional reserve changes have alternatives that PJM is not willing to study.
- Additional reserve changes significantly delay addressing immediate needs.

Implementation

- **Implementation time frames matter**
  - **The IMM proposal can be implemented in the near term.**
  - **Additional reserve changes significantly delay addressing immediate needs.**
  - **The PJM proposal competes with other implementation priorities that also address future market needs, like the multiconfiguration model / ESR model.**

System Implementation

- **Correctly modeling reserves and modeling the flexibility in the market requires a more sophisticated model than PJM currently uses.**
- **The multiconfiguration and storage models that are part of the nGEM project are complementary to the RCSTF.**
- **RCSTF implementation should not be allowed to slow the work on nGEM priorities.**
- **PJM and stakeholders should develop and implement rules for CC/CT/ST operating transitions and storage before implementation of new reserves design.**

RCSTF Recommendation

- **The IMM recommends that the RCSTF vote on interim packages that address the near term needs.**
- **The IMM has created interim packages grouped by need and implementation type.**

- **Incorporating net load forecast uncertainty in reserves should be addressed as soon as possible.**
- **Improvements to reserve performance accountability should continue to move forward.**

RCSTF Recommendation

- **The IMM overall proposal is separated into three packages for sequential implementation:**
  1. **Changes to market inputs**
     - Incorporate net load forecast uncertainty in reserves
  2. **Changes to PJM internal systems and processes + 1.**
     - Reserve performance evaluation and settlements changes
  3. **Changes to market clearing engines + 1. + 2.**
     - Reserve eligibility, inclusion of DR, reserve subzone use, performance adjustment to resource clearing, and all other changes.

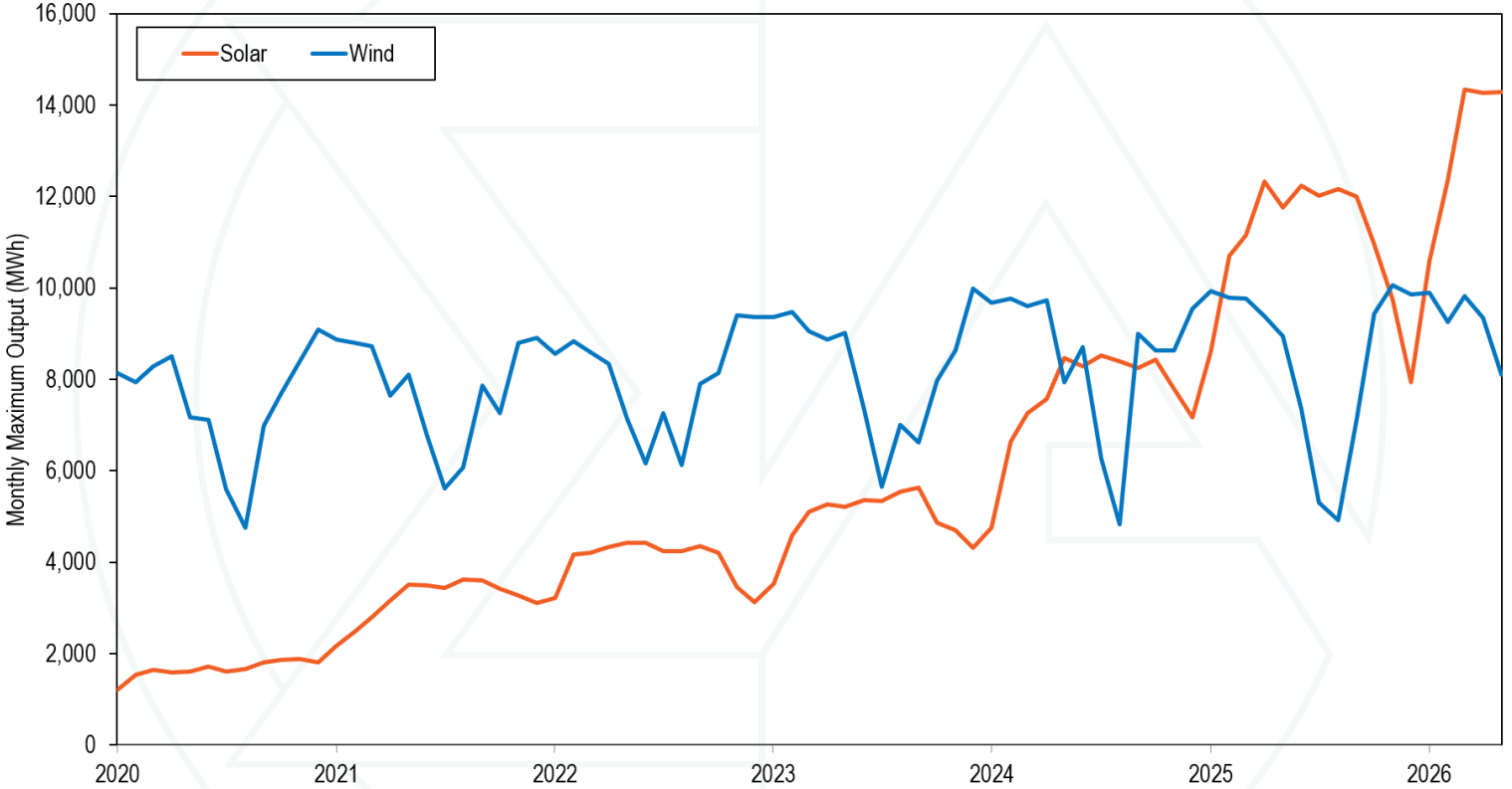
Net Load Forecast Uncertainty

- **Addressing net load forecast uncertainty remains the most pressing issue at the RCSTF.**
- **Generation from solar in PJM continues to grow.**
- **Incorporating uncertainty in the reserve products does not require a complicated market design.**
  - **This is the approach of the IMM proposal.**

Annual Maximum Hourly Solar and Wind Output

	Solar Maximum Hourly Output			Solar Percent of	Wind Maximum Hourly Output			Wind Percent of
Year	Maximum Hourly MWh	Change	Percent Change	All Generation For The Year	Maximum Hourly MWh	Change	Percent Change	All Generation For The Year
2020	1,879			0.4%	9,095			3.3%
2021	3,617	1,739	92.5%	0.9%	8,911	(184)	(2.0%)	3.3%
2022	4,429	812	22.4%	1.1%	9,402	491	5.5%	3.8%
2023	5,630	1,201	27.1%	1.4%	9,993	592	6.3%	3.5%
2024	8,532	2,901	51.5%	2.1%	9,768	(226)	(2.3%)	3.7%
2025	12,325	3,794	44.5%	2.9%	10,058	290	3.0%	3.7%
2026	14,348	2,023	16.4%	2.4%	9,896	(161)	(1.6%)	4.7%

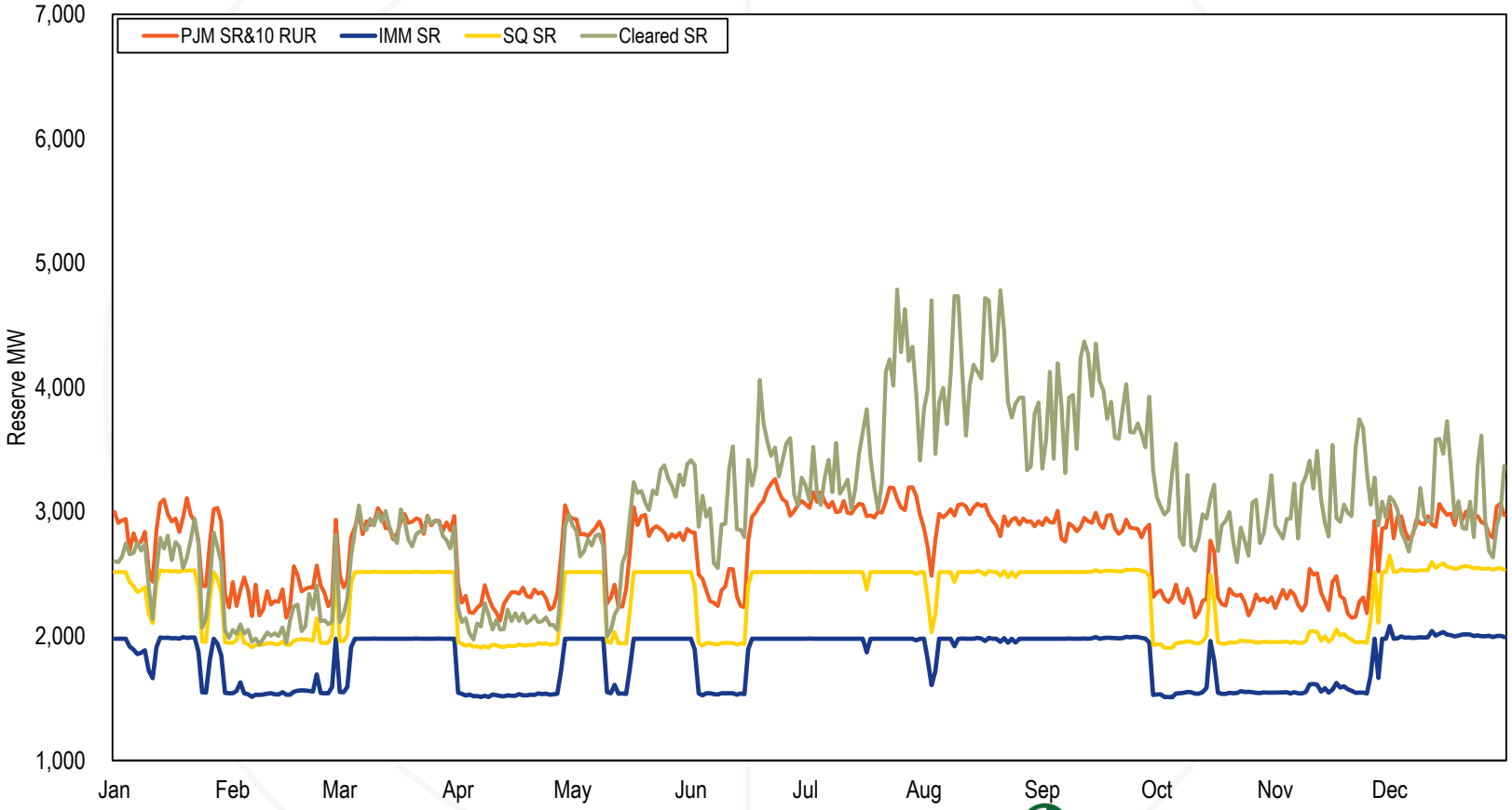
Maximum Solar and Wind Hourly Output by Month



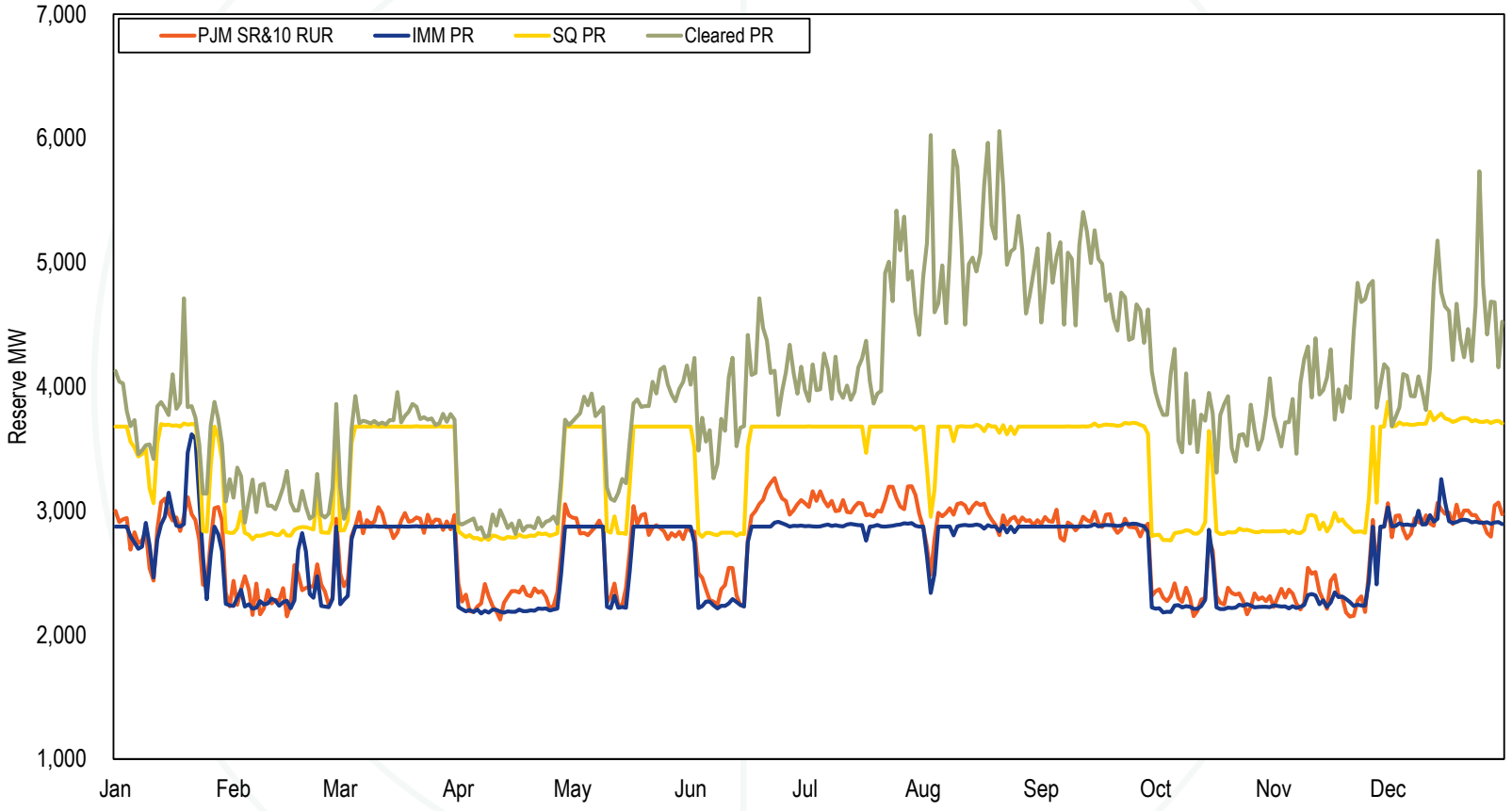
PJM and IMM 10 min Reserves Amounts

- The graphs compare status quo requirements and cleared reserves to the PJM and IMM proposed 10 min reserve quantities.
- Online and Offline Reserves
  - PJM proposes that all 10 min reserves are online only.
  - The PJM proposed amounts are the same for both online only and total 10 min reserves.
  - The IMM proposes separate synchronized (online) and primary (online or offline) reserve requirements.
- PJM proposed amounts exclude the status quo performance adder. PJM amounts will be higher if performance adder is maintained.

PJM and IMM 10 Minute Online Reserves



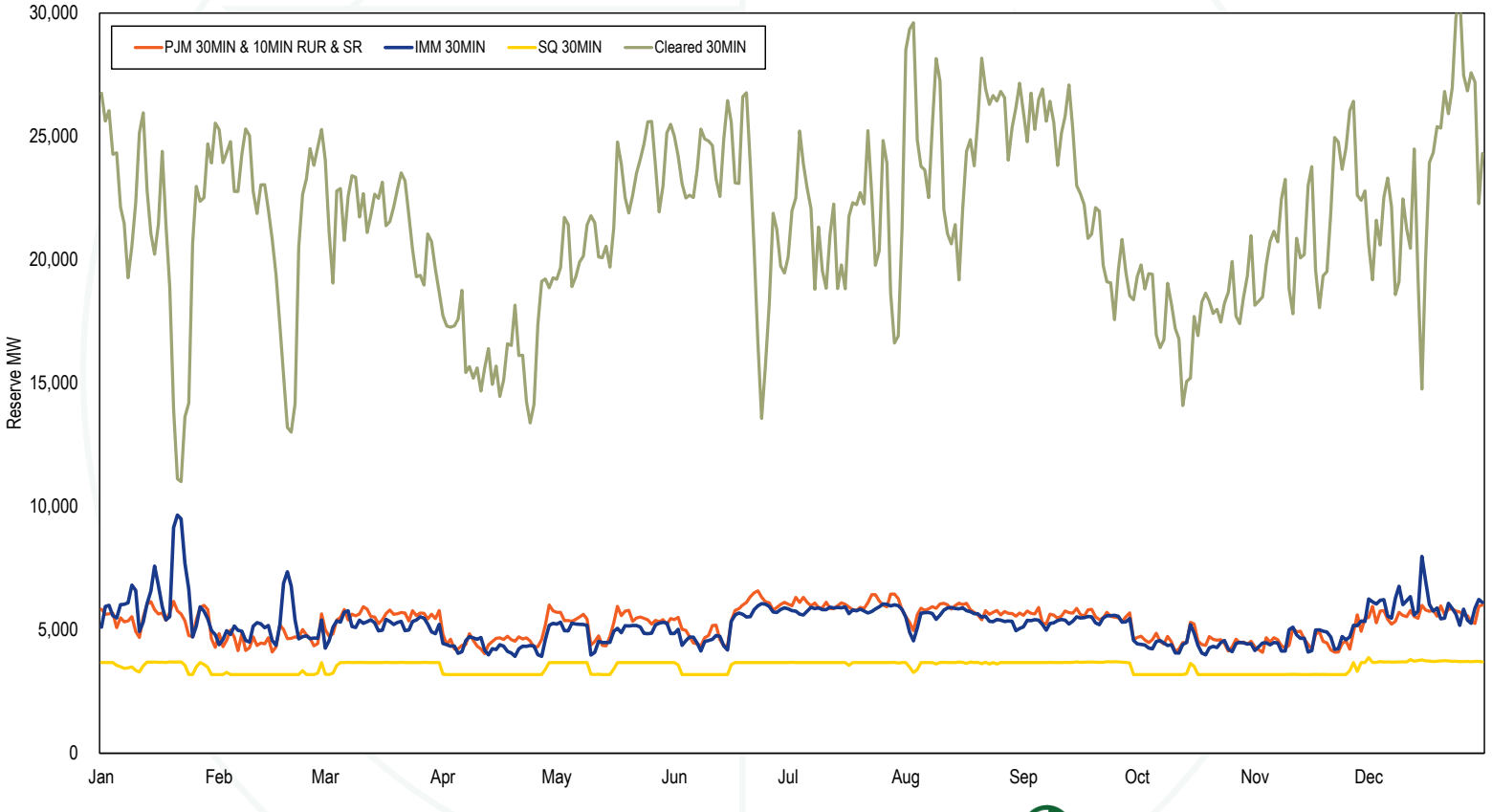
PJM and IMM Total 10 Minute Reserves



PJM and IMM 30 min Reserves Amounts

- **The graph compares the status quo requirement and cleared reserves to the PJM and IMM proposed 30 min reserve quantities.**
- **Online and Offline Reserves**
  - **PJM proposes an online only component for a share of the 30 min reserves.**
  - **The IMM proposes that all 30 min reserves can be online or offline.**

PJM and IMM 30 Minute Reserve Proposals



PJM vs IMM Reserves Products

- A key difference between the PJM and IMM reserve requirements is the product definitions: online vs offline.
- PJM would significantly increase the required amount of online reserves, which increases production costs, increases prices, and reduces market efficiency.
- PJM should make full use of offline reserves.
- PJM's proposed elimination of the offline 10 min product (NSR) would make the market less efficient and would reduce reliability if current 10 min start generators remove fast start capability.

Reserve Performance

- PJM has made process and software changes that have improved reserve performance.
- The IMM has worked with market participants to improve reserve performance.
- This momentum should be maintained. More progress can be gained.
- The IMM proposal replaces PJM's performance adder to reserve requirements with a targeted performance adjustment to reserve supply.
- The IMM proposal also ensures that all reserve performance is measured and has logical penalties.

Synchronized Reserve Response

- The table shows the history of synchronized reserve event response.
- Both the measurement and performance were affected by the 2022 reserve market changes.
- Performance has improved considerably with both communications software changes and efforts to work with market participants to address the causes of underperformance.

Average synchronized reserve response from scheduled resources for events longer than 10 minutes, excluding over response

Year	Number of Events of Any Length	Number of Events Longer than 10 Minutes	Average Percent of Scheduled Synchronized Reserve MW that Responded to Events Longer than 10 Minutes	Percent of Events that were Longer than 10 Minutes
2017	16	6	87.6%	37.5%
2018	18	8	74.2%	44.4%
2019	13	3	86.8%	23.1%
2020	17	5	59.5%	29.4%
2021	18	5	83.1%	27.8%
2022 (Jan - Sep)	14	3	71.2%	21.4%
2022 (Oct - Dec)	9	7	50.3%	77.8%
2023	12	3	55.6%	25.0%
2024	19	5	58.2%	26.3%
2025	28	7	78.3%	25.0%
2026	8	1	72.3%	12.5%

Other Highlights of Full IMM Proposal

- Status quo reserve products
- Status quo ORDCs
- Status quo use of day-ahead market to clear real-time market reserve needs
- Generator performance uncertainty captured in 30 min reserves
- Inclusion of demand response in 30 min reserves
- Allocation of reserve costs to load plus exports
- Use of reserve subzone instead of nodal reserves

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