

RCSTF IMM Proposal Options

RCSTF

November 18, 2025

IMM



Monitoring Analytics

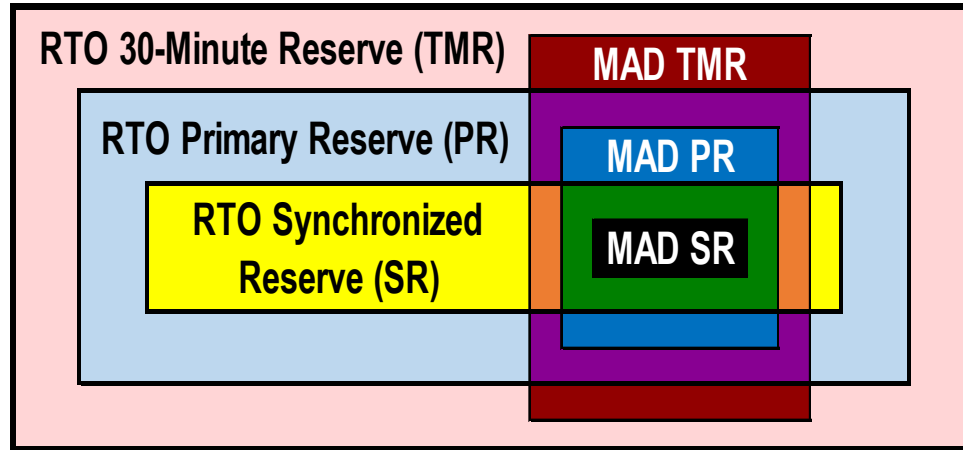
Overview

- This presentation provides an update and review of the IMM's RCSTF proposal.
- Slides that were include in the last presentation are indicated with an asterisk. *



IMM Proposal Options

- The IMM proposal will be based on the existing reserve products and pricing structure
- Incorporating reserves to capture uncertainty in the net load forecast error and generation.



30 Minute Uncertainty Reserves*

- The purpose of secondary reserves is to cover uncertainty and to support the market when primary reserves have been deployed.
- The requirement for 30 minute reserves should be based on
 - net load forecast error
 - forced outage risk, to the extent not covered by primary reserves

IMM Options: 30 Minute Reserves

- **Uncertainty reserves only for the full reserve requirement**
- **Include net load forecast error and generator performance**
- **The uncertainty is the difference between the forecasts for the 30 minute and 2 hour look ahead times.**
- **The reserve requirement will be sufficient to cover the historic uncertainty at a defined percentile.**
- **The IMM will provide data, examples, and details of the calculation.**
- **No process for extensions of the reserve requirement.**

30 Minute Reserves Supply*

- **The June peak load event shows that 30 min demand response was used as reserves.**
- **Exports are recallable.**
- **Max emergency generation can be called.**
- **The reserve market can cover more of the operator actions taken prior to load shed.**
 - **Include 30 minute demand response capacity**
 - **Include recallable exports**
 - **Include max gen capacity as reserves**

Comparison to PJM's 30 Min Reserves Options

- **PJM proposes to include three elements in 30 min reserves to be carried in addition to primary reserves.**
 - Largest contingency
 - Ramping forecast (online only)
 - Net load forecast uncertainty (online only)
- **IMM proposes to include two elements in 30 min reserves.**
 - Generator performance uncertainty
 - Net load forecast uncertainty
- **IMM proposes all 30 min reserves to be both online or offline, like the status quo.**

Uncertainty Reserve Requirements*

- **Reserve requirements should be informed by**
 - **Historic market data**
 - **Current market conditions**
- **Varying by time of day, time of year, and/or load level**
- **Balance between precision and simplicity**



Transparency in Reserve Requirements*

- The determination of reserve requirements needs transparency to create confidence that market requirements are not arbitrary and subjective.
- Principles
 - Algorithmic: quantitative method
 - Verifiable: can be replicated and checked for accuracy
 - Systematic: a rule driven approach
- If I had the same inputs, I would get the same answer.

10 Minute Uncertainty Reserves

- Use primary reserves for 10 minute uncertainty
 - Synchronized reserves are online.
 - Nonsynchronized reserves are offline.
- Primary reserve requirement
 - Uncertainty due to net load forecast error
 - Largest supply contingency (MSSC)
 - No ramp product component
- Primary reserve requirement

$$\text{Max} (\underbrace{1.5 \times \text{MSSC}}_{\text{status quo}}, \underbrace{\text{MSSC} + \text{uncertainty}}_{\text{proposed extension}})$$

10 minute Ramp / Uncertainty Reserves*

- **NERC requires contingency reserves to cover the largest contingency.**
- **PJM carries primary reserves sufficient to cover 150 percent of the largest contingency, which can cover 10 min net load uncertainty.**
- **There is no need for additional 10 min reserves unless the 10 min uncertainty is more than 50 percent of the largest contingency.**
- **There is no need for a separate 10 min product. The 10 min uncertainty can be covered by primary reserves.**

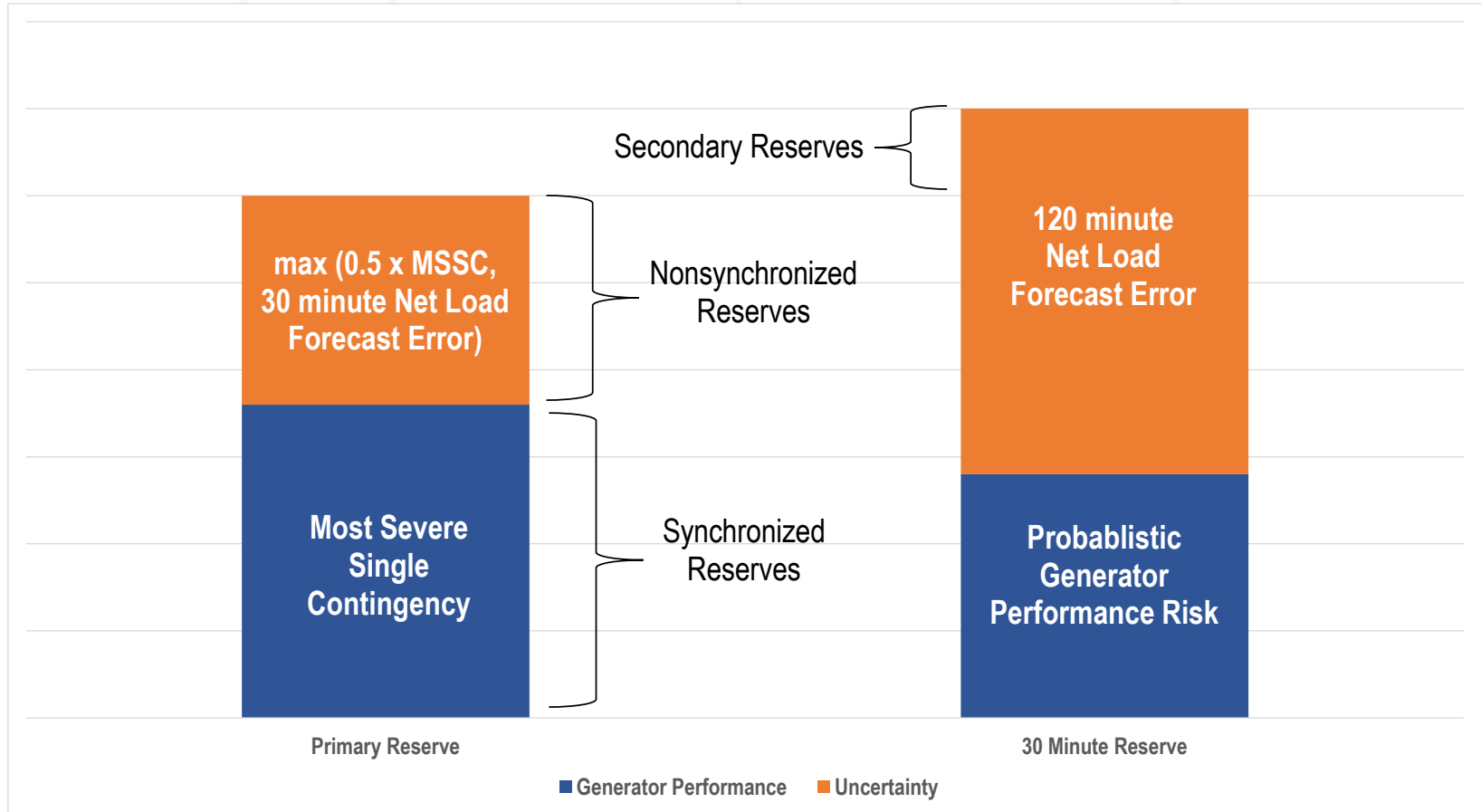
Comparison to PJM's 10 Min Reserves Options

- **PJM proposes to add a new product.**
 - Synchronized reserves (online only)
 - Nonsynchronized reserves (online or offline)
 - Ramping and uncertainty reserves (online only)
- **IMM proposes to keep the two existing products.**
 - Synchronized reserves (online only)
 - Nonsynchronized reserves (online or offline)

10 minute Ramp / Uncertainty Reserves*

- **Multi-interval dispatch remains the best solution for enhancing dispatch to address system ramp needs.**
- **PJM proposes to require the ability to automatically follow dispatch for ramp/uncertainty reserves.**
 - **The purpose of 10 min reserves is to convert to energy when called.**
 - **No 10 min reserves need a more restrictive requirement to follow dispatch than that required to provide energy.**
 - **The restriction would create an unnecessary barrier to entry, limiting competition.**

Conceptual Diagram of IMM Reserves Proposal



IMM Options: Day Ahead Only Reserves

- **The IMM proposes to maintain the status quo, no day ahead only reserves.**
- **The current reserve products would remain in the day ahead market to reflect real time reserve needs.**
- **The IMM does not support PJM's proposal to add a day ahead only reserve product.**

Day Ahead Reserves*

- **PJM proposes a day ahead only reserve product.**
- **Including DA only uncertainty in the market does not guarantee effective unit commitment changes.**
- **Creating a systematic modelling difference between the day ahead and real time markets will undermine market incentives.**
- **Day ahead only reserves do not ensure that fuel will be available in real time, especially on critical days.**
- **The only clear result of day ahead only reserves is higher prices.**

Offers for Reserves

- **The reserve markets are highly concentrated. The markets are cost based to mitigate market power.**
- **Cost-based offers would require fuel cost policies.**
- **The gas availability costs discussed in the RCSTF are not workable as reserve costs.**
- **Gas pipeline storage services**
 - **Park and loan services are interruptible, not reliable when they are needed.**
 - **Pipeline storage is a fixed cost, not applicable to the reserve market.**

Nested Reserve Products*

- **In the status quo reserve market, the products are nested by zones and by product definition.**
- **The most restrictive product, synchronized reserve, can satisfy the requirements for all the other products.**
- **As a result, the prices are additive when multiple reserve products or zones are in shortage.**
- **The current product nesting is a logical approach.**
- **Price capping in the PJM tariff prevents excessive pricing levels under shortage pricing.**

Unnesting ORDC Penalty Factors*

- **PJM proposes to unnest the primary and secondary reserve products, such that the ORDC penalty factors are not additive.**
- **If the prices are not additive, the penalty factors must be set to create the hierarchy of the products in the market clearing.**
- **This means that the penalty factors for the higher quality products must be at higher levels than the lower quality products.**
- **Depending on the ORDC definitions, this could result in more frequent pricing at higher penalty factors.**

ORDC Shape*

- A sloped ORDC has the penalty factor setting price any time the quantity of reserves is in the sloped range.
- A vertical ORDC maintains reserves at a given level and has prices determined by the supply curve, instead of an administrative price.
- ORDC pricing is needed in a shortage and not needed when there is no shortage.
- A sloped ORDC when there is a shortage makes sense.

ORDC Shape*

- **When reserves exceed the minimum reserve requirement (MRR), administrative pricing is not necessary. A sloped ORDC beyond the minimum requirement imposes shortage pricing when the market is not short.**
- **PJM's proposed new 10 min reserve product effectively extends the primary reserve ORDC beyond the MRR.**
 - **Since May 2023, PJM has already inappropriately added additional reserves by increasing the MRR by 30 percent.**

ORDC Penalty Factors*

- **Reserves are cleared in the RT SCED, five minute market solution.**
- **RT SCED is based on marginal costs, not commitment costs.**
- **The quantity of reserves cleared depends on the reserve penalty factor (ORDC height) vs the marginal cost of changing the economic dispatch for energy to create sufficient reserves.**
- **The \$850 per MWh penalty factor has not been too low, even when some generators' marginal costs have risen above \$1,000 per MWh.**

Additional Topics to be Added to IMM Proposal

- **Calculation of uncertainty reserve requirements**
- **Emergency generation and demand response deployment for energy and reserves**
- **Reserve deliverability**
- **Shortage pricing: Operating Reserve Demand Curves (ORDCs) and penalty factors**
- **Performance expectations**
- **Consequences for nonperformance**
- **Dispatch of energy and reserves, resource capabilities and modelling**

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