RCSTF IMM Update

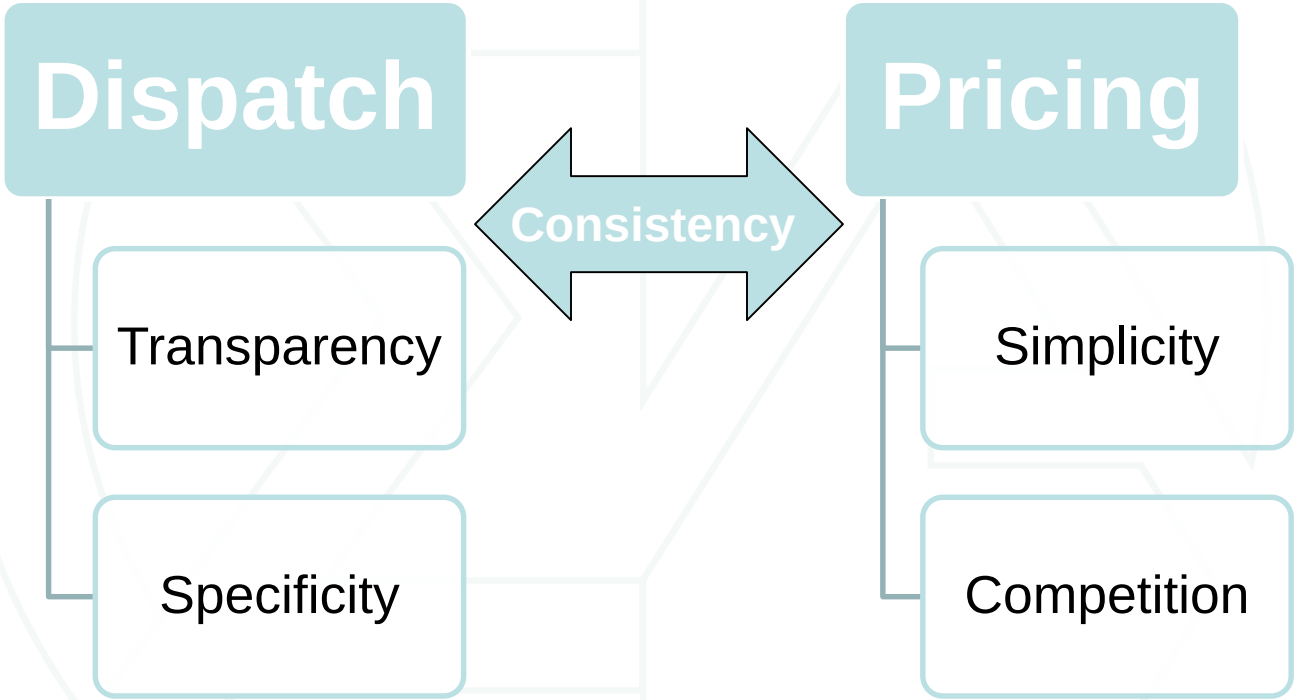
Reserve Certainty
Senior Task Force

August 27, 2025

IMM

Monitoring Analytics

Market Design Themes



Market Design Themes: Dispatch

Transparency

- Predictable changes to market requirements
- PJM accountability to be consistent
- Consistency so that market participants can make long term plans

Specificity

- Solutions directly address improvements to dispatch and commitment related to increasing solar and wind
- Focus on operational needs in specific situations
- Show how any particular resource's commitment and pricing would change

Market Design Themes: Pricing

Simplicity

- Minimize administrative pricing set by ORDCs
- Fewer products

Competition

- Minimize barriers to entry
- Create incentives to reduce costs and innovate
- Mitigate market power

Summary Topics

- DA Imbalance Reserves
- Ramp Product
- Uncertainty Reserves
- Look ahead software
- ORDC Changes
- Reserve performance
- Avoidable fuel costs in reserve offers

- IMM does not support.
- IMM does not support.
- IMM proposal
- IMM proposal
- IMM does not support.
- IMM proposal
- IMM does not support.

Monitoring Analytics

Products the IMM Does Not Support

DA Only Reserves

- Lacking specificity in expected results for dispatch and commitment
- Not simple, complicates performance and market incentives
- Market power mitigation concerns

10 Min Ramp / Uncertainty

- Does not dispatch the specific units needed to address a ramp issue
- Creates administrative shortage pricing when not in a shortage

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.**

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.**

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.**

Uncertainty Reserves

Primary Reserves

- Transparent requirements
- Specific, quantified sources of uncertainty included if exceed base requirements
- Simplicity of using existing products
- No new barriers to entry or market power concerns

Secondary Reserves

- Transparent requirements
- Specific, quantified sources of uncertainty by location
- Simplicity of using existing products
- Create more competition by including all sources of reserves

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 in the approach**

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.**

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**

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 capacity demand response**
  - **Include recallable exports**
  - **Include max gen capacity as reserves**

Operating Reserve Demand Curves

Competition: Offers set price when possible

Specificity: Penalty factors support market dispatch

Transparency: Clearly defined, static penalty factors

Simplicity: Build on existing products, nesting, and additivity

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.**

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