

PJM Scarcity Pricing Changes HEPG - October 1, 2009

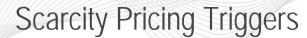
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- Scarcity Pricing is triggered in regions defined by transmission constraints.
 - Regions must be at least 2 entire contiguous transmission zones.
 - Defining constraints must be 500kV or greater.
 - Includes all pricing nodes with greater than 5% raise help dfax.
- Currently there are 6 regions defined including the PJM RTO as a whole.

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The following dispatch actions initiate a scarcity pricing event:

- Begin to dispatch on-line generators which are partially designated as Maximum Emergency (MaxE) into emergency output levels.
- Begin to dispatch on-line generators which are designated entirely as MaxE, above their designated minimum load points, if they are currently on-line and operating at their minimum load points because of restrictive operating parameters associated with the generators.
- Begin to dispatch any offline generators that are designated entirely as MaxE and that have start times less than or equal to 30 minutes.
- Voltage reduction
- Emergency energy purchases
- Manual load dump

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- All offer caps are lifted within the local scarcity pricing region
- LMPs are set at the highest market-based offer operating at PJM's direction in the scarcity pricing region
- Resources called on for the scarcity condition are not offer capped
- The only offer caps are the \$1000/MWh energy offer cap in the Tariff



- Improve reliability by reducing demand and increasing generation during periods of operating reserve (OR) shortage.
- 2. Make it more worthwhile to invest in demand response.
- 3. Encourage existing resources to continue to be relied on during OR shortages.
- 4. Encourage entry of new generation and demand response.
- 5. Comparable treatment of all resources.
- 6. Ensure market power is mitigated.



New Methodology: Overview

- Methodology that employs an operating reserve constraint penalty factor curve method and the joint, simultaneous co-optimization of energy and reserves
 - "Scarcity" is determined by a "shortage of reserves"
 - There is a price (penalty factor price) associated with allowing reserves to go into shortage in order to maintain energy balance
 - An example of how this works is presented in Appendix 2 of this presentation.
 - An example of how this works across locations in RTO implementations to date can be found http://www.pjm.com/committees-and-groups/working-groups/working-groups/spwg/20090903/20090903-item-04-locational-example.ashx
- Market power screening through the use of the Three Pivotal Supplier Test and market power mitigation to cost-based offers will remain in place at all times
 - Prices increase as a result of entering a reserve shortage and are driven by the penalty factor prices associated with allowing reserve to go into shortage

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New Methodology: Details

- 10-Minute Non-synchronized and Synchronized Reserve Products
 - Used to meet Synchronized and Primary Reserve requirements
 - 30-Minute product was discussed but decided against for initial implementation
 - Further discussion on this will deferred till after initial implementation
- PJM Operations proposed reserve regions
 - RTO reserve region
 - Mid-Atlantic + DOM reserve region delineated by APSOUTH as is done today for Synchronized Reserve
 - 5-minute co-optimized energy and A/S prices and possibly some assignments
- One reserve constraint penalty factor curve for each product and region
 - 4 separate curves
 - Recognizes shortage may not occur in Primary Reserve first, but could happen with Synchronized first.

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Open Issues Under Discussion With Stakeholders

- Emergency resource inclusion and handling of emergency procedures
- Non-convexities in reserve commitments and price setting
- Shape and magnitude of the penalty factor curve
- Locational price additivity and the VOLL

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