

Problem/Opportunity Statement

Operating Reserve Demand Curve & Transmission Constraint Penalty Factors

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Reserves play an important role in maintaining the reliability of the bulk power system. The North American Electric Reliability Corporation (NERC) mandates that each regional transmission organization and independent system operator (RTO/ISO), as Balancing Authorities, maintain sufficient reserves to respond to the loss of the largest single contingency on its system within 15 minutes.

Operating reserves in the PJM market are separated into Primary Reserves and Secondary Reserves. Primary Reserves, resources capable of converting reserve capability into energy in 10 minutes or less are procured by PJM in the real-time market. Primary Reserves are sub-divided into Synchronized and Non-Synchronized Reserves. PJM currently defines secondary reserves as 30-minute reserves, currently procured in the day-ahead energy market as Day-Ahead Scheduling Reserves. There is no NERC requirement for secondary reserves.

PJM utilizes an Operating Reserve Demand Curve (ORDC) and “penalty factors” to price the value of reserves. Along with the application of the PJM Transmission Constraint Penalty Factor, the energy component of LMP under PJM’s existing ORDC rules can reach \$3,750/MWh before congestion is added. For the “downward sloping” ORDC to go into effect on May 1, 2022, approved by the Federal Energy Commission (FERC) in May 2020¹, in situations of reserve shortages, PJM energy market prices can reach or exceed \$12,050/MWh in cases of extreme reserve shortages.

Recent events in ERCOT illuminate the lack of a “circuit breaker” in the future PJM ORDC rules and pertinent section of the PJM Operating Agreement for addressing an extended period in which ORDC penalty adders are binding. Other PJM market products have a type of circuit breaker after which penalties cease to apply. For example, PJM’s capacity market has a stop-loss limit in its Capacity Performance rules to address resource exposure when “a combination of an unusually high number of Emergency Actions and/or very poor resource performance could lead to a total net charge liability that is out of all proportion to the risks a resource reasonably should undertake in committing capacity”.² Sponsors submit that there is no demonstrated reliability benefit for imposing extreme pricing on an extended or indefinite period during an emergency. Other PJM market products have a type of circuit breaker after which penalties cease to apply.

Product	Current Maximum Clearing Price (\$/MWh)	After May 1, 2022 Maximum Clearing Price (\$/MWh)
Secondary Reserves	N/A	\$2,000*
Primary Reserves	\$850	\$,6,000*
Synchronized Reserves	\$1,700	\$10,000*
Energy	\$3,750 [^]	\$12,050 ^{*,^}

[^] No congestion is included directly.

* Assumes the sub-zone is not modeled for 30 Minute Reserve. In instances when the sub-zone is modeled, the \$2,000 penalty factor on the 30 Minute Reserve Sub-zone ORDC would also cascade through the above prices.

¹ PJM Interconnection, L.L.C., 171 FERC ¶ 61,153 (2020) <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=15540317>.

² PJM’s December 2014 Capacity Performance filing in FERC Docket No. ER15-623 at page 46.