



Operating Reserve Demand Curves (ORDC) for Reserve Price Formation Project Delivery Year 2021/2022

Markets Implementation Committee
April 07, 2021

In Docket Nos. EL19-58-000 and ER19-1486-000, the Commission accepted proposed revisions to the PJM Tariff and Operating Agreement to effectuate enhanced reserve price formation in PJM markets.

Under the revised language in the Tariff, Attachment K-Appendix, Section 3.2.3A.02 (C), and Operating Agreement, Schedule 1, Section 3.2.3A.02(C), **PJM is required to post revised Operating Reserve Demand Curves (ORDCs) by April 1 for the delivery year starting in June.**

While this Tariff and Operating Agreement language will not become effective until May 1, 2022, PJM has posted the ORDCs for Synchronized Reserve, Primary Reserve, and the 30-Minute Reserve Requirements for the RTO and Mid-Atlantic & Dominion Reserve sub-zone, for Delivery Year 2021/2022 given it starts this coming June.

PJM indicated the following with respect to the development of the ORDC curves:

- The uncertainties defining the ORDC are quantified from three full calendar years of data.
- PJM will annually update the determination of these quantifications to account for the most recent calendar year's data.
- PJM will post the revised ORDCs each year by April 1 for the delivery year starting in June.

- PJM has developed and posted the set of ORDCs to be used for the 2021/2022 Delivery Year (June 1, 2021 through May 31, 2022).
 - Posted ORDCs will be effective on May 1, 2022 through May 31, 2022 (first month the reserve price formation project go-live).
- ORDCs developed for Synchronized Reserve (SR), Primary Reserve (PR) and 30-Minute Reserves.
- ORDCs developed using calendar years 2018, 2019 and 2020 data.
- ORDCs developed for the PJM RTO and Mid-Atlantic and Dominion (MAD) sub-zone.
 - No new reserve sub-zones created.

- For illustrative purposes a Minimum Reserve Requirement (MRR) of 1,400 MW was used for the curves.
- For illustrative purposes a MRR of 2,100 MW ($1.5 \times 1,400$ MW) was used for the PR curves.
- The SR MRR in Day Ahead (DA) will be based on a resource with the largest bid in Eco Max for a given hour.
- The SR MRR in Real Time (RT) will be based on the max of a resource's State Estimator MWs or bid in Eco Max, whichever is higher.
- The PR MRR in both DA and RT is equal to 1.5 times the SR MRR.

▶ PJM Coronavirus (COVID-19) Information, maintenance planned

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Ancillary Services

Ancillary services help balance the transmission system as it moves electricity from generating sources. PJM operates several markets for ancillary services: the Synchronized Reserve Market, the Non-Synchronized Scheduling Reserve Market and the Regulation Market. [Learn more](#) about ancillary services at the PJM website.

[Ancillary Service Market Results](#)

Synchronized Reserve	Date
Communication Process for Consideration of Some Resources for Tier 1 Synchronized Reserve PDF	6.19.2020
Communication of Synchronized Reserve Quantities to Resource Owners PDF	3.18.2019
Reserve Zone & Sub-Zone Classifications PDF	7.10.2020
Mid-Atlantic-Dominion Subzone Bus & Resource List - Effective 3.10.2021 XLS	3.12.2021
Historical Synchronized Reserve Events	
Modification to Synchronized Reserve Market to Better Reflect the Operating Characteristics of Participating Generating Unites PDF	7.1.2013

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Regulation Requirement Definition PDF	8.2.2019
RTO Regulation Signal Data ZIP (434MB)	1.4.2021
Regulation Uplift and Lost Opportunity Cost PDF	3.18.2019
Regulation Market Concepts - Benefits Factor Calculation PDF	3.18.2019
Regulation Self-Test Signals	
Normalized Dynamic and Traditional Regulation Signals - May 2014 XLS	8.21.2014
Normalized Signal Test (after 1.30.2017): RegA RegD CSV	3.13.2019
Normalized Signal Test: RegA RegD CSV	8.20.2014
40-Minute Performance Score Template - Updated to Reflect August MRC Changes XLS	10.9.2013
Zone Preliminary Billing Data	
PJM Regulation Zone	
Regulation Performance Impacts Templates	
Proposed Benefits Factor Formulation - Version 1.1 XLS	9.15.2015

Manuals

M-10: Pre-Scheduling Operations
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M-11: Energy & Ancillary Services Market Operations
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M-12: Balancing Operations
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M-14D: Generator Operational Requirements
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M-15: Cost Development Guidelines
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M-27: Open Access Transmission Tariff Accounting
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M-28: Operating Agreement Accounting
[WEB](#) | [Current](#) | [Redline](#) | [PDF](#) Sections 4-7

M-36: System Restoration
[WEB](#) | [Current](#) | [Redline](#) | [PDF](#) All Sections

Operating Reserve Demand Curve	Date
ORDC Description PDF	3.30.2021

ORDCs for the 2022/2023 Delivery Year (June 1, 2022 through May 31, 2023) will be developed and posted by April 1, 2022.

The 2022 Delivery Year ORDCs will be developed using data from calendar years 2019, 2020 and 2021.

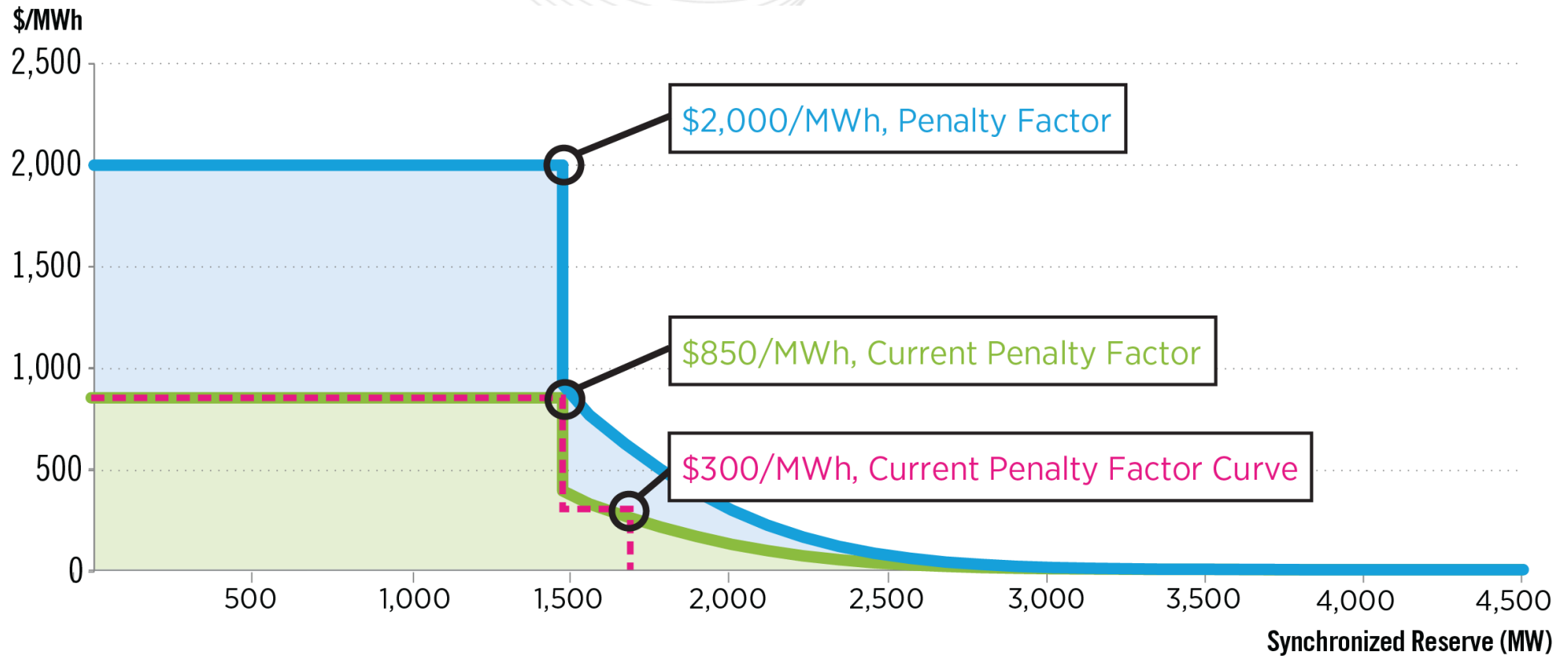
Will include ORDCs for the RTO, MAD and any new reserve sub-zone(s) identified by PJM.

The ORDC:

Sets the reserve requirement for market clearing purposes

Puts a defined limit on the cost to be incurred when procuring reserves

Synch Reserve ORDC Penalty Factor Comparison



For illustrative purposes only.

	10-Min (SR)	10-Min (PR)	30-Min
MRR	Output of largest online unit (~1,450 MW)	150% of output of largest online unit (~2,175 MW)	Max of 3,000 MW or largest gas contingency (approximately 200% of largest unit)
Uncertainties	Load, Wind, Solar, Thermal Forced Outages	Load, Wind, Solar, Thermal Forced Outages	Load, Wind, Solar, Thermal Forced Outages, Net Interchange
Adjusted by Regulation?	Yes	Yes	Yes
Look-Ahead Uncertainty Interval	30 minutes	30 minutes	60 minutes
Penalty Factor	\$2,000/MWh	\$2,000/MWh	\$2,000/MWh

Twenty-four different ORDCs will be modeled per reserve zone, one for each season and time-of-day blocks.

Using historical uncertainty data from most recent three full calendar years

Season	Time-of-Day Block (in Hour Beginning)
Summer (June – August)	1 (2300 – 0200)
Fall (September – November)	2 (0300 – 0600)
Winter (December – February)	3 (0700 – 1000)
Spring (March – May)	4 (1100 – 1400)
	5 (1500 – 1800)
	6 (1900 – 2200)

- The zonal ORDCs for each of the three products will be developed in a similar manner to the RTO ORDCs.
- The data used to calculate the zonal ORDC will be zonal data.
- The penalty factors will be identical to the RTO penalty factors.

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Operating Reserve Demand Curves



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