



Market Simulation Update

Market Simulation

Transmission Expansion Advisory Committee

September 13, 2024



2024-2025 Stage 1A ARR 10 Year Analysis Update

Xu Xu, Sr. Lead Engineer
Market Simulation

- Purpose:

Ensure the transmission system is capable to support the simultaneous feasibility of Stage 1A ARR's upto 60% of Network Service Peak Load inclusive of the projected ten-year load growth

- Challenges
 - Some transmission zones are expected high load growth in the next 10 years
- Results:
 - 2024/2025 Stage 1A 10-Year ARR analysis identified violations near Peach Bottom area
 - Upgrades are anticipated under the current RTEP process



Results of 2023/24 Stage 1A ARR 10-year Analysis

Facility Name	Facility Type	First Year of Violation	Upgrade expected to fix infeasibility	Expected in-service date
COOPERPE230 KV COO-GRA I/o L500.Conastone-PeachBottom.5012	LN	1	2022 RTEP Reliability Window 3 for load growth and generation deactivation (b3780, b3800)	2027-2028
COOPERPE230 KV COO-PEA I/o L500.Conastone-PeachBottom.5012	LN	1	2022 RTEP Reliability Window 3 for load growth and generation deactivation (b3780, b3800)	2027-2028
NOTTINGH230 KV 1-3 I/o L500.Conastone-PeachBottom.5012	LN	1	2022 RTEP Reliability Window 3 for load growth and generation deactivation (b3780, b3800)	2027-2028
NOTTINGH230 KV 2-3 I/o L500.Conastone-PeachBottom.5012	LN	1	2022 RTEP Reliability Window 3 for load growth and generation deactivation (b3780, b3800)	2027-2028
NOTTINGH230 KV NOT-PEA I/o L500.Conastone-PeachBottom.5012	LN	1	2022 RTEP Reliability Window 3 for load growth and generation deactivation (b3780, b3800)	2027-2028
KILMER 230 KV KIL-LAKI I/o L230.Greenbrook-LakeNelson	LN	6	b3737.28 Reconductor Kilmer-Lake Nelson I 230 kV	2029
LAKENELS230 KV LAK-MID I/o L230.Greenbrook-LakeNelson	LN	6	b3737.28 Reconductor Kilmer-Lake Nelson I 230 kV	2029



2024 Acceleration Analysis of RTEP Reliability Projects

Nicolae Dumitriu, Manager Market Simulation

1.5.7 Development of Economic-based Enhancements or Expansions.

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(b) Following PJM Board consideration of the assumptions, the Office of the Interconnection shall perform a market efficiency analysis to compare the costs and benefits of:

- (i) accelerating reliability-based enhancements or expansions already included in the Regional Transmission Plan that if accelerated also could relieve one or more economic constraints;
- (ii) modifying reliability-based enhancements or expansions already included in the Regional Transmission Plan that as modified would relieve one or more economic constraints; and
- (iii) adding new enhancements or expansions that could relieve one or more economic constraints, but for which no reliability-based need has been identified. Economic constraints include, but are not limited to, constraints that cause:
 - (1) significant historical gross congestion;
 - (2) pro-ration of Stage 1B ARR requests as described in the Operating Agreement, Schedule 1, section 7.4.2(c); or
 - (3) significant simulated congestion as forecasted in the market efficiency analysis.

The timeline for the market efficiency analysis and comparison of the costs and benefits for items in the Operating Agreement, Schedule 6, section 1.5.7(b)(i-iii) is described in the PJM Manuals.

- (c) The process for conducting the market efficiency analysis described in subsection (b) above shall include the following:
- (ii) The Office of the Interconnection shall identify any planned reliability-based enhancements or expansions already included in the Regional Transmission Expansion Plan, which if accelerated would relieve such constraints, and present any such proposed reliability-based enhancements and expansions to be accelerated to the Transmission Expansion Advisory Committee for review and comment. The PJM Board, upon consideration of the advice of the Transmission Expansion Advisory Committee, thereafter shall consider and vote to approve any accelerations.

- Scope
 - Determine which Reliability upgrades, if any, have an economic benefit if accelerated or modified.
- Study Assumptions
 - Analysis uses the most recent Market Efficiency Base Case available
 - Two simulated years used to study impacts of approved RTEP reliability projects:
 - Near-Term simulations
 - Future simulations
- Process
 - Compare market congestion for near term vs. future simulations.
 - Estimates economic impact of accelerating planned reliability upgrades.

- Completed production cost simulations:
 - Near-term topology cases used 2024 MMWG powerflow (AS-IS topology)
 - Future topology cases used 2029 RTEP powerflow (RTEP Topology)
 - Used 2024 load forecast for PJM zones
 - Simulated 2025 and 2029 years
- Determined congestion reductions between the AS-IS and RTEP topology cases.
- Identified approved reliability upgrades that are responsible for congestion reductions between the AS-IS and RTEP topology cases.
- Checked the feasibility of accelerating project schedules for the identified reliability upgrades.
- Results of analysis included on the following slide.



Acceleration Evaluation RTEP Upgrades

Constraint	Area	Simulated 2025 Annual Congestion Savings (\$M)	RTEP Upgrade	Upgrade ISD
Lincoln-Straban 115 kV	METED	153.1	B3800: Build new Hunterstown-Carroll 230 kV circuit	6/1/2028
Juniata #2 500/230 kV XFMR	PPL	22.77	B3664: Replace station equipment at Juniata 230 kV	5/1/2026
Haumesser Road-W De Kalb 138 kV	COMED-NIPS	19.11	B3811: Rebuild Haumesser Road to H-452 138 kV	12/1/2028
Nottingham Reactor 230 kV	PECO	18.26	B3800: Eastern Cluster	12/1/2030
Powerton-Towerline 138 kV	COMED-AMIL	16.87	B3760: Replace wave trap at Powerton 138 kV	9/30/2024
Dumont-Stillwell 345 kV	AEP-NIPS	15.97	B3775: Dumont-Stillwell 345 kV sag study	12/1/2026
Northwest-Conastone 230 kV	BGE	13.72	B3771: Reconductor Northwest-Conastone 230 kV circuits	6/1/2027
St John-Crete 345 kV	NIPSCO-COMED	10.68	B3775: Reconductor/Rebuild Crete-St John 345 kV	12/1/2026
Roxbury-Shade Gap 115 kV	PENELEC	8.63	B3751, B3752: Rebuild Roxbury-Shade Gap 115 kV	6/1/2027
Olive-University Park 345 kV	AEP-COMED	7.72	B3775: Olive-University Park 345 kV sag study	12/1/2026
Face Rock #2 115/69 kV XFMR	PPL	7.42	B3800: Eastern Cluster	12/1/2030
Maliszewski 765/138 kV XFMR	AEP	6.35	B3852: Install second 765/345 kV bank at Vassell	6/1/2027
Charlottesville-Proffit 230 kV	DOM	5.1	B3800: Rebuild 230 kV line #2054	12/29/2027
Plymouth Meeting-Whitpain 230 kV	PECO	3.35	B3697: Replace station equipment at Whitpain and Plymouth	6/1/2025

- The reliability projects on the previous slides were evaluated for acceleration potential.
- None of these projects will be accelerated for one or more of the following reasons:
 - Project has a near-term in-service date.
 - Project currently in the siting and permitting process and schedules not final.
 - Cost of acceleration is greater than the simulated Market Efficiency benefits.
 - For some projects, PJM and the Transmission Owners are working to coordinate the implementation of project work in order to meet the current expected in-service dates.
 - For some projects, analysis of outage schedule shows no ability to accelerate.

2024 Reliability Window 1

PROMOD Cases for Optional Congestion Analysis

- Cases can be used for optional congestion analysis to inform the 2024W1 reliability analysis
 - Cases should only be used for testing the robustness of proposed reliability solutions to 2024W1 violations.
- 2024W1 2029 and 2024W1 2032 PROMOD cases
 - Modified generation expansion to align with the reliability powerflow cases posted for the 2024W1.
 - Modified event files to align the reactive interface limits with the base flows from the reliability powerflow cases posted for the 2024W1.

2024/25 Long-Term Market Efficiency Cycle

- PJM requested stakeholders to provide feedback on the ME Base Case by August 31, 2024.
- Next Steps – add modeled years 2035 and beyond:
 - Update interregional data.
 - Update generation expansion to observe 17.8% IRM (beyond year 2032).
- Update case with solutions selected during the 2024 Window 1 analysis.
 - PV Analysis to determine the limits for the reactive interfaces.

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Market Efficiency Update



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- V1 – 9/9/2024 – Original slides posted
- V2 – 9/11/2024
 - Slide 10: Removed Carson-Chaparral line, RTEP baseline b3694.8, from the table (acceleration of b3694.8 was approved as part of the 2023 Acceleration Analysis).

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