Market Efficiency Update

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Transmission Expansion Advisory Committee
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2022/23 Market Efficiency Cycle

2022/23 Long-Term Window – ME Base Case

- Back in January, PJM posted the preliminary ME Base Case:
  - Included the reliability upgrades from the 2022 Window 1 and 2022 Multi-Driver Window.
  - Preliminary case was posted on the ME secure page.
- Updated Market Efficiency Assumptions whitepaper posted with the July TEAC materials.
- Currently updating the ME Base Case with the solution selected for the 2022W3.
- PJM delayed the opening of the 2022/2023 Long-Term Window until the reliability violations for the 2022W3 are being addressed.

2023 Acceleration Analysis of RTEP Reliability Projects

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.

Acceleration Analysis of Reliability Upgrades

- Scope
  - Determine which Reliability upgrades, if any, have an economic benefit if accelerated or modified.
- Study Assumptions
  - Analysis utilized the most recent 2027 Market Efficiency Base Case available at the time.
  - 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.
  - Estimate economic impact of accelerating planned reliability upgrades.

Acceleration Analysis Status and Next Steps

- Completed production cost simulations
  - Near-Term and Future study years with AS-IS Topology.
  - Near-Term and Future study years with RTEP Topology.

- Identified reliability upgrades responsible for congestion reductions between the AS-IS and RTEP topology cases.

- Checked the feasibility of accelerating schedules for the identified reliability upgrades.

- Results presented on the following slides.

Acceleration Analysis: 2027 Load, Generation and Economic Assumptions

Congestion Decreases Associated With Approved Reliability Projects - 2027 Study Year			2027 Study year		
			2024 Topology	2027 Topology	Congestion Savings ($ Millions)
Constraint Name	AREA	TYPE	Year 2027 Congestion ($ Millions)	Year 2027 Congestion ($ Millions)	
COLORA-CONOWING 220-88	PECO/DPL	LINE	$0.8	$0.0	$0.8
CHAPRLTP-CARSON4 249B	DOM	LINE	$1.8	$0.0	$1.8

Upgrade Associated with Congestion Reduction	ISD
B3729: To increase the Maximum Operating Temperature of DPL Circuit 22088 (Colora-Conowingo 230 kV), install cable shunts on each phase, on each side of four (4) dead-end structures and replace existing insulator bells.	2027
b3694.8: Partial wreck and rebuild 10.34 miles of 230 kV line #249 Carson-Locks to achieve a minimum summer emergency rating of 1047 MVA. Upgrade terminal equipment at Carson and Locks to not limit the new conductor rating.	2026

Note: For a particular flowgate, the congestion savings for the study year are calculated as the difference in simulated congestion between the PROMOD case with AS-IS topology and the PROMOD case with the RTEP topology.

Acceleration Analysis Results

- Project B3729 - a $0.26 million project to increase the Maximum Operating Temperature of DPL Circuit 22088 (Colora - Conowingo 230 kV), will be accelerated to June 2026 at no additional cost.

- Project B3694.8 - a $25.6 million project to rebuild 10.34 miles of 230 kV line #249 Carson-Locks will be accelerated to June 2025 at no additional cost.

DPL: Acceleration of Reliability Project B3729

Process Stage: First Review

Criteria: Market Efficiency - Acceleration Analysis

Assumptions Reference: 2023 Market Efficiency Assumptions with Dominion Load from 2022 Forecast

Problem Statement:

Simulated congestion on DPL Circuit 22088 (Colora-Conowingo 230 kV) line without the B3729 project

Proposed Solution:

Accelerate the expected in service date of the reliability project B3729 from 6/1/2027 to 6/1/2026

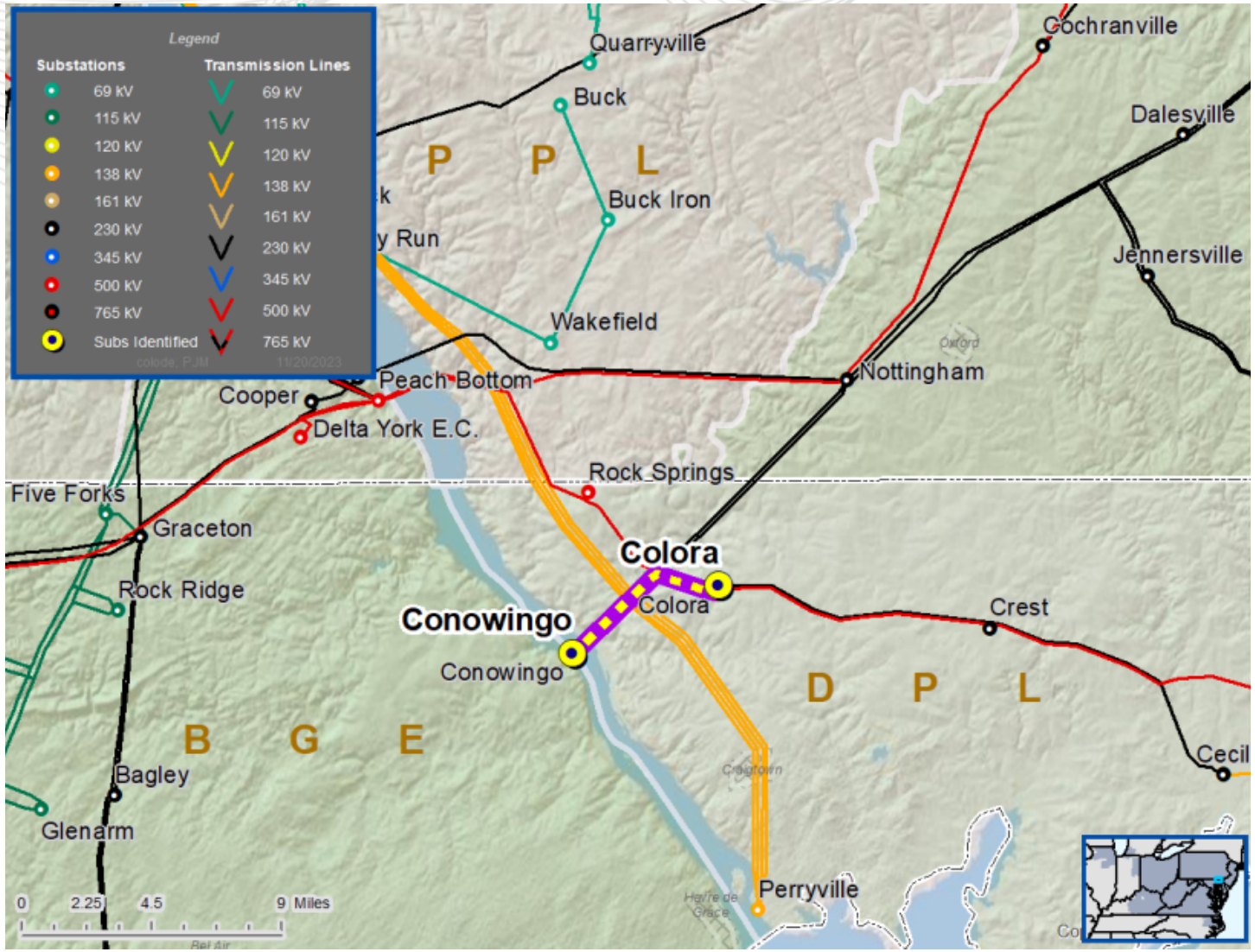
Project Description:

Increase of the Maximum Operating Temperature of DPL Circuit 22088 (Colora-Conowingo 230 kV), install cable shunts on each phase, on each side of four (4) dead-end structures and replace existing insulator bells.

Cost/Benefit Analysis:

- **Acceleration Cost**: $0
- **Estimated Annual Congestion Benefit**: $ .8 M

New Expected In-Service: 6/1/2026



DOM: Acceleration of Reliability Project B3694.8

Process Stage: First Review

Criteria: Market Efficiency - Acceleration Analysis

Assumptions Reference: 2023 Market Efficiency Assumptions with Dominion Load from 2022 Forecast

Problem Statement:

Simulated congestion on DOM Circuit 249B (Carson-Chaparral Tap 230 kV) line without the B3694.8 project

Proposed Solution:

Accelerate the expected in service date of the reliability project B3694.8 from 6/1/2026 to 6/30/2025

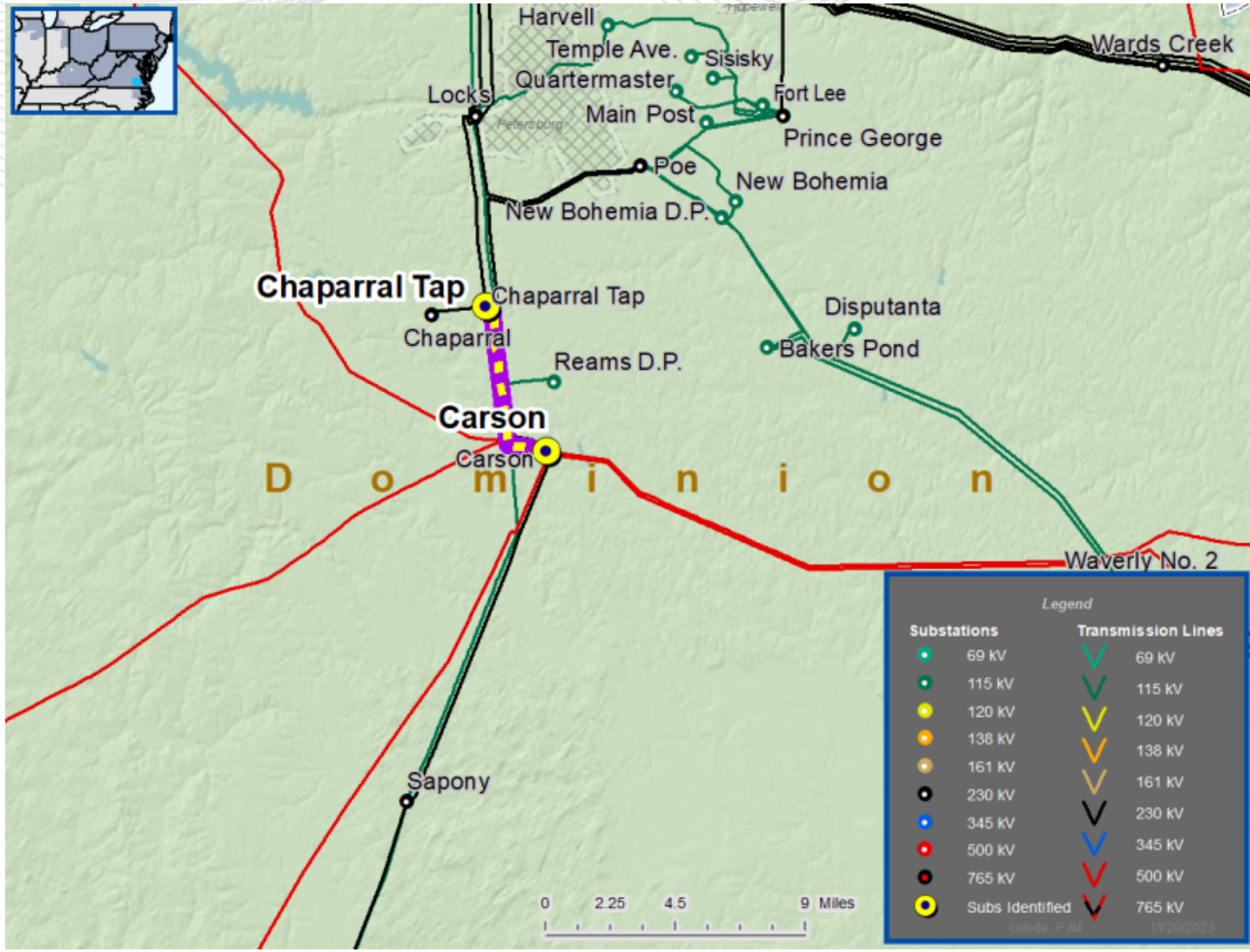
Project Description:

Partial wreck and rebuild 10.34 miles of 230 kV line #249 Carson-Locks to achieve a minimum summer emergency rating of 1047 MVA. Upgrade terminal equipment at Carson and Locks to not limit the new conductor rating.

Cost/Benefit Analysis:

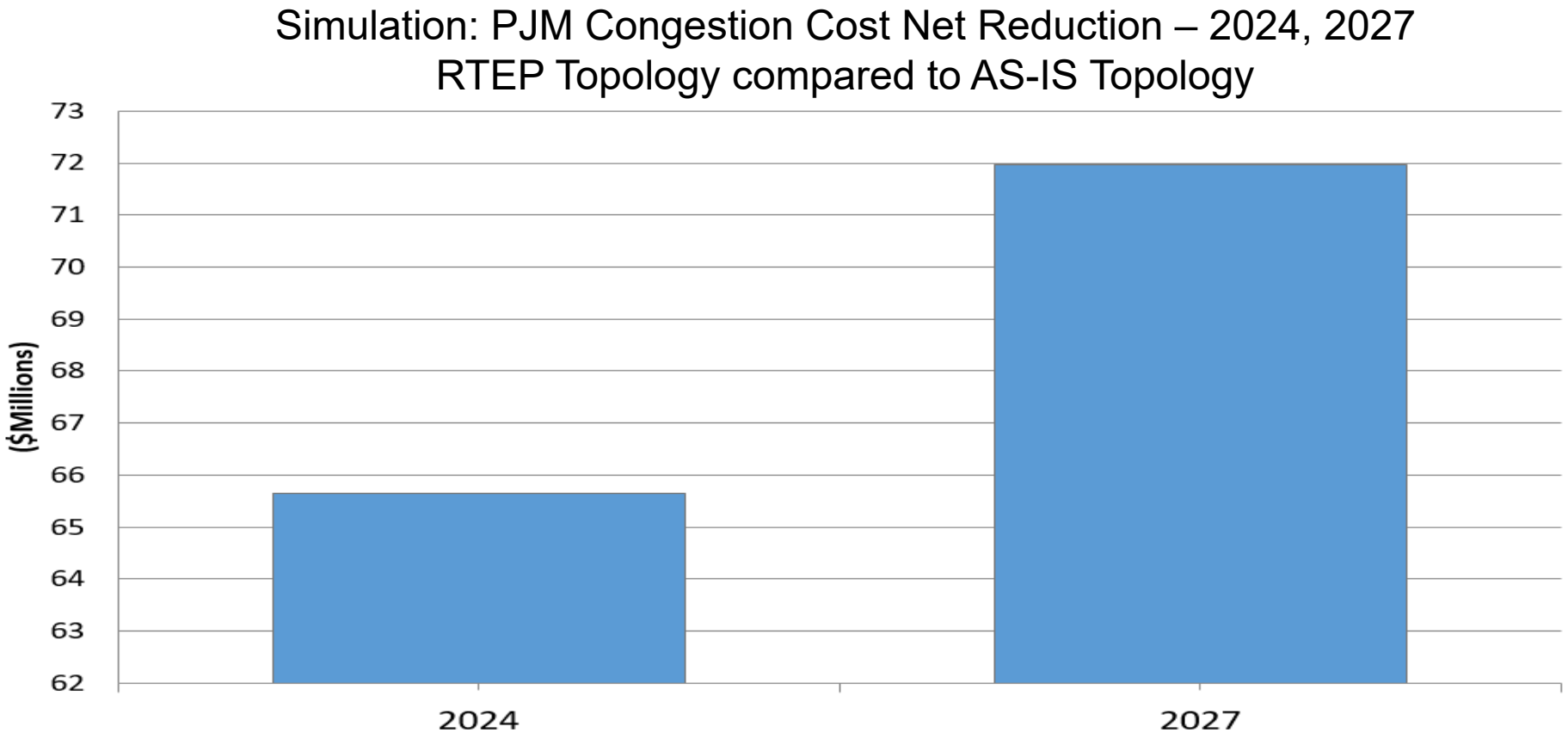
- **Acceleration Cost**: $0
- **Estimated Annual Congestion Benefit**: $ 1.8 M

New Expected In-Service: 6/30/2025



Simulated RTEP Portfolio Congestion Savings

- Annual congestion reductions for study years 2024 and 2027 comparing the 2027 RTEP topology vs 2024 MMWG topology simulation results.



2023 Annual Re-evaluation of RTEP Market Efficiency Projects

Re-evaluation Overview

- PJM is required by Schedule 6 of the Operating Agreement (OA) to "annually review the cost and benefits" of Board-approved market efficiency projects that meet certain criteria to assure that a project continues to be cost beneficial.

- The annual re-evaluation is not required for projects already in-service, that have commenced construction, or have received state siting approval.

- On Nov. 21, 2023, PJM filed with FERC a request for a waiver of the timing requirement associated with the Annual Reevaluation Analysis to permit PJM time to update the market efficiency model to include the Board-approved 2022 RTEP Window #3 projects

PC Informational Posting: FERC Waiver of Timing Requirement for Annual Market Efficiency Reevaluation

Re-evaluation of Projects with EP* Status and Capital Cost < $20 Million

- Projects not under construction or without a CPCN, and with capital costs less than $20 million were reevaluated using the benefits determined at the time of approval.
- The project costs were updated to reflect the most recent quarterly update.
- Because the cost estimates for the projects below have not changed since the project approval, these projects continue to maintain a benefit-to-cost ratio greater than 1.25.

PJM Window Project ID	Baseline#	Type	Area	Constraint	Status*	ISD	Cost ($M)	B/C Ratio	Description
202021_1-704	b3697	Upgrade	PECO	Plymouth - Whitpain 230 kV	EP	6/1/2025	.62	75.30	Replace station equipment at Whitpain and Plymouth 230 kV
202021_1-218	b3698	Upgrade	PPL	Juniata - Cumberland 230 kV	EP	12/31/2023	8.99	11.28	Reconductor 14.2 miles of Juniata-Cumberland 230 kV
202021_1-651	b3702	Upgrade	DOM	Charlottesville – Proffit 230 kV	EP	11/1/2023	11.38	16.05	Install series reactor on Charlottesville – Proffit 230 KV

**EP - Engineering and Procurement Status*

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Market Efficiency Update

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Revision History

- V1 – 11/30/2023 – Original slides posted

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