



# Reliability Analysis Update

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Transmission Expansion Advisory Committee

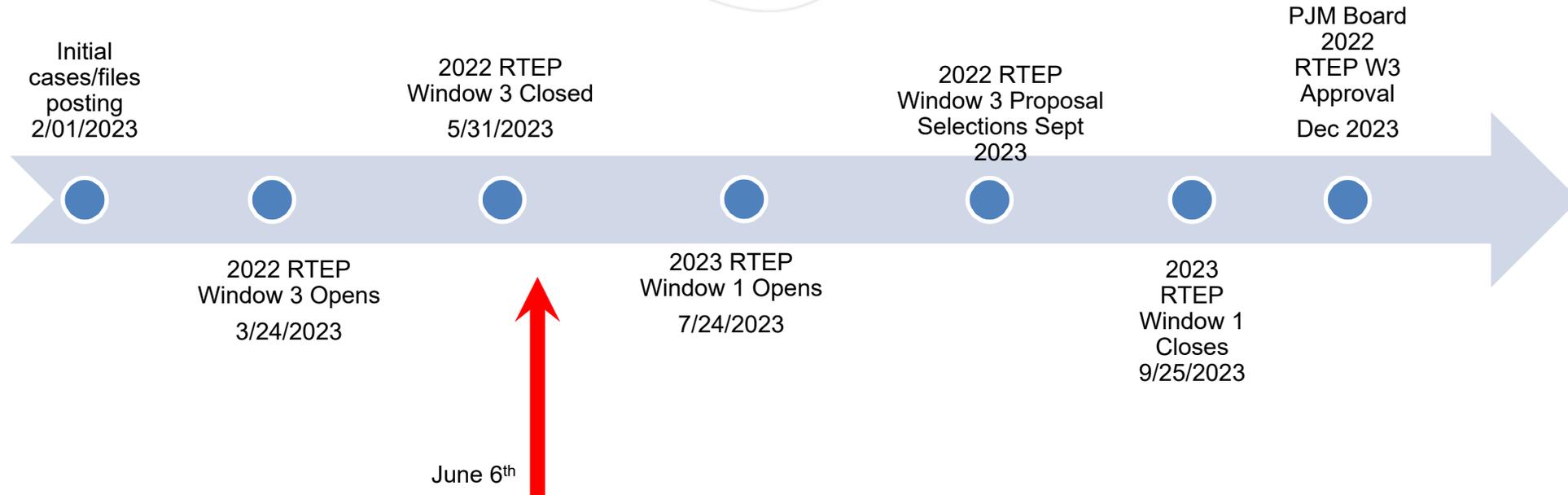
June 6, 2023

# 2022 RTEP W3

## Timeline and Status Update



# 2022 RTEP Window 3 and 2023 RTEP Window 1 - Timeline



- The 2022 Window 3 officially closed on May 31 2023.
- 72 Proposals were received from 10 entities
  - 7 are Incumbent, 3 Non Incumbent
- 16 Projects are upgrades, while 50 are Greenfield
- Numerous proposals to resolve bulk transfers (500 kV and above as well as HVDC solutions)
- 44 Proposals have Cost Containment Commitments
- PJM is currently reviewing the submitted proposals and will provide more updates at the July TEAC
- Targeting Dec 2023 Board Approval – Oct and Nov TEAC 1<sup>st</sup> and 2<sup>nd</sup> reads

- PJM Released updated basecase and information files on May 31 2023
- Window will focus on resolving reliability constraints outside the area currently covered by the 2022 RTEP W3 scope.
- 60 Day Window
- Targeting Feb 2024 board approval – Oct, Nov and Dec TEAC for solutions.



# Drivers For 500 kV Transmission Line Loading Increases in 2023 RTEP

- At 4/27/2023 special TEAC session, PJM planners presented preliminary findings for 2023 RTEP
- New 500 kV overloads in the Mid-Atlantic, APS and Dominion regions were identified that had not previously been identified in the 2022 RTEP
- PJM presented the primary reasons for these new 500 kV overloads:
  - Load forecast changes including Dominion and APS data center loads
  - Generator Deactivations
  - NJ offshore wind
  - New planning procedures
    - Block dispatch that is no longer based on historical PJM intra-regional transfers
    - Generator deliverability test modifications

- The Peach Bottom – Conastone (5012) 500 kV transmission line showed a pre-contingency winter loading increase from 2,873 MW in the 2022 RTEP Window 3 winter model to 5,869 MW in the 2023 RTEP Window 1 winter model
- Stakeholders asked PJM to quantify the drivers for this loading increase on the 5012 line

- Since the 2021 RTEP
  - PJM has had unprecedented data center load growth (~7,500 MW) currently forecast by 2027-28 in Dominion (Northern Virginia) and APS (Doubs)
  - 11,100 MW deactivation announcements to the west and south of Conastone, about 5,300 MW of which occurred after the 2022 RTEP Window 3 case was created
  - The vast majority of the new generation signing ISAs has been solar, which has low availability during the winter period
    - There has been a net decrease (new ISAs not in suspension minus withdrawn ISAs) of about 3,000 MW in new non-solar generation to the west and south of Conastone
  - PJM has implemented a new block dispatch procedure that does not maintain historical intra-regional transfers. The old dispatch procedure would have dispatched most of the generators in the Dominion zone at 100% or higher to maintain historical regional interchange.
  - The replacement generation is coming from the region to the east of Peach Bottom resulting in larger east-to-west transfers
  - The Market Efficiency 9A project was suspended

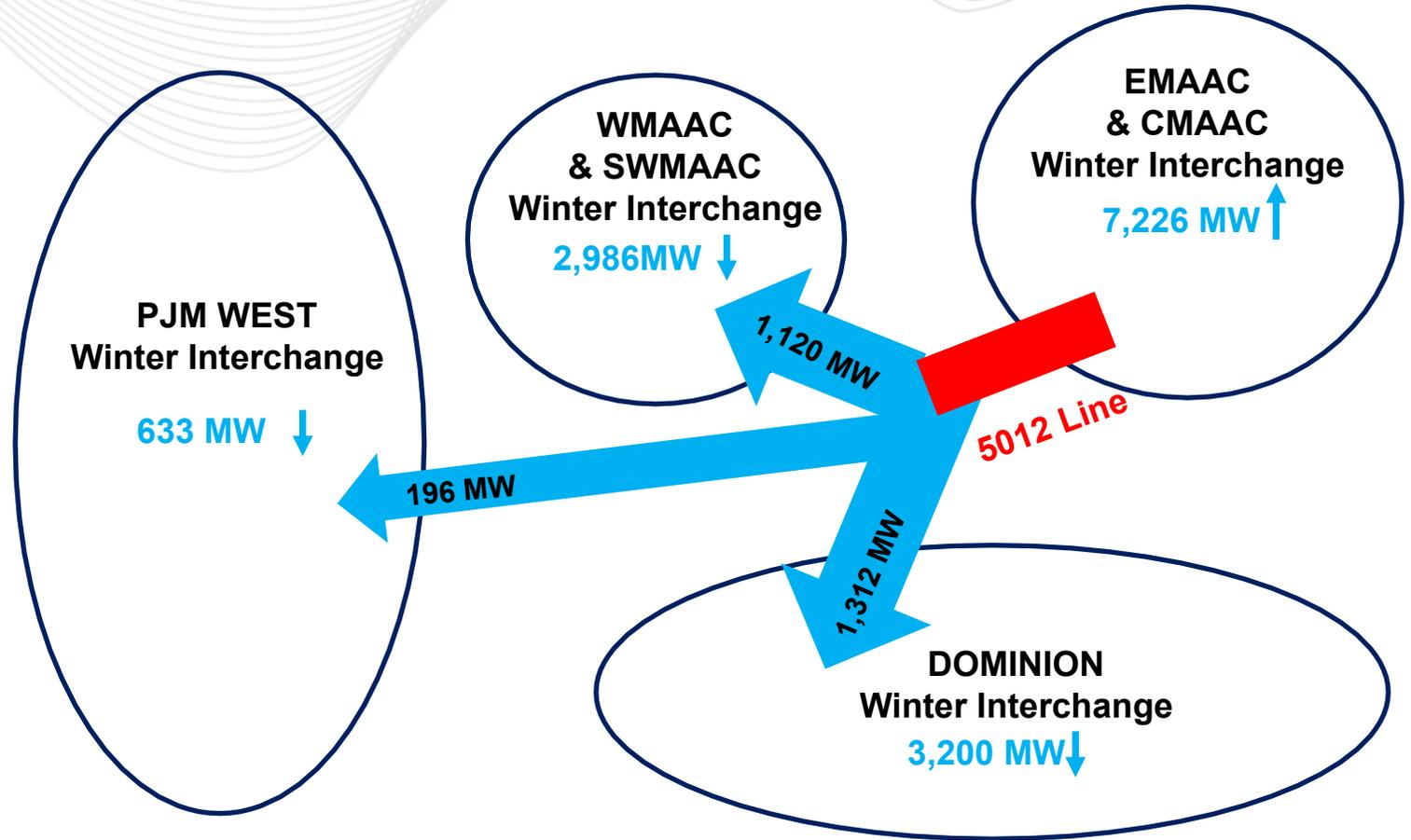


# Critical 5012 Deactivation Announcements Since 2021 RTEP

Unit Name	Capacity	Fuel Type	State	Transmission Owner Zone
Morgantown Unit 1	613.3	Coal	Maryland	PEPCO
Morgantown Unit 2	619.4	Coal	Maryland	PEPCO
Cheswick 1	567.5	Coal	Pennsylvania	DL
Will County 4	510.0	Coal	Illinois	ComEd
Waukegan 7	328.0	Coal	Illinois	ComEd
Waukegan 8	354.4	Coal	Illinois	ComEd
Zimmer 1	1,320.0	Coal	Ohio	DEOK
Sammis Unit 5	291.3	Coal	Ohio	ATSI
Sammis Unit 6	600.0	Coal	Ohio	ATSI
Sammis Unit 7	600.0	Coal	Ohio	ATSI
Brandon Shores 1	638.9	Coal	Maryland	BGE
Brandon Shores 2	642.7	Coal	Maryland	BGE
Homer City 1	620.0	Coal	Pennsylvania	PENELEC
Homer City 2	614.0	Coal	Pennsylvania	PENELEC
Homer City 3	650.0	Coal	Pennsylvania	PENELEC
Yorktown 3	767.1	Oil	Virginia	Dominion
Joliet 6	281.0	Natural Gas	Illinois	ComEd
Joliet 7	550.0	Natural Gas	Illinois	ComEd
Joliet 8	550.0	Natural Gas	Illinois	ComEd
<b>TOTAL</b>	<b>11,117.6</b>			

# Primary Drivers For 5012 Line Flow Increase Between 2023 RTEP W3 & 2022 RTEP W1

- 5,314 MW of announced deactivations with replacements flowing from the East including 2,758 MW of New Jersey offshore wind
  - WMAAC & SWMAAC
    - ✓ Brandon Shores: 1,282 MW (48% DFAX)
    - ✓ Homer City: 1,884 MW (31% DFAX)
  - PJM West
    - ✓ Joliet: 1,381 MW (39% DFAX)
  - Dominion
    - ✓ Yorktown 3: 767 MW (44% DFAX)
- New dispatch rules
  - Removed PJM historical interchange considerations in Dominion & MAAC
  - Block Dispatch



Text in Blue represent the change in tie-line flow for each region (up or down)

# TPL-001-5

## Timeline and Status Update

- FERC Order issued approving TPL-001-5.1 on 6/10/2020
- TPL-001-5.1 becomes effective 7/1/2023
  - First annual Planning Assessment to be completed in accordance with the standard but without Corrective Action Plans (CAPs) for revised P5 by 7/1/2023
- Additional 24-month period (7/1/2025) allows time for the development of CAPs for Category P5 planning events involving single points of failure in Protection Systems
- TPL-001-5.1 is fully enforceable by 7/1/2029

# P5 (Single Points of Failure) – Table 1 Planning Events

Category	Initial Condition	Event <sup>1</sup>	Fault Type <sup>2</sup>	BES Level <sup>3</sup>	Interruption of Firm Transmission Service Allowed <sup>4</sup>	Non-Consequential Load Loss Allowed
P5 Multiple Contingency (Fault plus <u>relay non-redundant component of a Protection System</u> failure to operate)	Normal System	Delayed Fault Clearing due to the failure of a non-redundant <u>relay component of a Protection System</u> <sup>13</sup> protecting the Faulted element to operate as designed, for one of the following: 1. Generator 2. Transmission Circuit 3. Transformer <sup>5</sup> 4. Shunt Device <sup>6</sup> 5. Bus Section	SLG	EHV	No <sup>9</sup>	No
				HV	Yes	Yes

13. Applies For purposes of this standard, non-redundant components of a Protection System to the following consider are as follows:

- a. A single protective relay which responds to electrical quantities, without an alternative (which may or may not respond to electrical quantities) that provides comparable Normal Clearing times;
- b. A single communications system associated with protective functions or types: pilot (#85), distance (#21), differential (#87), current (#50, 51), necessary for correct operation of a communication-aided protection scheme required for Normal Clearing (an exception is a single communications system that is both monitored and reported at a Control Center);
- c. A single station dc supply associated with protective functions required for Normal Clearing (an exception is a single station dc supply that is both monitored and reported at a Control Center for both low voltage (#27 & 59), directional (#32, & 67), and tripping (#86, & 94) and open circuit);
- d. A single control circuitry (including auxiliary relays and lockout relays) associated with protective functions, from the dc supply through and including the trip coil(s) of the circuit breakers or other interrupting devices, required for Normal Clearing (the trip coil may be excluded if it is both monitored and reported at a Control Center).

- Total number of unique P5 contingencies per season:
  - Summer: 91
  - Winter: 71
  - Light Load: 26
- Total number of unique P5 contingencies:
  - 104

- PJM is working with TO's on the identification of CAPs necessary to remediate the P5 violations
  - CAPs to be identified by 7/1/2025
  - Elimination of non-redundancy and/or inclusion of monitoring & reporting where applicable
- Future series RTEP builds will be TPL-001-5.1 compliant
- PJM has received the preliminary Stability study results and are reviewing. Stability Study to be completed before 7/1/2023

# BGE B3305 Cancellation

## B3305 Cancellation

Project B3305 was identified to address reliability and End Of Life issue identified in 2020 RTEP Window 1

**Problem Statement:** The Constitution to Concord 115 kV circuits # 110567 and 110568 are overloaded for towerline outage. The circuits were overloaded in the Summer generation deliverability test.

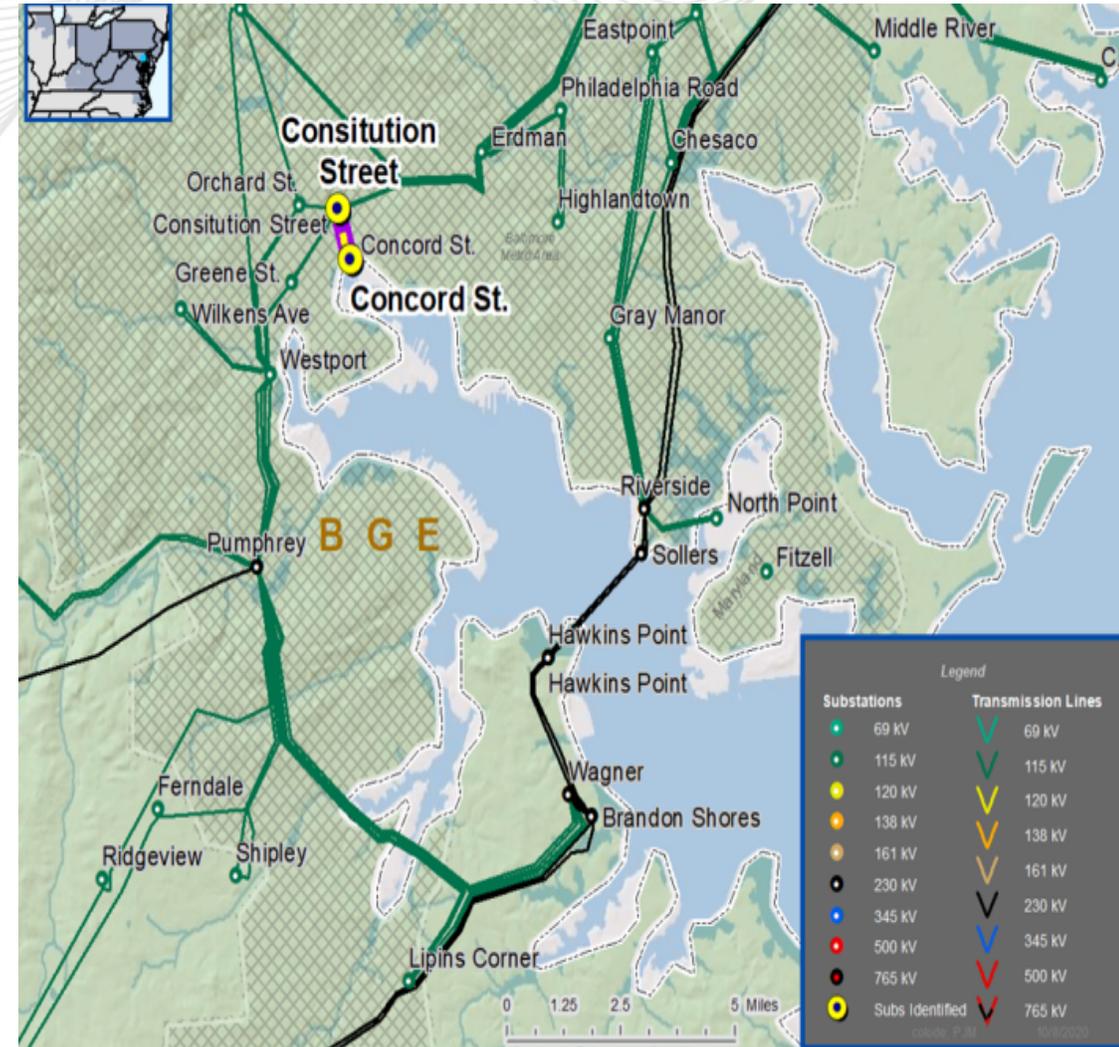
- Violations were posted as part of the 2020 Window 1: (FG# GD-S480 and GD-S483)
- There were 7 projects proposed to address the violations.

**Recommended Solution was:** (Proposal # 2020-1-494)

- Replace Pumphrey 230/115kV transformer with a higher impedance unit. (B3305)

PJM performed retool analysis to see if the reliability requirement still exist. PJM identified no reliability violation without the B3305 upgrade.

The B3305 upgrade is no longer needed to address the reliability need and the B3305 will be canceled.



# Appendix

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## Reliability Analysis Update



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Version No.	Date	Description
1	6/1/2023	<ul style="list-style-type: none"><li>• Original slides posted</li></ul>
2	6/5/2023	<ul style="list-style-type: none"><li>• Update to Slide X</li></ul>
3	6/6/2023	<ul style="list-style-type: none"><li>• Slide 18 - updated</li></ul>

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