

# **Reliability Analysis Update**

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Transmission Expansion Advisory Committee February 4, 2025



## **Resources Available to PJM Stakeholders**

# (Transmission Planning)



### **Reference Resources**

 <u>PJM Learning Center</u> – Overviews on PJM's priorities and responsibilities, including Planning responsibilities

 Process to build a new facility – Overview of the steps and parties involved in the process to build a new facility from the need to completion.

PJM Manual 14B – Details on how PJM conducts analysis (web or pdf)

• PJM Manual 14F – Overview of the competitive process (web or pdf)



### **Reference Resources**

- Generation interconnection queue List of all projects for proposed generation. PJM does not solicit these requests, but PJM will ensure each project can operate reliably.
  - <u>Serial process</u> Historic view of all projects submitted prior to 2022
  - <u>Cluster process</u> Progress of all projects processed with the reformed interconnection process

PJM Manual 14H – Overview of the generation interconnection process (<u>web</u> or <u>pdf</u>)



**Reference Resources** 

 <u>General PJM training</u> – A variety of training resources on various aspects of PJM, including overviews such as <u>PJM Introduction</u> and <u>PJM 101: The Basics</u>.

<u>2022 RTEP Window 3 FAQ</u> – A lot of great background that applies to the current body of work.

- PJM's Client Management team Single point of contact for any questions about PJM.
  - Phone: (610) 666-8980 or (866) 400-8980
  - E-mail: custsvc@pjm.com



# 2025 RTEP Window 1



## 2025 RTEP Window 1 – Timeline

Initial 2025 RTEP Modelling Assumptions Nov 2024 – Feb 2025		2025 RTEP Window 1 Opens June 2025		2025 RTEP Window 1 Evaluations Sept. 2025		2025 RTEP Window 1 Selections 1 <sup>st</sup> and 2 <sup>nd</sup> Read Dec 2025		2025 RTEP Window 1 – Board Approval Q1 2026	
1	2025 RTEP Window 1 Baseline Studies Mar 2025		2024 RTEP Window 1 Closes Aug 2025		2025 RTEP Window 1 Selections 1 <sup>st</sup> Read Nov 2025		2025 RTEP Window 1 Selections 2 <sup>nd</sup> Read Dec 2025		



2025 RTEP Window 1 Load and Generation Assumptions

• 2025 RTEP Window 1 will utilize the 2025 PJM Load Forecast (Jan 2025);

https://www.pjm.com/-/media/DotCom/library/reports-notices/load-forecast/2025-load-report.pdf

- 2030 Load Forecast to increase by 16 GWs approximately (compared to 2024 Load Forecast)
- PJM is currently working on finalizing the initial RTEP Baseline models
  - Planned for completion by end of February
- Resource balancing to serve forecasted load is expected be tight;
  - PJM will share more information related to Resource Assumptions and Sensitivity Scenarios (beyond baseline) in March 2025.



# Cancellations

# PSEG Transmission Zone: Baseline b3737.41 Cancellation: Windsor – Clarksville 230kV

**B3737.41:** Windsor to Clarksville Subproject: Upgrade terminal equipment at Clarksville 230 kV for a cost of \$1.49M was identified part of the NJ OSW SAA 1.0 study

The project was a sub project of a larger project that is upgrading all terminal equipment at Windsor 230 kV and Clarksville 230 kV as necessary to create a paired conductor path between Clarksville and JCPL East Windsor Switch 230 kV

The B3737.41 was identified to address an N-2 violation.

**Cancellation Reason:** It was determine that all terminal equipment at Clarksville 230kV have ratings equal to or greater than the needed rating and the upgrade is no longer required



# JCPL Transmission Zone: Baseline b2003 Cancellation: Whippany – Montville 230kV

**B2003** – Construct 6.4 miles of 230 kV circuit from Whippany to Montville in JCPL zone, at a cost estimate of \$37.5 M.

The upgrade was identified to address an N-1-1 violation in the Montville vicinity. Loss of two 230 kV circuits sourcing the Montville area causes voltage collapse resulting in potential loss of >300 MW load.

#### **Cancellation Reason:**

Due to routing and permitting issues, FirstEnergy has requested this project be cancelled and has notified PJM that an alternative solution must be selected.





# Changes to Previously Approved RTEP Projects

# Brandon Shores Deactivation Project Updates: Summary of Cost Changes

RTEP ID	Project Description		Original Cost Estimate (\$M)	Updated Cost Estimate (\$M)	Cost Change
b3780.1	Peach Bottom North upgrades – substation work		33	76.63	43.63
b3780.2	Peach Bottom to Graceton (PECO) – New 500 kV transmission line	PECO	48	63.74	15.74
b3780.3	West Cooper substation (3 breaker ring + transformer, control house + substation build, reconfigure Cooper distribution station feed)		Canceled	Canceled	0
b3780.4	Peach Bottom to Graceton (BGE) – transmission work		17	38.8	21.8
b3780.5	Build Solley Road substation + Statcom.	BGE	109	239.6	130.6
b3780.6	Build Granite substation + Statcom.	BGE	91	198.6	107.6
b3780.7	Build Batavia Road substation.	BGE	36	127.8	91.8
b3780.8	Graceton 500 kV expansion. Add 3x 500 kV breaker bays, 2x 500/230 kV auto transformer, 1x 500 kV caps.	BGE	82	213.2	131.2
b3780.9	Graceton to Batavia Road 230 kV double circuit pole line	BGE	195	207.2	12.2
b3780.10	Install new Conastone capacitor.	BGE	15	33.7	18.7
b3780.11	Brighton Statcom and capacitor	PEPCO	63	229	166
b3780.12	Burchess Hill Cap	PEPCO	15	12	-3
b3780.13	Batavia Road to Riverside 230 kV reconductor	BGE	21	57.3	36.3
b3780.14	Reconfigure Cooper transmission feeds by establishing new Cooper-Bramah 230 kV line and rerouting existing transmissions lines by Cooper.	PECO	3.6	6.73	3.13
b3780.15	Cut in 5012 Peach Bottom-Conastone 500 kV line into both ends of Bramah 500/230 kV substation by rebuilding 5012 from Graceton to Peach Bottom South on single circuit structures and terminating into Bramah (PECO Scope).	PECO	7.86	7.29	-0.57
b3780.16	Terminate new Cooper-Bramah 230 kV line (Transource Scope) at Bramah 230 kV.	Transource	0.47	0.47	0
b3780.17	Cut in 5012 Peach Bottom-Conastone 500 kV line into both ends of Bramah 500/230 kV substation by rebuilding 5012 from Graceton to Peach Bottom South on single circuit structures and terminating into Bramah (Transource Scope).		1.1	1.1	0
b3781	Replace line drops to Doubs transformer 3.	APS	0.8	0.8	0
	Total	738.83	1513.96	775.13	

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# Brandon Shores Deactivation Project Updates: Drivers for Cost Increases - Exelon

- Actual vendor quotes received through competitive bid process for major long lead equipment were higher than budgetary quotes originally received during the conceptual design phase.
- Detailed 30% design & engineering identified necessary changes to scopes after performing more detailed assessment of site conditions and engineering studies – i.e. New Batavia Substation scope changed from AIS (Air Insulated Substation) to GIS (Gas Insulated Substation) due to space constraints and wetland conditions.
- Constructability reviews were conducted as part of 30% design to limit ad-hoc changes during construction. The
  outcome of these efforts resulted in a more comprehensive plan for ROW (right of way) access and
  construction, which should limit cost overruns later in the project life cycle, and more importantly, last minute
  changes to already challenging outage requirements.
- Additional contracting resources are required due to volume and scale of work on the system and outage constraints, which could require out of state resources to support without compromising existing projects and commitments. Labor rates for construction and engineering have also increased significantly over the past 1-2 years.
- Increased indirect costs and overhead to manage significant volume and complexity of work.

### Brandon Shores Deactivation Project Updates:



#### 500kV Recommended Reinforcements

- PECO B3780.1: Peach Bottom North Upgrades substation work
- PECO B3780.2: New Peach Bottom to Graceton 500kV (PECO Scope)
- PECO B3780.3: West Cooper Substation expansion [Canceled replaced with Transource B3737.47 New Bramah (North Delta) 500/230 kV Substation]
- BGE B3780.4 : New Peach Bottom to Graceton 500kV (BGE Scope)
- BGE B3780.8: Graceton 500kV expansion
- BGE B3780.10: Install New Conastone Capacitor
- PEPCO B3780.11: Brighton Statcom and Capacitor
- PEPCO B3780.12: Burchess Hill Cap
- PECO B3780.15: Cut 5012 Peach Bottom Conastone 500 kV line into Bramah by rebuilding 5012 on single circuit structures & terminate into Bramah (PECO Scope)
- Transource B3780.17: Cut 5012 Peach Bottom Conastone 500 kV line into Bramah by rebuilding 5012 on single circuit structures & terminate into Bramah (Transource Scope)

#### 230 kV Recommended Reinforcements

- BGE B3780.5: Build Solley Road Substation + Statcom
- BGE B3780.6: Build Granite Substation + Statcom
- BGE B3780.7 : Build Batavia Road Substation
- BGE B3780.9: Graceton to Batavia Road 230 kV Double Circuit Pole Line
- BGE B3780.13: Batavia Road to Riverside 230kV reconductor
- PECO B3780.14: Reconfigure Cooper feeds by establishing new Cooper-Bramah 230 kV
- Transource B3780.16: Terminate new Cooper-Bramah 230 kV at Bramah
- APS B3781: Replace line drops to Doubs Transformer 3

#### Projected ISD: 12/31/2028

Required ISD: 6/1/2025

Estimated Cost: \$ 738.83 Million \$1,513.96 Million





### NJ State Agreement Approach Project Update

#### Designated Entity: MAOD

- Existing Scope :
  - Construct the Larrabee Collector Station (LCS) AC switchyard, composed of a 230 kV 3 x breaker and a half substation with a nominal current rating of 4000 A and four single phase 500/230 kV 480 MVA autotransformers to step up the voltage for connection to the Smithburg substation
  - Procure land adjacent to the AC switchyard, and prepare the site for construction of future AC to DC converters for future interconnection of DC circuits from offshore wind generation. Land should be suitable to accommodate installation of 4 individual converters to accommodate circuits with equivalent rating of 1400 MVA at 400 kV
  - Includes Prebuild extension work and three sets of AC collector lines from the LCS to the offshore wind converter station areas
  - Required IS Date: 12/31/2027
  - Estimated Cost: \$217.1M
- Amended Scope :
  - Remove Prebuild extension work from the scope of work. Prebuild extension work includes the civil work (i.e., duct banks) to accommodate four (4) HVDC circuits from the Prebuild "point of demarcation" to each offshore wind generator's converter station area on the LCS property

Revised Cost Estimate: \$208.9M (Decrease of \$8.2M)



#### NJBPU Approval:

NJBPU approved this modification, by order issued on December 18, 2024, in Docket No. QO20100630.



## TPL-001-5 P5 Corrective Action Plans (CAPs)



## TPL-001-5.1 P5 CAPs

- Corrective Action Plans (CAPs) to be identified for violations up through the 2024 Series RTEP.
  - Initial P5 violations were identified on the 2022 Series RTEP to align with the effective date of TPL-001-5 of July 1<sup>st</sup> 2023. NERC Implementation Plan provides an additional 24 months to develop CAPs (July 1<sup>st</sup>, 2025).
  - PJM is requesting CAPs to be provided for any additional P5 violations identified on the 2024 Series RTEP.
- A summary of the P5 violations from the 2024 Series RTEP (2029 SUM/WIN/LL cases) were provided at the November TEAC.
- CAPs (baseline upgrades) will be non-competitive as per the transmission substation equipment exemption (OA, Schedule 6, section 1.5.8(p)).
  - Construction responsibility for and ownership of each project shall be designated to the respective incumbent Transmission Owner.
- PJM is currently working with Transmission Owners to finalize the submission of CAPs prior to July 1<sup>st</sup>, 2025.

## **TPL-001-5.1 Implementation Plan Timeline**





# PJM CIL (Capacity Import Limit) Study 2024

TEAC Meeting 02/04/2025





- Purpose:
  - The purpose of this study is to confirm that the PJM and surrounding transmission systems will be robust enough to enable PJM to import the amount of emergency assistance (CBM) assumed available in the 2024 PJM Reserve Requirement Study (RRS) and PJM RAA (R6.1).
    - The amount of CBM used in the PJM Reserve Requirement Study (RRS) is **<u>3,500 MW</u>**.
    - Attachment C.7 of Manual M-14B requires that CBM be preserved in generator deliverability studies
- Methodology:
  - Attachment G.11 "PJM Capacity Import Limit (CIL) Calculation Procedure"
- Definition: PJM Capacity Benefit Margin (CBM)
  - Attachment C.3.1 Generator Deliverability Procedure "CBM is the amount of imports that PJM assumes will be available from neighboring regions during a RTO-wide capacity deficiency."



### Results



### Conclusion

- The primary drivers for the CBM allocation changes from the previous study are
  - North The previously binding Oakdale-Laurel Lakes 115kV tie line is once again binding in the 2024 PJM CIL study case. Settings for the future Hillside PAR, which affects loading on the Oakdale-Laurel Lakes 115kV tie line, is currently under development. Upon consultation with NYISO, PJM set the Hillside PAR to zero MW at maximum import level, consistent with NYISO practice. The result is a year to year decrease in import capability from the North Zone.

#### - South 1, South 2, West 1, West 2

- The 2024 Window 1 Selected Proposal was applied to the study case.
  - Previously identified binding facility Belmont 765/500kV #5 transformer in APS is no longer binding
  - Previously identified binding facility Racine-Elm Rd 345kV line in MISO is no longer binding
  - Newly identified Zion Station Waukegan 345kV line in ComEd is now binding
  - Binding facilities from the 2023 study are also binding in the current 2024 study
    - Volunteer Phipps Bend 500 kV in TVA
    - Person-Sedge Hill 230 kV tie line to CPLE
- PJM overall import capability (FCITC\*) increased from the 2023 Study to the 2024 Study
  - From 13,720 MW in 2023 to 15,482 MW in 2024
  - NYISO Hillside PAR with "study" settings decreased the import capability from the North Zone but more will be learned when Operations finalizes the settings.
    - \*First Contingency Incremental Transfer Capability



# Questions?



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### **Reliability Analysis Update**

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### **Revision History**

Version No.	Date	Description
1	Jan 30 <sup>th,</sup> 2025	Initial slides posted
2	Jan 31 <sup>st</sup> ,2025	<ul> <li>Slide #23, Changed AEP to APS</li> </ul>

