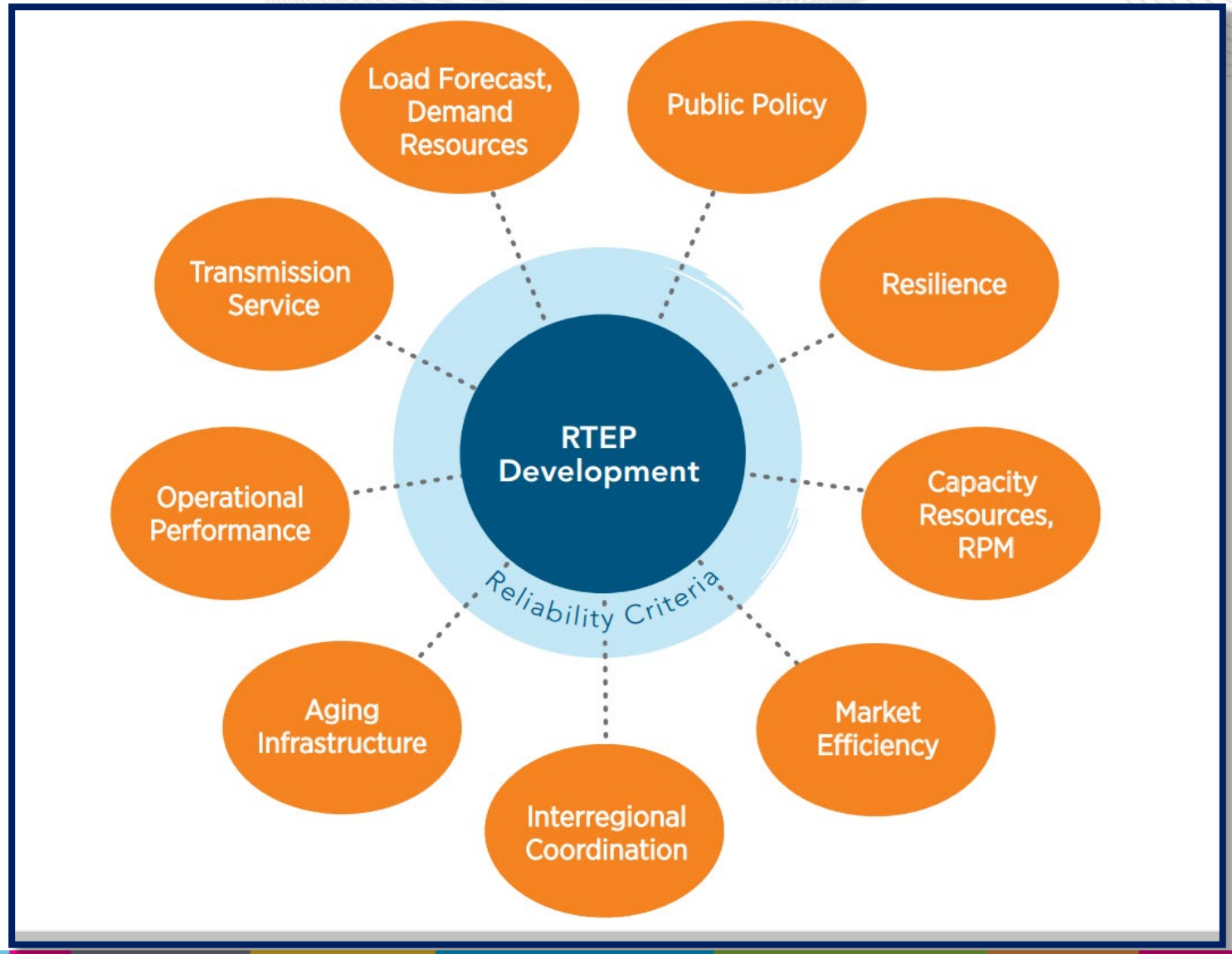
PJM Regional Transmission Expansion Plan (RTEP) Process

Nebiat Tesfa, Principal Engineer
Transmission Planning
IPSAC - May 2, 2025

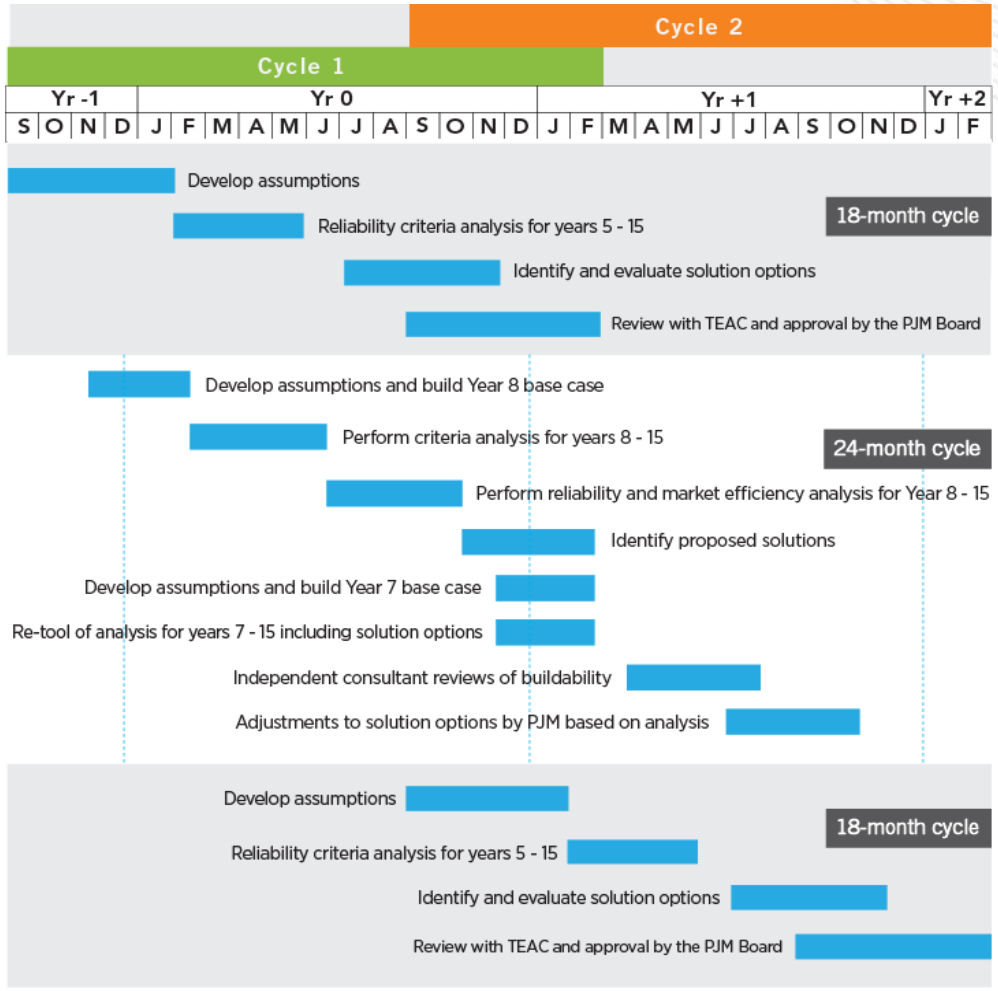
PJM Planning Links

- Planning Committee (PC)
  - http://www.pjm.com/committees-and-groups/committees/pc.aspx
- Transmission Expansion Advisory Committee (TEAC)
  - http://www.pjm.com/committees-and-groups/committees/teac.aspx
- Interregional Planning
  - http://www.pjm.com/planning/interregional-planning.aspx
- Services and Requests
  - http://www.pjm.com/planning/services-requests.aspx
- RTEP Development
  - http://www.pjm.com/planning/rtep-development.aspx
- Manual 14B
  - http://www.pjm.com/-/media/documents/manuals/m14b.ashx

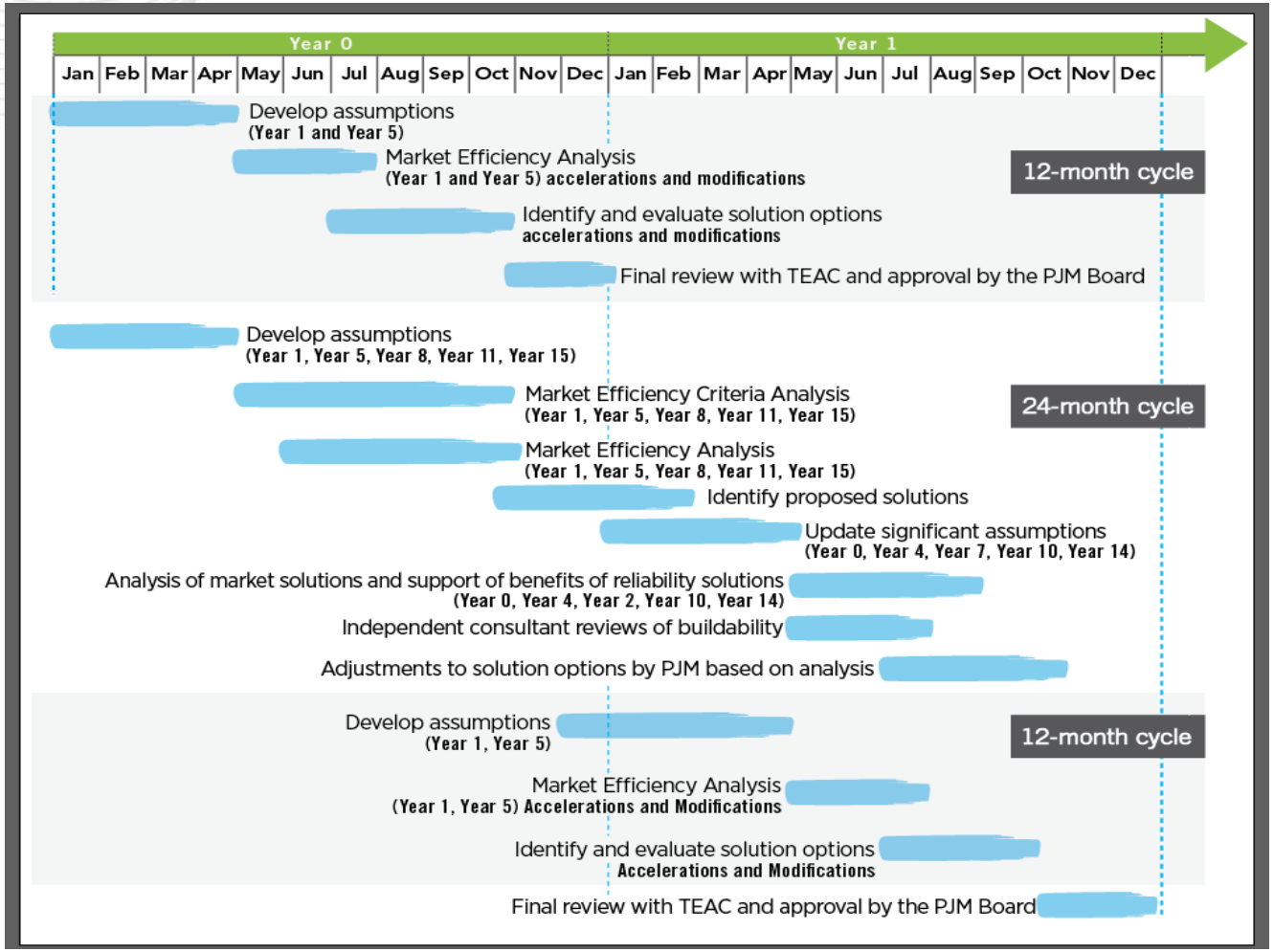
System Expansion Drivers



PJM's 2-year Reliability



PJM's 2-year Market Efficiency



2025 RTEP Assumptions and Updates

2025 RTEP Assumptions

- PJM annually presents the assumptions at the beginning of each year.
- Follow the link below for details of the 2025 RTEP Assumptions presentation.

https://www.pjm.com/-/media/DotCom/committees-groups/committees/teac/2025/20250107/20250107-item-11---2025-rtep-assumption.pdf

https://www.pjm.com/-/media/DotCom/committees-groups/committees/teac/2025/20250304/20250304-item-16---2025-rtep-assumption-update.pdf

https://www.pjm.com/-/media/DotCom/committees-groups/committees/teac/2025/20250401/20250401-item-15---2025-rtep-assumption-update.pdf

- As part of the 24-month RTEP cycle, a year-7 (2032) base case will be developed and evaluated as needed as part of the 2025 RTEP
- The year 7 case will be based on the 2029 Summer case that was originally developed part of the 2024 RTEP
  - Purpose: To identify and develop longer lead transmission upgrades and right size near-term upgrades with longer term needs.

FERC 1000 Process

- As per the PJM Operating Agreement, a proposal window will be conducted for all reliability needs that are not Immediate Need reliability upgrades or are otherwise ineligible to go through the window process.
- FERC 1000 implementation will be similar to the Previous years RTEP.
  - Advance notice and posting of potential violations
  - Advance notice of window openings
  - Window administration

Expected Timeline

- **June 2025 (<u>targeting early June 2025</u>)**
  - Open competitive proposal window
- **July/August 2025**
  - Close competitive proposal window
  - Finalize mid-year retool
- **August to November 2025**: Evaluate proposals
- **October 2025 to February 2026**: Review (TEAC) and Approve proposals (PJM Board)

PSEG/NY Interface

- PJM/NYISO Interface
  - B & C cables will be modeled out of service consistent with 2024 RTEP
- Linden VFT
  - Modeled at 330 MW (Towards NY)
- HTP (HVDC link)
  - Modeled at 0 MW Schedule

- PJM will account for the PJM States (ISAC) input towards the development of the 2025 RTEP Scenarios.

- PJM will also run scenarios capturing impact of potential delays to OSW development (In NJ and DE)

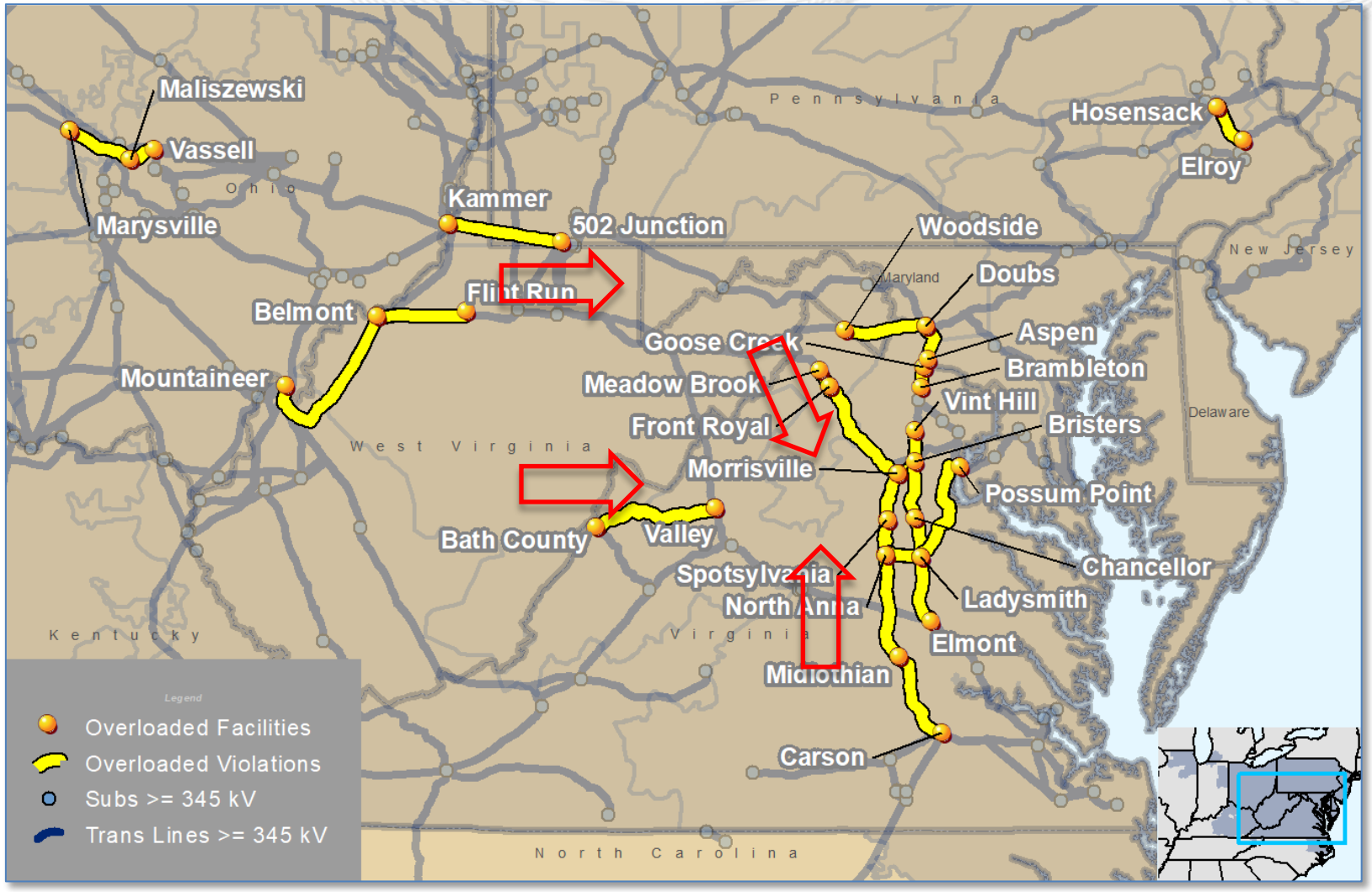
2024 RTEP Window 1 Updates

Baseline Reliability Projects

2024 Reliability Window 1 Needs

- 2024 Window 1 Needs:
  - Heavy transmission interface flows west to east driven by load increase in Dominion/East. PJM earlier identified need for additional west-east reinforcement is materializing earlier – higher forecasted load in MAAC/Dominion/APS.
    - 10 GW and 15 GW of load increase for 2029 and 2032 respectively between the 2022 LF and 2024 LF
    - The load growth is attributed primarily to data centers and some electrification/EV loads.
  - In addition to regional transfer requirements, there are load pockets that need to be addressed in AEP, ATSI, ComEd, Dominion, PECO, BGE and PPL transmission zones.
    - Primarily due to shift in generation flow as a result of overall system load increase and +2 GW of generation deactivations.
  - The eight-year RTEP (2032) scenarios mainly focus on right-sizing solutions.
    - Long-lead transmission needs (capture long-lead items).
    - Check/confirm impact of “forecast” generation on transmission needs identified in the five-year model.
    - PJM will also be considering robustness of the solutions in view of the anticipated 2025 PJM Load Forecast.

2024 RTEP Window 1 Needs: 500 kV & 765 kV



2024 Reliability Proposal Window 1

- 2024 Window 1 opened on July 15, 2024 and closed September 17, 2024.
- The 2024 Window 1 was conducted to address Reliability violations identified for the year of 2029 to 2032 RTEP studies.
- For this Window, PJM sought technical solutions, also called proposals, to resolve potential reliability criteria violations on facilities identified in accordance with all applicable planning criteria (PJM, NERC, SERC, RFC, and Local Transmission Owner criteria).
  - 88 unique and 6 combined proposals submitted from 16 different entities (10 Incumbents & 6 Non Incumbents)
    - 40 Greenfields
    - 48 Upgrades
  - Cost Estimates for the unique proposals: Approximate range from $0.12 M – $2.84 B
  - 43 proposals with Cost Containment
  - Several proposals offered 765 kV and/or 500 kV reinforcements.
- The evaluation for the Window 1 proposed projects is in progress and is expected to be completed by the end of December 2024 and board approved in February 2025.

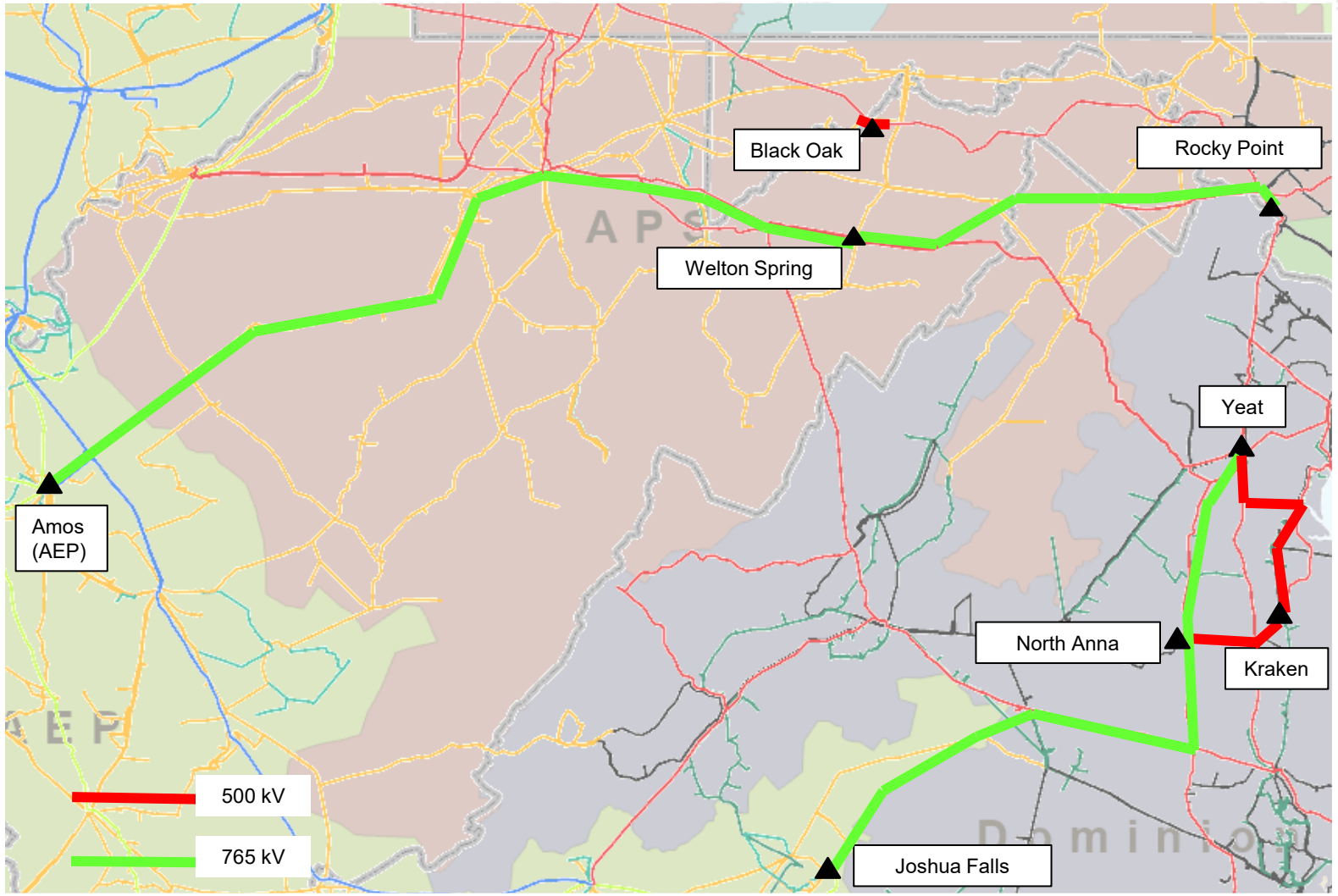
2024 Reliability Proposal Window 1
Selected Proposals

PJM Completed Evaluating the Proposed projects and selected the final Solutions:

Regional Backbone Transmission approved projects:

- New 765 kV line from John Amos to Welton Spring to Rocky Point
  - Consists of building ~ 261 Milles of 765 kV transmission line, 1 - 765 kV switching station and 1 - 765/500 kV substation
- New 765kV line from Joshua Falls – Yeat
  - Consists of building ~ 156 mile of 765 kV transmission line and 1 - 765/500/230 kV substation
- New 500kV line from North Anna – Kraken – Yeat
  - Consists of building ~ 71 miles 500 kV transmission line and 1 - 500/230 kV substation
- In addition to the backbone projects listed above, more than 100 projects are approved to address the local violations
- Total approved Projects ~ $5.9B

Final – PJM Recommended Proposals
Regional Cluster – Summary



2024 RTEP Window 1 – Total Cost

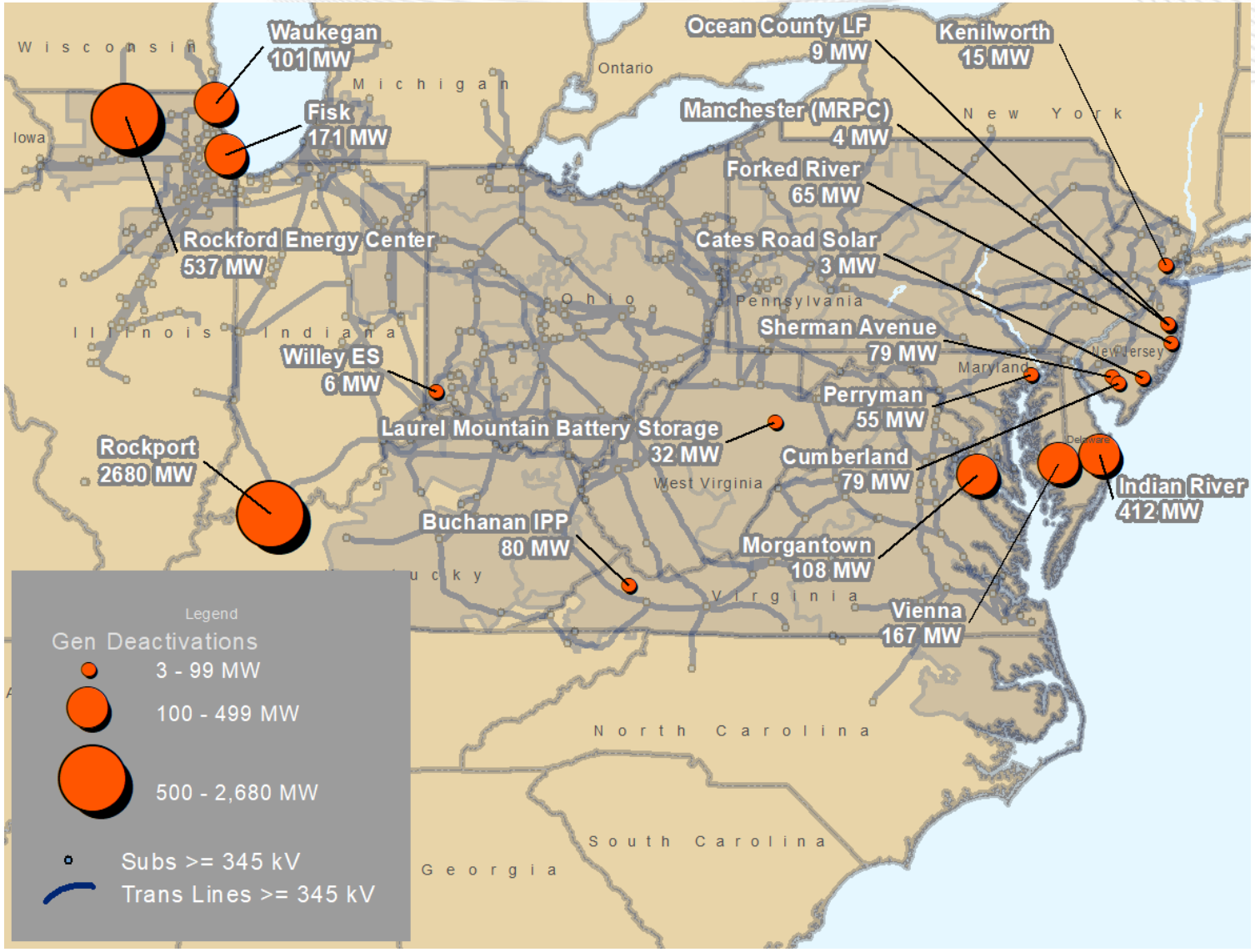
Region	Comp ($M)	Non-Comp ($M)
Regional Transfers	4545.7	
Regional –Short Circuit		100.8
DOM	216.8	74.7
MAAC	187.5	107.2
AMPT		12
AEP	342.0	44.7
DLCO		8
APS		0.691
ATSI	217.3	
ComEd	30.6	5.95
OVEC		0.8
Dayton		25
Total ($M)	**5539.8**	**379.8**

Total 2024 RTEP W1 Costs:

(Comp + Non-Com) = $5,539.8 + $379.8 = $5,919.6 M

Generation Deactivation Notification Update (Between 11/1/2024 and 4/1/2025)

Deactivations



Deactivation Status: Recently Announced

Unit(s)	Capacity (MW)	Fuel Type	Transmission Zone	Requested Deactivation Date	PJM Reliability Status
Lauel Mountain Battery	32	Battery	APS	7/1/2025	Reliability analysis underway
Rockport Unit 1, 2	2680	Coal	AEP	12/31/2028	Reliability analysis underway
Willey Energy Storage	6	Battery	DEOK	9/1/2025	Reliability analysis underway
Buchanan Unit 1, 2	80	Natural Gas	AEP	7/1/2025	Reliability analysis underway
Ocean County LF	9.1	Biomass	JCPL	7/1/2025	Reliability analysis underway

Deactivation Status: Recently Announced

Unit(s)	Capacity (MW)	Fuel Type	Transmission Zone	Requested Deactivation Date	PJM Reliability Status
Ocean County LF	9.1	Biomass	JCPL	7/1/2025	Reliability analysis underway
Forked River Unit 1, 2	65	Natural Gas	JCPL	6/1/2027	Reliability analysis underway
Rockford CT11, CT12, CT21	537	Natural Gas	ComEd	6/1/2026	Reliability analysis underway
Cumberland CT 1	79	Natural Gas	ACE	6/1/2027	Reliability analysis underway
Sherman Avenue CT1	79	Natural Gas	ACE	6/1/2027	Reliability analysis underway

Deactivation Status: Recently Deactivated

Unit(s)	Capacity (MW)	Fuel Type	Transmission Zone	Actual Deactivation Date	PJM Reliability Status
Cates Road Solar	2.6	Solar	ACE	4/1/2025	Reliability analysis complete; no impacts identified
Manchester 1 LF	4	Methane	JCPL	4/1/2025	Reliability analysis complete; no impacts identified
Indian River 4	411.9	Coal	DPL	2/24/2025	Reliability issue identified

Deactivation Status: Recently Withdrawn Deactivation Notices

Unit(s)	Capacity (MW)	Fuel Type	Transmission Zone	Date of Withdrawn Deactivation Request	PJM Reliability Status
Perryman 6 Unit 1	54.9	Natural Gas	BGE	3/18/2025	Reliability analysis complete; no impacts identified
Morgantown CT 3, 4	108	Oil	PEPCO	3/17/2025	Reliability analysis complete; no impacts identified
Fisk CT 31, 32, 33, 34	170.7	Oil	ComEd	2/3/2025	Reliability analysis complete; no impacts identified

Deactivation Status: Recently Withdrawn Deactivation Notices

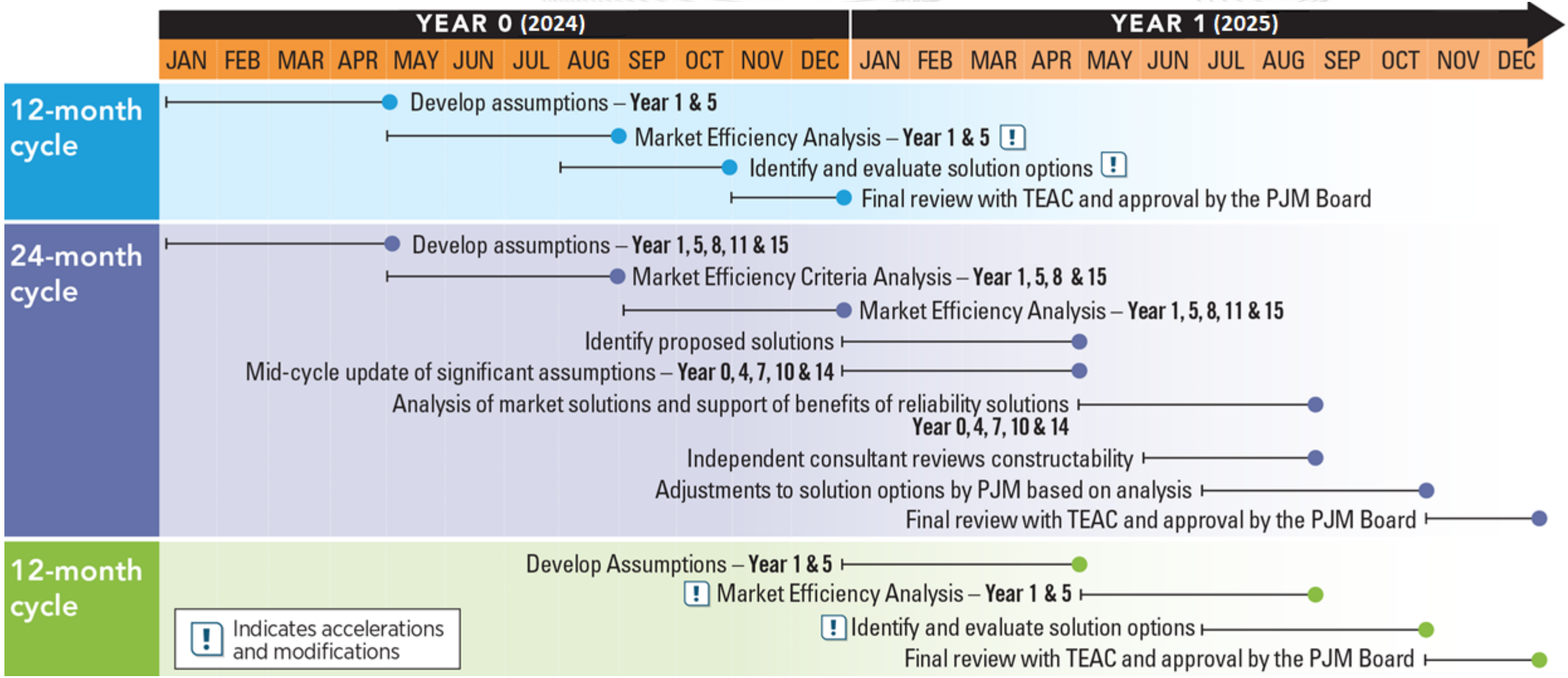
Unit(s)	Capacity (MW)	Fuel Type	Transmission Zone	Date of Withdrawn Deactivation Request	PJM Reliability Status
Vienna 8, CT 10	167.3	Oil	DPL	2/3/2025	Reliability analysis complete; no impacts identified
Waukegan CT 31, 32	101.4	Oil	ComEd	2/3/2025	Reliability analysis complete; no impacts identified
Kenilworth	15	Natural Gas	PSEG	1/30/2025	Reliability analysis complete; no impacts identified

PJM Market Efficiency Update

Nick Dumitriu
Manager, PJM Market Simulation

2024/25 Market Efficiency Cycle

2024/25 Market Efficiency Timeline



2024/25 ME Base Case Status

- Upgraded to PROMOD IV user interface version 11.5. (PROMOD IV Engine I).
  - Also posted associated PROMOD CFG file on Market Efficiency secure page.
- ME Base Case updates:
  - Topology for years 2025/2029 and 2032/2035 based off the RTEP 2029 Case and RTEP 2032 Case, respectively (topology includes 2024W1 approved solutions).
  - Applied a number of rating updates received from transmission owners.
  - Updated reactive interface definitions and ratings.
  - Generation expansion for all modeled years assumes a PJM Reserve Requirement of 17.8%.
- Mid-cycle update of all modeled years posted on Market Efficiency secure page.
- Updated ME Assumptions Whitepaper posted with March TEAC materials.

2024/25 ME Window Congestion Drivers

Constraint*	Area	Type	Included in the 2024/25 ME Window	2029 Base Simulation Annual Congestion ($Million)	2032 Base Simulation Annual Congestion ($Million)	2029 Sensitivity Simulation Annual Congestion (2025 Load Report) ($Million)	Comment
Museville-Smith Mountain 138 kV	AEP	Line	Yes	11.4	24.9	20.2	Constraint has significant historical congestion. Additional future congestion increases driven by increased load forecast.
West Point-Lanexa 115 kV	DOM	Line	Yes	2.0	1.7	2.0	Congestion driven by the renewable generation buildup.
Garrett-Garrett Tap 115 kV	PN-APS	Line	Yes	1.8	2.1	1.8	Congestion driven by the renewable generation buildup.

**Includes constraints with annual simulated congestion greater than $1Million and 25 hours binding in each of 2029 & 2032 simulated years.*

- For additional details regarding congestion drivers selection process see Market Efficiency update at March TEAC.

Congestion Driver Selection Process - Exclusions

- Some congested facilities were not included in the 2024/25 ME Window and will continue to be reviewed as part of the current 2025 RTEP process.
- Considerations for not including:
  - Potential congestion mitigation from announced future topology changes not yet included in the RTEP:
    - Announced supplemental projects.
    - Network upgrades.
  - 2025 Load Forecast Report Impact
    - New large load additions in the western portion of the PJM system.
    - Sensitivity shows significant congestion changes, both increases and decreases, in the western portion of the PJM system.
    - Further analysis needed for constraints in the western portion of the PJM system.
  - MISO Tranche 2.1 Impact
    - 765kV and 345kV upgrades in MISO.
    - Further analysis needed for constraints close to the PJM/MISO border to evaluate the congestion impact of MISO Tranche 2.1 recently approved by the MISO Board.

PJM Congested Facilities not included in the ME Window

Constraint*	Area	Type	To be included in the 2024/25 ME Window	Comment
Olive-P9700 East 345 kV	AEP-MISO	Line	No	Significant congestion decreases from MISO Tranche 1 upgrades and from 2025 Load Sensitivity.
Haviland-East Lima 138 kV	AEP	Line	No	2025 Load Sensitivity shows significant congestion decrease due to increased load in western part of the system.
Twin Branch-Meridian 345 kV	AEP	Line	No	2025 Load Sensitivity shows significant congestion decrease due to increased load in western part of the system.
Leroy Center-Spruce 138 kV	ATSI	Line	No	2025 Load Sensitivity shows significant congestion decrease due to increased load in western part of the system.
Chesterfield-Basin 230 kV	DOM	Line	No	Congestion expected to be addressed by future network upgrade proposed as part of TC1.
Boonetown-South Reading 230 kV	METED	Line	No	Future First Energy supplemental project will address congestion.
Lenox-Macnew Tap 115 kV	PN	Line	No	Congestion may be mitigated by future New York PAR at Hillside. Waiting for NYISO decision on PAR model/operation.
AP South Interface	PJM	Interface	No	2025 Load Sensitivity shows significant congestion decrease due to increased load in western part of the system.
Joshua Falls-Yeat Interface	PJM	Interface	No	2025 Load Sensitivity shows significant congestion decrease due to increased load in western part of the system.

**Includes constraints with annual simulated congestion greater than $1Million and 25 hours binding in each of 2029 & 2032 simulated years.*

PJM Congested Facilities not included in the ME Window (cont.)

Constraint*	Area	Type	To be included in the 2024/25 ME Window	Comment
Wolfs Crossing TR 81 345/138 kV	CE	TR	No	There are significant congestion changes, both decreases and increases, from the new 2025 Load Forecast. These constraints may also see significant congestion changes from recently approved MISO Tranche 2.1 projects. Further analysis needed. **These facilities will not be included in the 2024/25 ME Window.**
Nelson-Electric Junction 345 kV**	CE	Line	No	
Cherry Valley-Silver Lake 345 kV**	CE	Line	No	
Haumesser-W Dekalb 138 kV	CE	Line	No	
Crescent Ridge-Corbin 138 kV**	CE-MISO	Tie Line	No	
Kewanee B1Z1 138 KV**	CE	CB	No	
Quad Cities-MEC Cordova 138 kV**	CE-MISO	Line	No	
Kewanee-Putnam 138 kV**	CE-MISO	Line	No	
McGirr Rd-ESS H447 138 kV	CE	Line	No	
Stateline-Roxana 138 kV**	CE-MISO	Line	No	
Quad Cities-ESS H471 345 kV**	CE	Line	No	

**Includes constraints with annual simulated congestion greater than $1Million and 25 hours binding in each of 2029 & 2032 simulated years.*

*** Coordinated PJM/MISO Market-to-Market Constraint.*

2025 Market Efficiency Timeline

Step	Tentative Target Date
Post Final Base Case, Sensitivity Scenarios, and Congestion Drivers	April 11, 2025
Long Term ME Proposal Window (60 Days)	April 11, 2025 – June 10, 2025
Analysis of Proposed Solutions	June – September 2025
TEAC Reviews and Board Approval	October - December 2025

Questions?