Reliability Analysis Update

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Transmission Expansion Advisory Committee
August 6, 2024

Outline

- 2024 Window 1 Updates
  - Timeline
  - Summary of 2029 vs 2032 System Model Comparison
  - P5 Contingencies – Update
  - Next Steps

2024 RTEP Window 1 Updates

2024 Window 1 Timeline Update

- Current schedule
  - 2024 RTEP proposal Window 1 opened on July 15th, 2024, and will close on September 13th, 2024
    - First addendum posted on July 25th
    - Posting of the 8 year study files and updated problem statement on August 2nd
    - Targeting to release the sensitivity cases August 16th
  - 60 day window
  - Window summary and solutions to be brought forward to the TEAC starting in Oct. 2024 and through Jan. 2025
  - Board approvals in Feb 2025

2024 RTEP 2029 vs. 2032 Summary

2032 (8-Year RTEP Model) - Purpose

- Right size solutions of the 5-Year RTEP needs
- Capture Long-Lead Items
- Check/Confirm impact of “forecast” generation on transmission needs identified in the 5-Years model
  - Model reasonably anticipated generation “forecast” in Dominion
  - Confirm whether forecast resources available in the west supports needed West-East transfers
  - Evaluate whether forecast generation offsets regional path transfer need (DOM and MAAC resources)

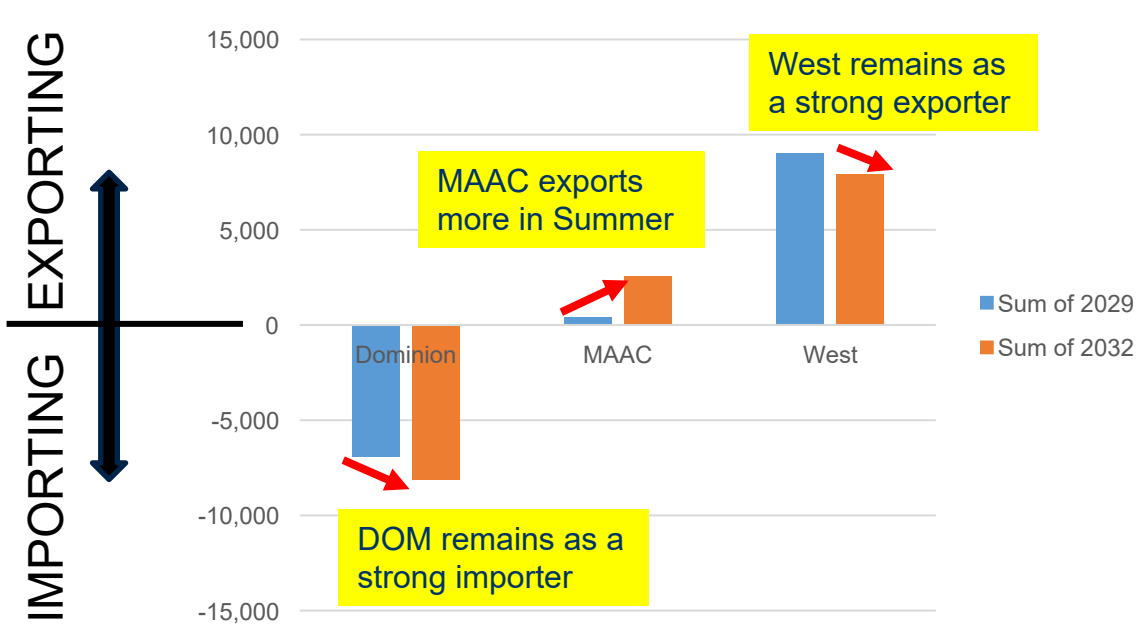
Summary of Changes 2029 vs. 2032

- Increase load to align with the 2032 load forecast:
  - 4.5 GW increase in Dominion
  - 1.4 GW increase in MAAC
  - 0.65 GW increase in West
- Include the remainder of the NJ SAA OSW, and associated upgrades
- Additional generation to accommodate the significant load increase, including but not limited to:
  - CVOW
  - Chesterfield
- Generation deactivations, notably:
  - Elwood and Elgin

Area Interchange - Ties (2029 vs 2032)

SUMMER

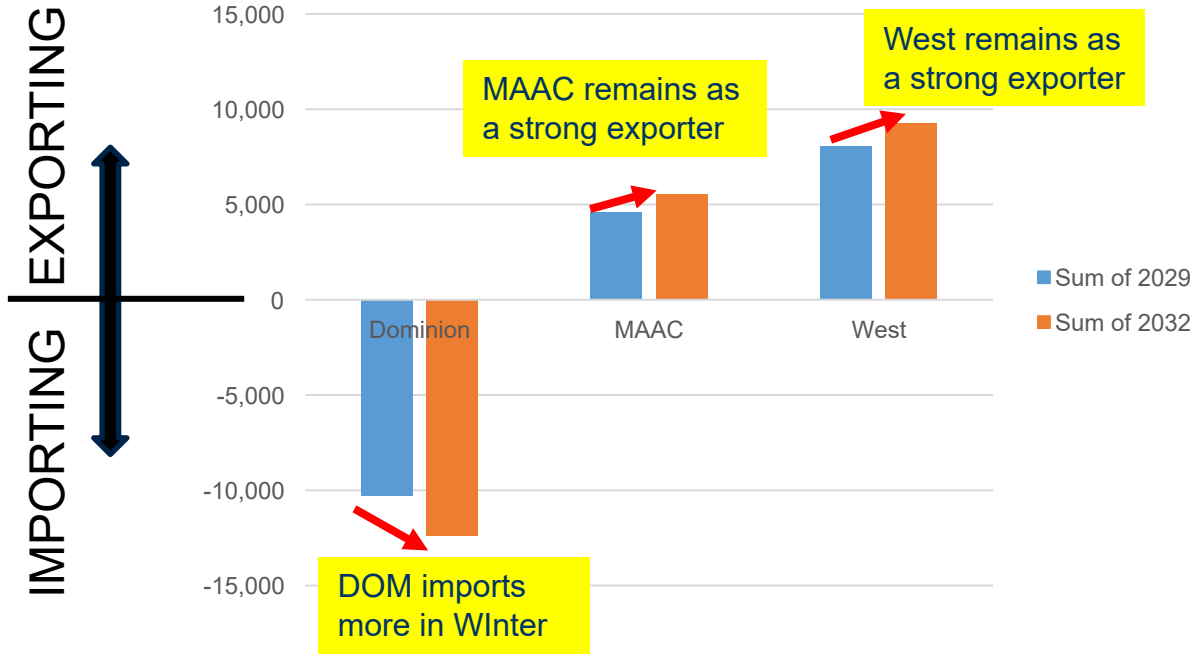
Row Labels	MW Flow 2029	MW Flow 2032	MW Change
Dominion	-6,886	-8,093	-1,207
MAAC	403	2,559	2,155
West	9,019	7,927	-1,093



Need for continued reinforcement of West/APS-DOM transfer path

WINTER

Row Labels	MW Flow 2029	MW Flow 2032	MW Change
Dominion	-10,298	-12,409	-2,111
MAAC	4,616	5,556	940
West	8,077	9,285	1,208

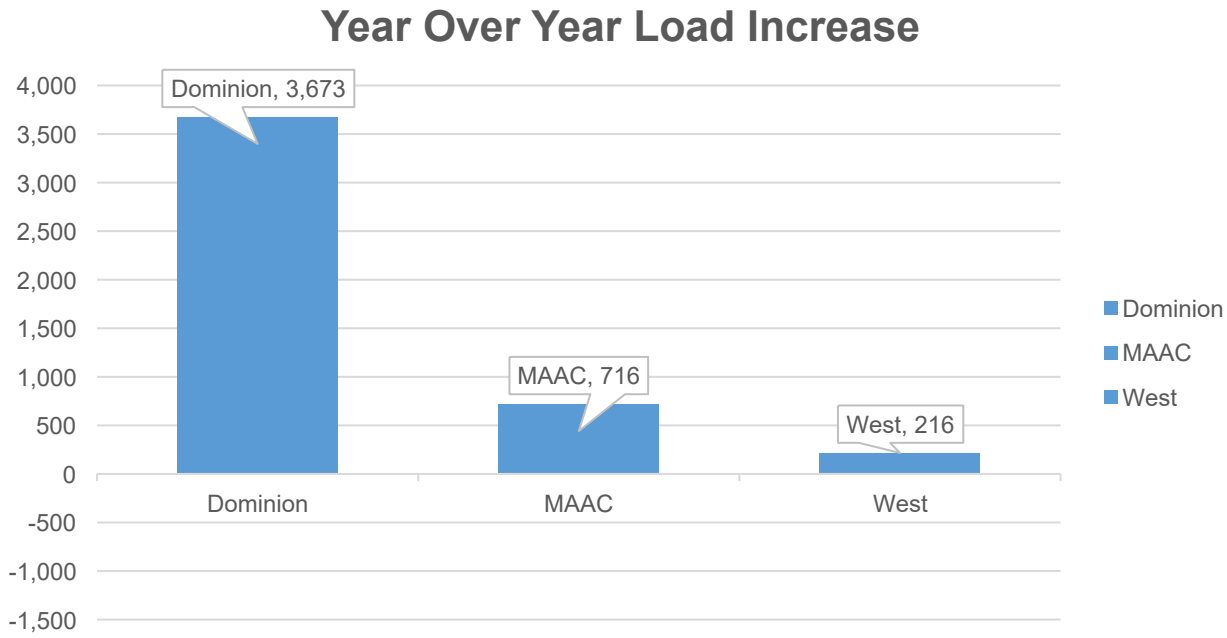


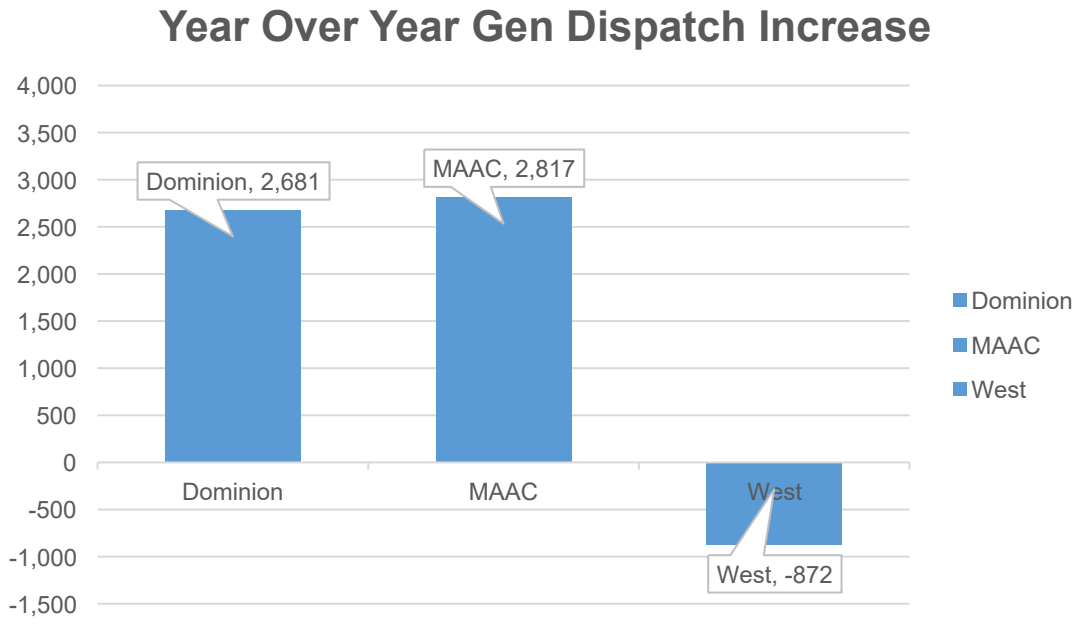
Consistent need for high West/APS – MAAC transfer capability

Load and Gen Dispatch Increase – **Summer** (2029 to 2032)

PJM	MW Increase Load
Dominion	3,673
MAAC	716
West	216
Grand Total	**4,606**

PJM	MW Increase Gen Dispatch
Dominion	2,681
MAAC	2,817
West	-872
Grand Total	**4,626**

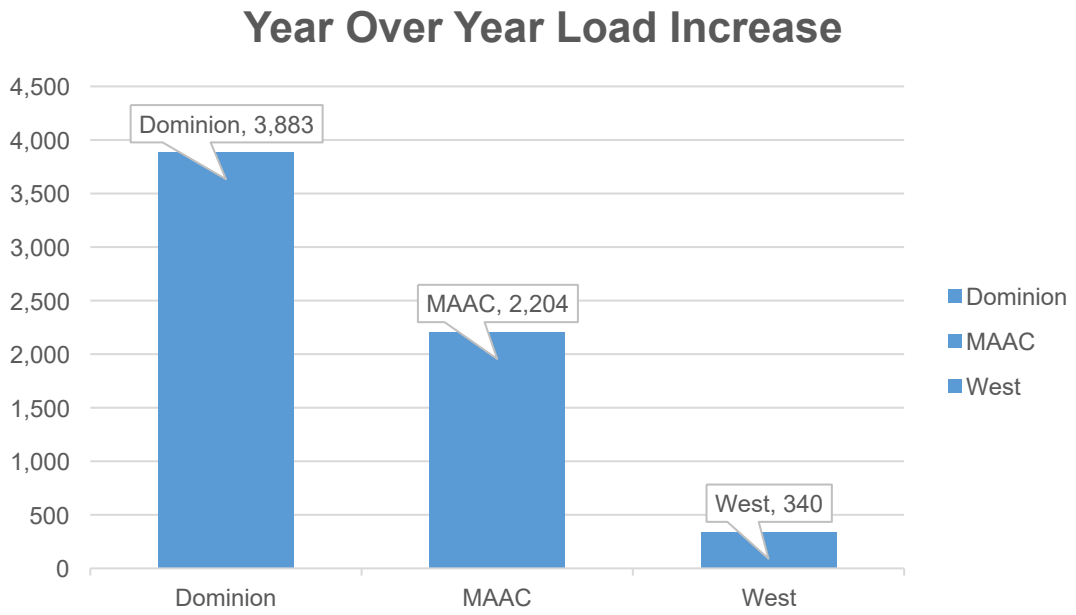


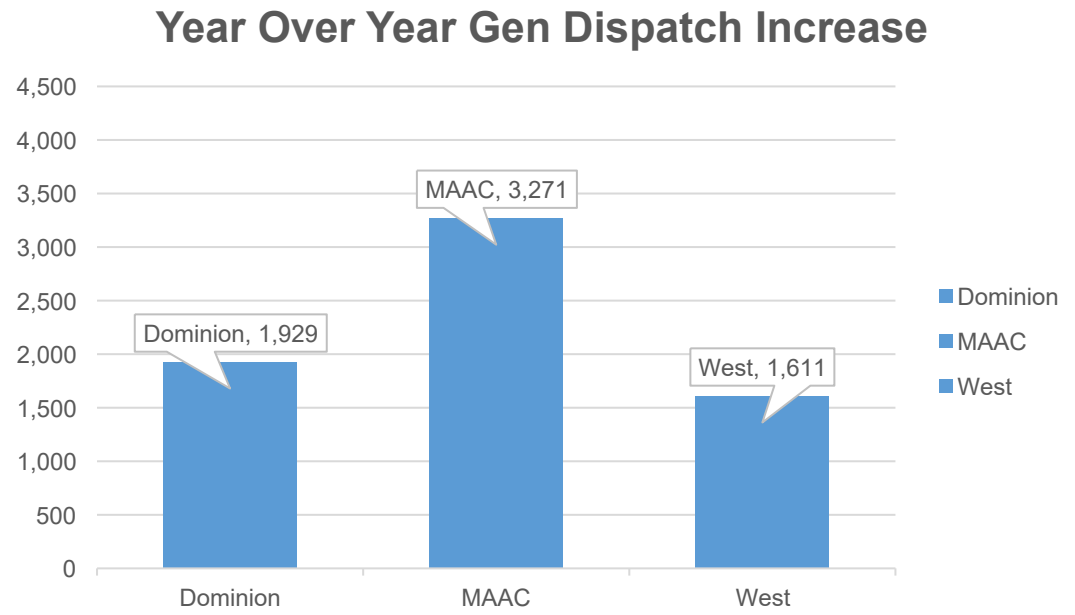


Load and Gen Dispatch Increase – **Winter** (2029 to 2032)

PJM	MW Increase Load
Dominion	3,883
MAAC	2,204
West	340
Grand Total	**6,427**

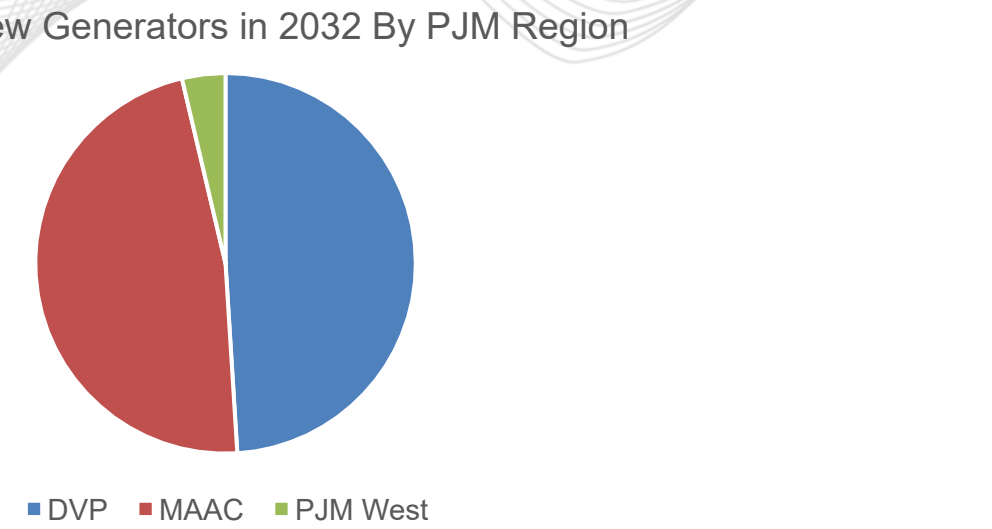
PJM	MW Increase Gen Dispatch
Dominion	1,929
MAAC	3,271
West	1,611
Grand Total	**6,811**

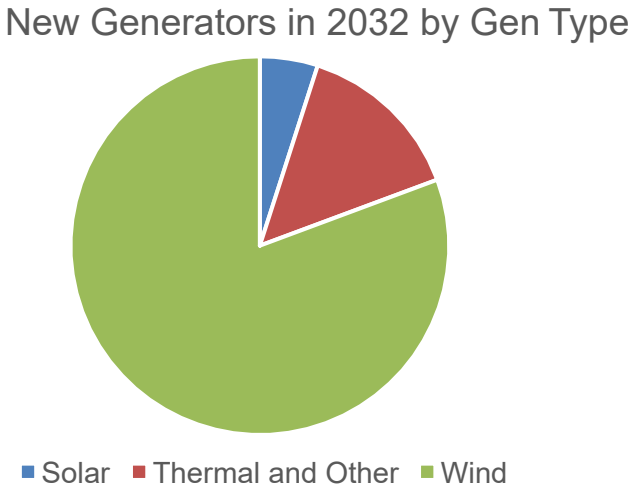




New Generator Additions In 2032 As Compared to 2029 Case

Row Labels	Increase in Pmax (MW)
DVP	**3,878**
Solar	100
Thermal and Other	1,138
Wind	2,640
MAAC	**3,742**
Wind	3,742
PJM West	**292**
Solar	292
Grand Total	**7,912**



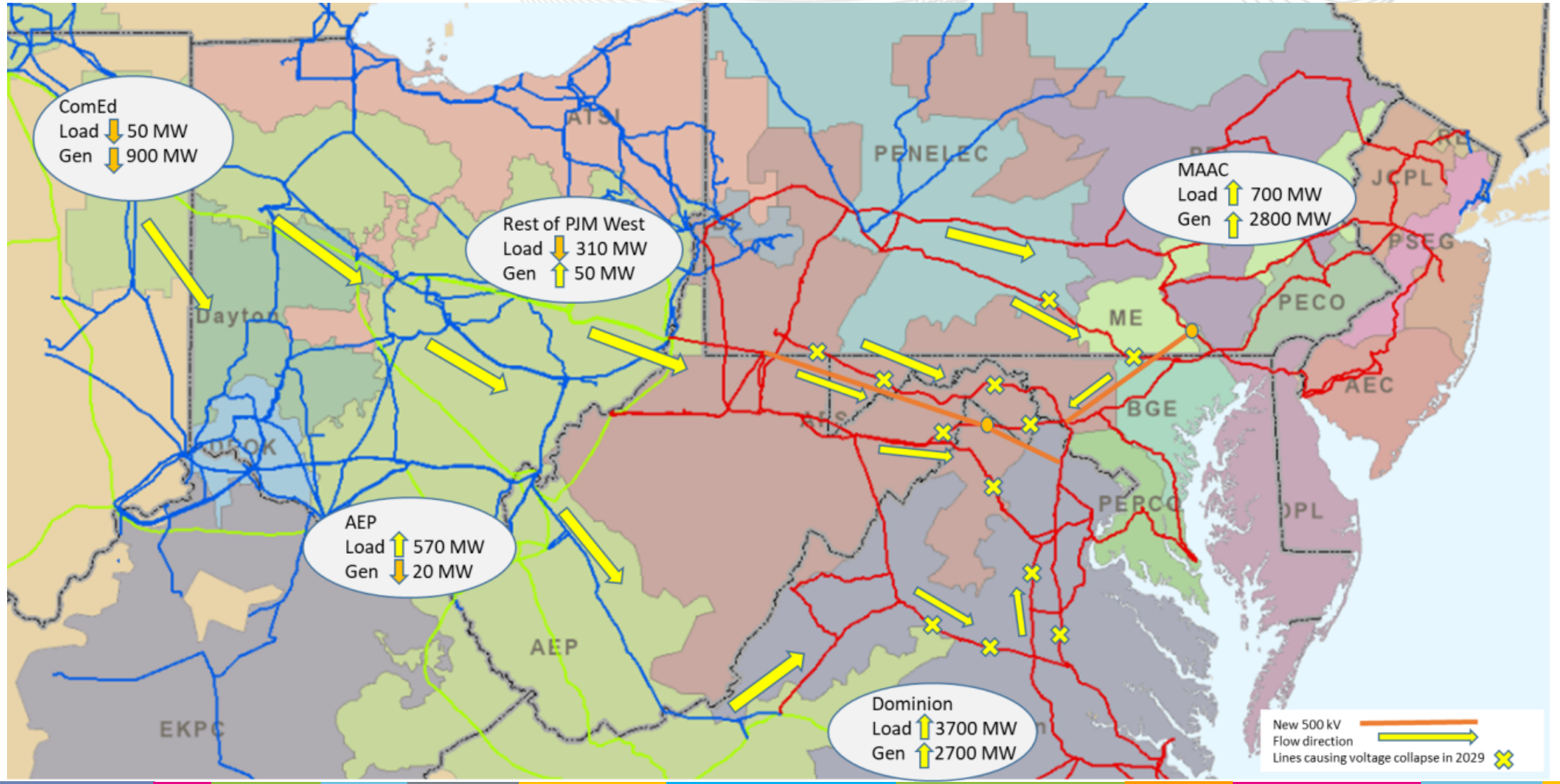


Deactivated Generation In 2032 As Compared To 2029 Case

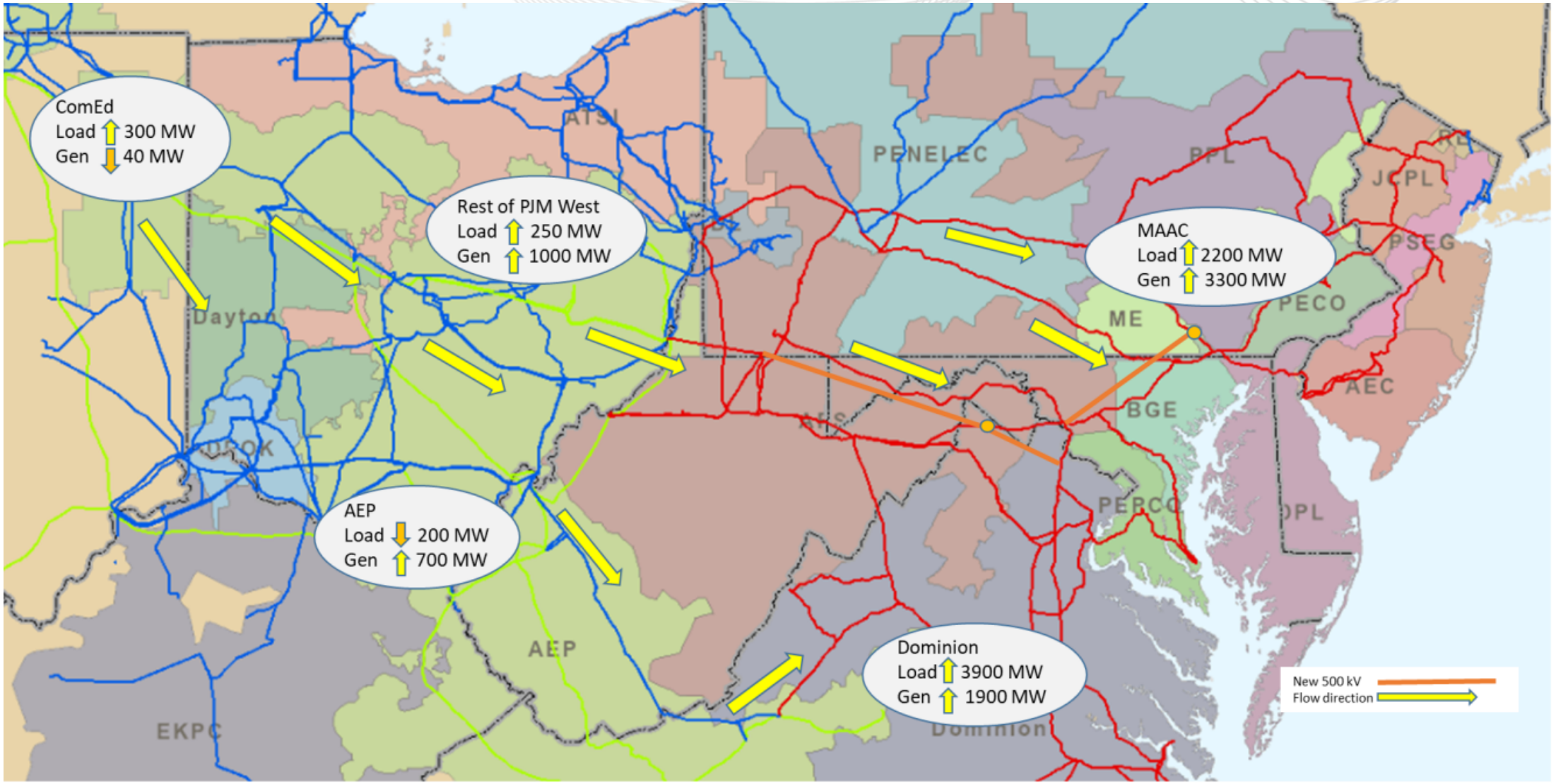
- This encapsulates the Elgin/Elwood generators

Row Labels	Decrease in Pmax (MW)
PJM West	**1833.1**
Thermal and Other	1833.1
Grand Total	**1833.1**

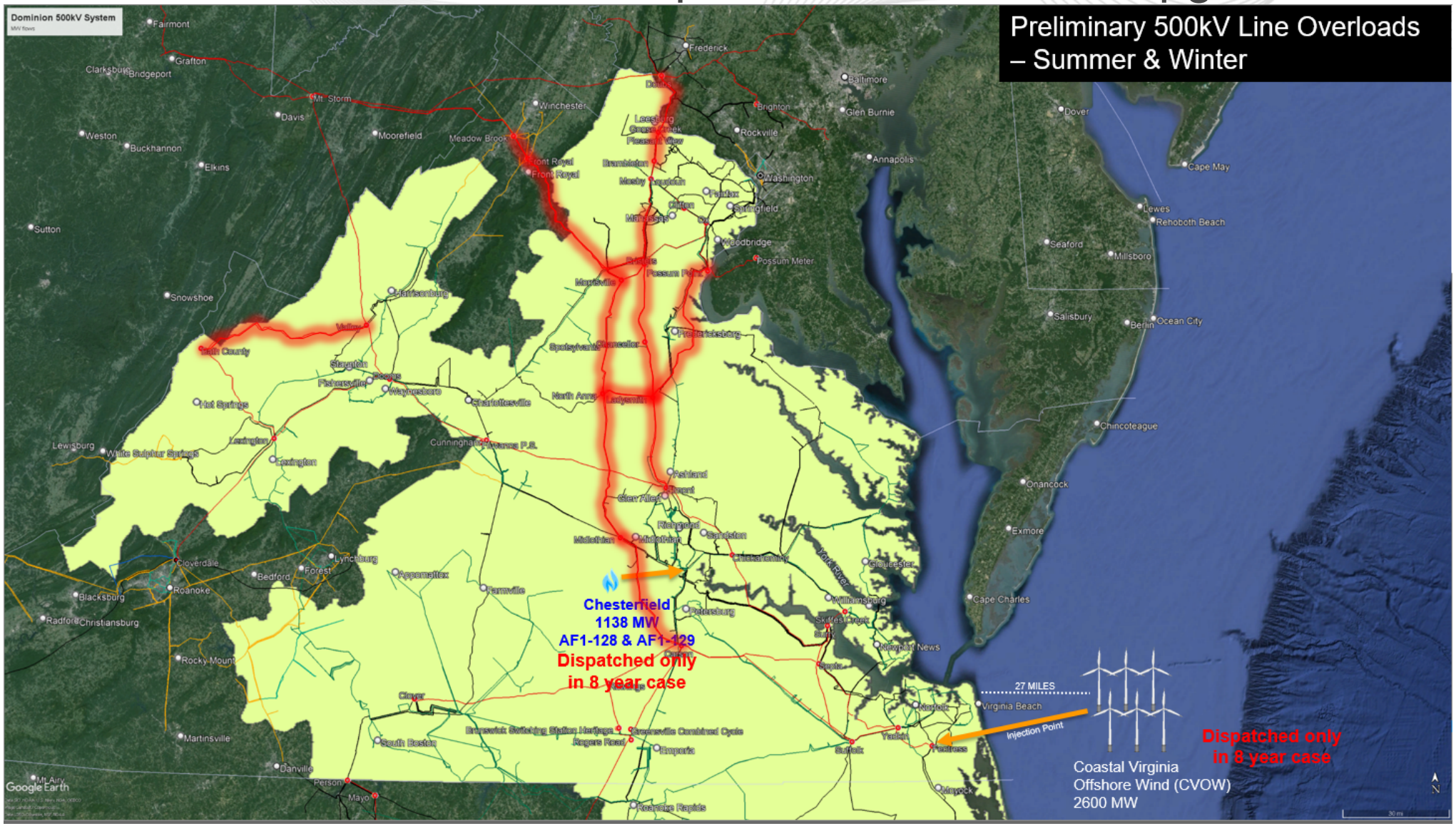
2029 vs. 2032 RTEP Window 1 Summer Comparison



2029 vs. 2032 RTEP Window 1 Winter Comparison



Forecast Generation Impact – Internal DOM upgrades: 2032



New Thermal Overloads (2032)
Not including unsolved contingencies

	Summer	Winter	Light Load
Above 345 kV	14	6	9
Below 345 kV	50	32	26
Transformers	12	10	5
Total New overloads	76	48	40

*PJM is in the process of validating the overloads with the TO's
** PJM is also in the process of validating if facilities are conductor limited

Sensitivity Scenario to Assess impact of load growth - Western PJM

- AEP is forecasting load growth in the next 5 to 8 years (up to 2032)
- Forecast update submissions ongoing and will be captured part of the 2025 PJM Load Forecast (to be published in Dec 2024/ Jan 2025)
- PJM will bring forward additional information regarding load and generation assumptions to the August TEAC.
- This sensitivity analysis to be conducted by PJM will focus on ensuring selection of the right solutions out of 2024W1 RTEP – will not introduce new needs/solutions.

2032 Needs Inclusions

- Consistent regional long lead reliability needs between 5 and 8 year timeframes
- 500 kV that do not have long lead will be excluded (ex. transformers, breaker contingency driven and shorter developments)
- 230 kV long lead needs (that are more tied to regional transfers)
- Solutions to common needs between 5 and 8 years will have to be right-sized to address both needs.
- Instances where longer lead solutions could address multiple near-term needs.

P5 Contingencies

- PJM has determined that the P5 CAPs fall under the exemption for thermal reliability violations on transmission substation equipment (OA, Schedule 6, section 1.5.8(p))
  - The substation equipment exemption is limited to a narrow set of transmission facilities (*i.e.*, existing transmission substation equipment, including ancillary protective devices, where the substation requirement is the limiting element giving rise to the reliability violation)
    - Such violations are resolved as a replacement in kind to existing transmission substation equipment
  - In the case of P5 violations, the ancillary protective devices (e.g., battery, relay, communication systems, CT/PT, DC trip) are the limiting elements giving rise to the reliability violation
- The solution to the violations, including redundancy, lack of alarming, or DC supply issues including monitoring and alarming, is to incorporate local redundancy or implement needed alarms/protection/DC supply enhancements within existing substation equipment.

2024 W1 RTEP - Next Steps

- AEP/Western Load growth sensitivity model (to inform selection of needed transmission) will be posted around August 16th
- 2024W1 RTEP will be running for 60 days and targeting PJM Board Approvals (Feb 2025)
  - TEAC 1st and 2nd reads to span between Oct 2024 and Jan 2025

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Reliability Analysis Update

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Revision History

Version No.	Date	Description
1	8/1/2024	• Original slides posted
2	8/5/2024	• Added slide 15: Forecast Generation Impact – Internal DOM upgrades: 2032. • Updated the Y-axis on slides 8,9,10.

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