Solution for the Immediate Need: Dominion 230kV Over Duty Breakers

First Read

Jeffrey Goldberg PE, Sr Engineer II
PJM Transmission Planning

Transmission Expansion Advisory Committee
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Outline

- First Read – Reliability Need to Address Short Circuit Analysis Results
- Need Drivers
- Alternatives Considered
- Why the Need was not Identified Earlier
- Conclusions and Recommendations
- Next Steps

First Read – Short Circuit

Baseline Reliability Projects

Need Drivers—Reliability Need to Address Short Circuit Concerns

- The 2025 PJM short circuit case identified four 230 kV breakers (Dominion Zone) as overdutied in the 2025 time frame as part of the normal RTEP short circuit activities to review both 5-year and 2-year cases for short circuit analysis.
- Part of the normal process in base case development, Dominion has made several modeling accuracy enhancements (impedance values) in the area of Carson and Ladysmith 230kV substations.
- The updated 2025 RTEP model revealed two 230kV breakers at Carson and two 230kV breakers at Ladysmith were overdutied in the near-term (2-year out) short circuit case.

Dominion Transmission Zone: Baseline Carson 230kV 200272 & 24972-3 CB Replacements

Process Stage: First Read

Criteria: Short Circuit

Assumption Reference: 2023 RTEP assumptions

Model Used for Analysis: 2025 & 2028 RTEP Short Circuit base cases

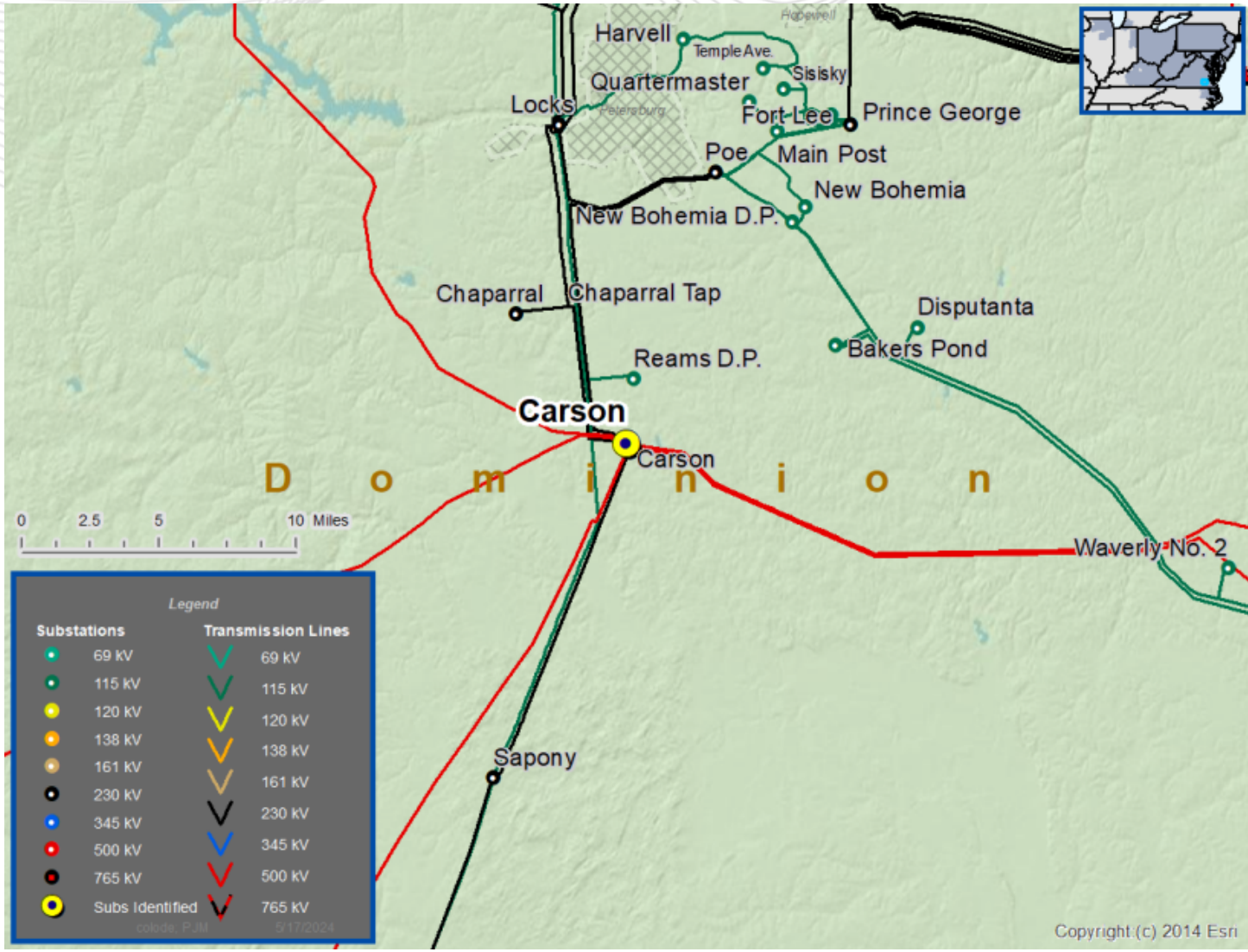
Proposal Window Exclusion: Immediate Need

Problem Statement:

In the 5-year 2028 RTEP Short Circuit base case, the Carson 230kV breakers 200272 and 24972-3 are identified as being over duty. In the 2-year 2025 RTEP Short Circuit base case, the same breakers were identified as being over duty.

Existing Facility Rating:

Circuit Breaker	Interrupting Rating (kA)
230kV breaker 200272	40
230kV breaker 24972-3	40



Dominion Transmission Zone: Baseline Carson 230kV 200272 & 24972-3 CB Replacements

Proposed Solution:

1) Replace over duty Carson 230kV circuit breakers 200272 and 24972-3 with an interrupting rating of 63 kA.

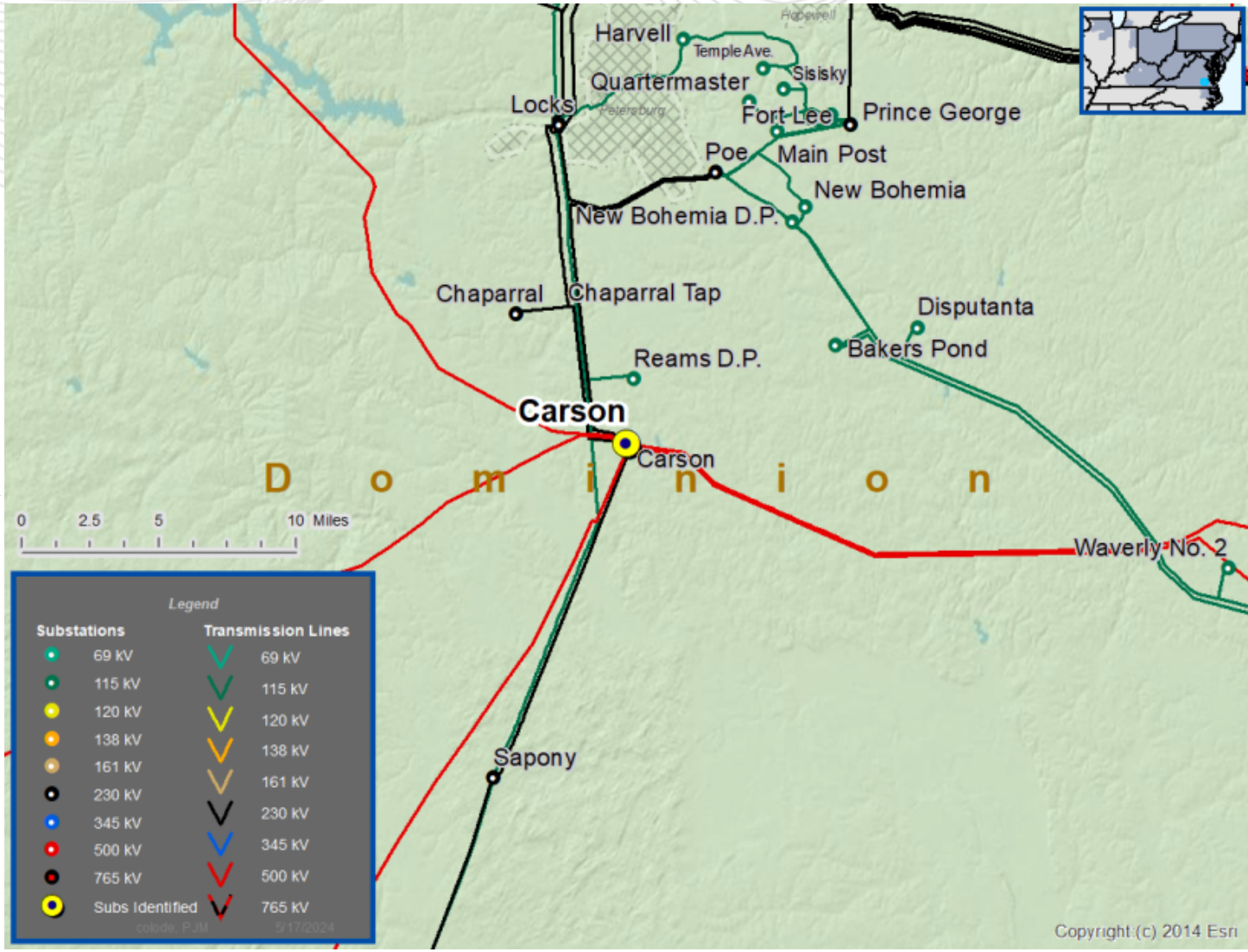
Estimated Cost: $1.25M

Preliminary Facility Rating:

Circuit Breaker	Interrupting Rating (kA)
230kV breaker 200272	63
230kV breaker 24972-3	63

Required IS Date: 6/1/2025

Projected IS Date: 6/1/2025



Dominion Transmission Zone: Baseline Ladysmith CT 230kV SX1272 & SX3472 CB Replacements

Process Stage: First Read

Criteria: Short Circuit

Assumption Reference: 2023 RTEP assumptions

Model Used for Analysis: 2025 & 2028 RTEP Short Circuit base cases

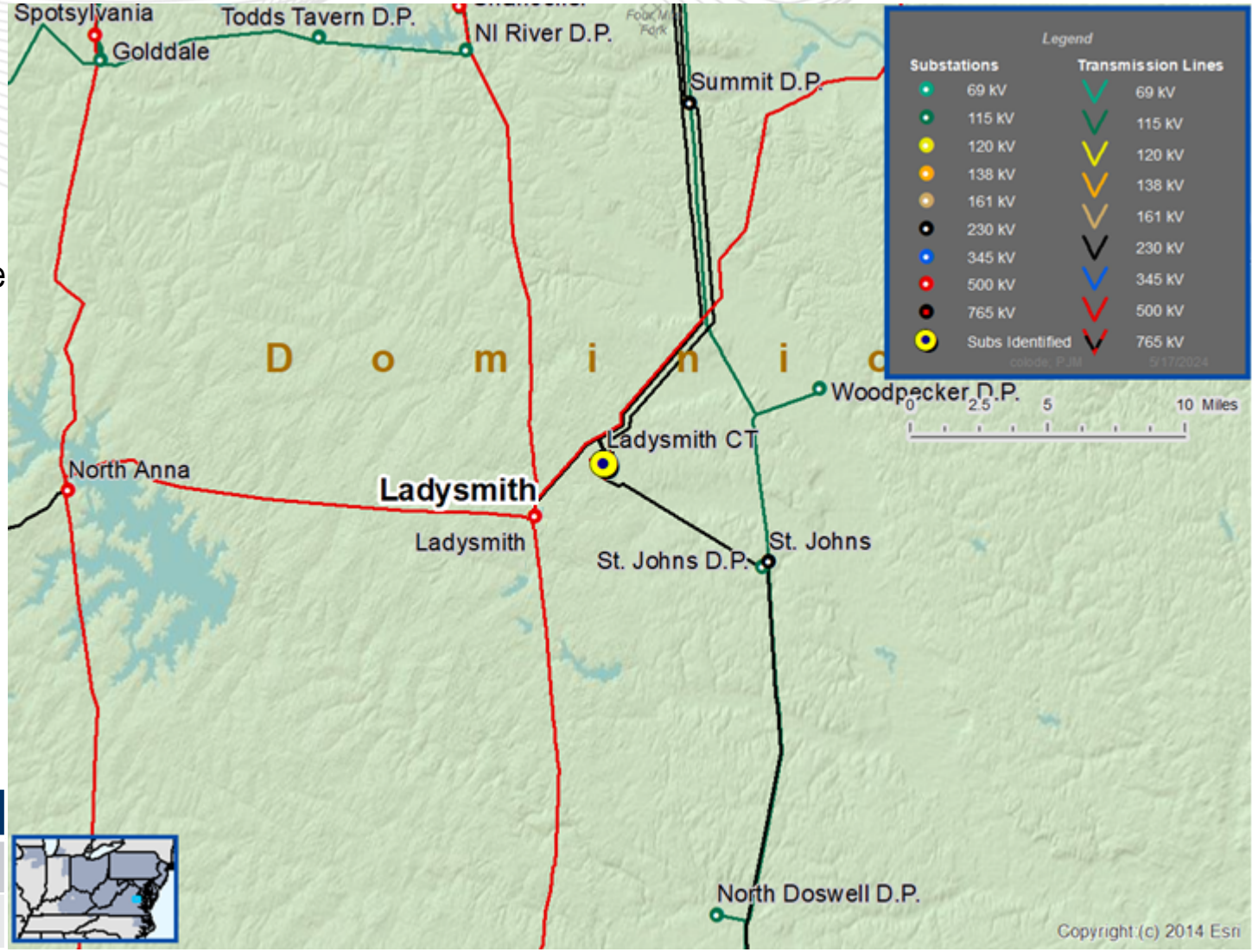
Proposal Window Exclusion: Immediate Need

Problem Statement:

In the 5-year 2028 RTEP Short Circuit base case, the Ladysmith CT 230kV breakers SX1272 and SX3472 are identified as being over duty. In the 2-year 2025 RTEP Short Circuit base case, the same breakers were identified as being over duty.

Existing Facility Rating:

Circuit Breaker	Interrupting Rating (kA)
230kV breaker SX1272	40
230kV breaker SX3472	40



Dominion Transmission Zone: Baseline Ladysmith CT 230kV SX1272 & SX3472 CB Replacements

Proposed Solution:

1) Replace over duty Ladysmith CT 230kV circuit breakers SX1272 and SX3472 with an interrupting rating of 63 kA.

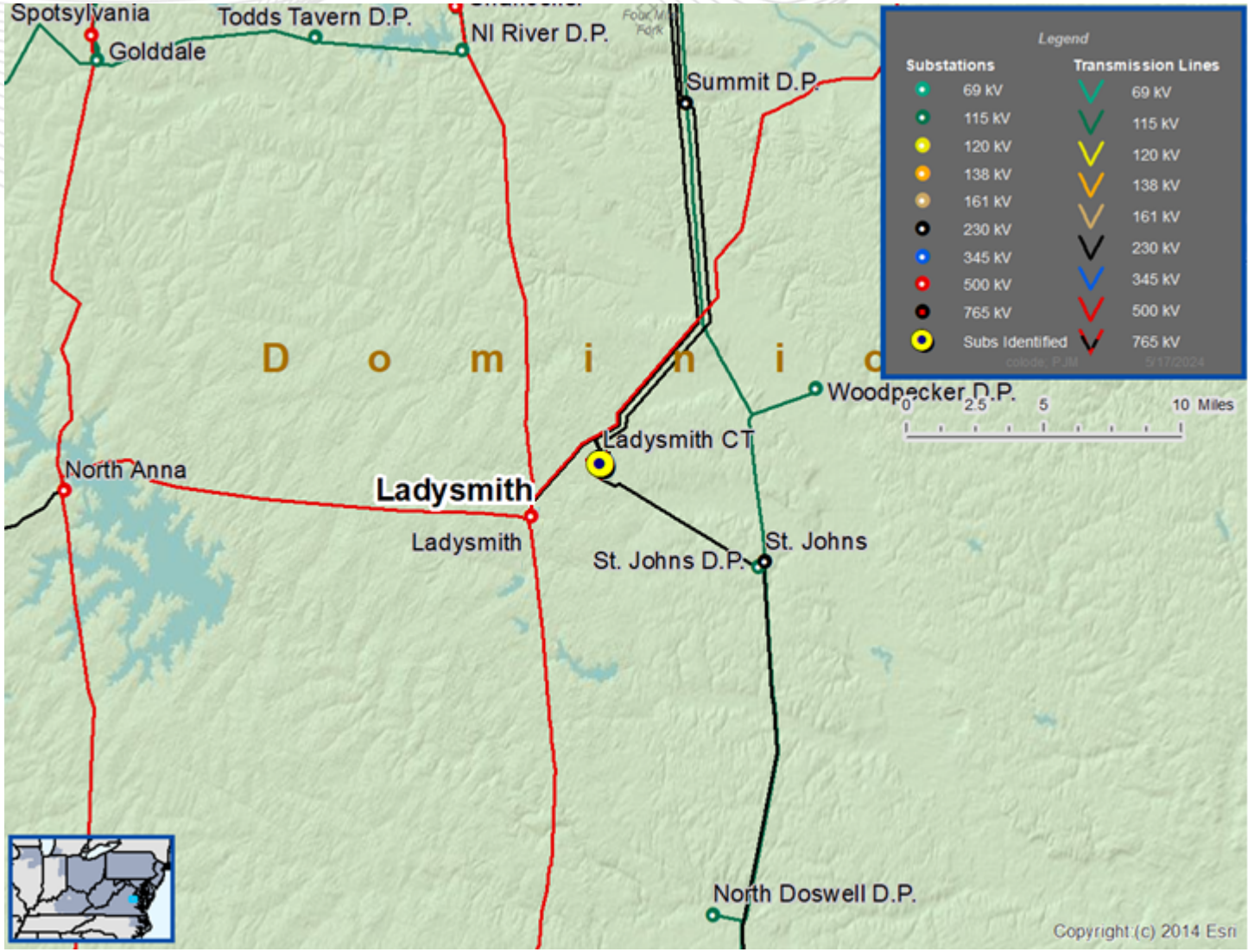
Estimated Cost: $1.25M

Preliminary Facility Rating:

Circuit Breaker	Interrupting Rating (kA)
230kV breaker SX1272	63
230kV breaker SX3472	63

Required IS Date: 6/1/2025

Projected IS Date: 6/1/2025



Alternatives Considered

- There are no feasible alternatives.
  - Replacing the identified over duty breakers with a higher rated breakers is the most efficient solution.
  - Keeping the existing breakers but lowering fault current could involve more costly and disruptive options (Impedance Additions and/or Reconfigurations).
  - The Dominion system is expanding and experiencing high load growth with short circuit levels trending more towards the 63kA capability levels (above 40kA). Shorter term solutions to maintain Interruption levels below 40kA would not be efficient.

Why the Need Was Not Identified Earlier

- PJM identified the short circuit issues during short circuit analysis procedure as part of the annual Regional Transmission Expansion Plan (RTEP) baseline assessment in accordance with the process outlined in PJM Manual 14B.
- This analysis includes a study of the entire PJM system based on its current configuration and equipment to determine if the short circuit current interrupting duty of circuit breakers is sufficient for the 2-year planning case.
- The identified short circuit issues were revealed using the recently updated modeling data and are triggered in both the 2-year and 5-year planning case, and, as a result, need to be addressed immediately.

Conclusions and Recommendations

- PJM has determined that the short circuit issues described above create an immediate reliability need for which a competitive window is not feasible.
- Furthermore, because these breakers are wholly located inside existing substations owned by Dominion, Dominion will be the designated entity to perform the work to replace the overdutied breakers.
- PJM will proceed with an Immediate need project(s) – without a Window— to address the reliability needs driven by the short circuit issues.

Next Steps

- PJM welcomes all stakeholders input and comments on its “Immediate Need Assessment.”

Contact

Facilitator:
Jason Connell,
Jason.Connell@pjm.com

Secretary:
Tarik Bensala,
Tarik Bensala@pjm.com

SME/Presenter:
Jeffrey Goldberg,
Jeffrey.Goldberg@pjm.com

Solution for the Immediate Need:
Dominion 230kV Over Duty Breakers

Member Hotline

(610) 666 – 8980

(866) 400 – 8980

custsvc@pjm.com

Revision History

Version No.	Date	Description
1	5/24/2024	• Original slides posted

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