



# Transmission Planning Reliability Analysis Update

Sami Abdulsalam, Senior Manager

Transmission Expansion Advisory Committee

March 7, 2023

- 2022 RTEP Window 3
- 2023 RTEP Window 1

- **Window Opened; February 24<sup>th</sup> 2023**
  - PJM posted preliminary planning basecases on January 31<sup>st</sup> 2023
  - 60 Day Window – Closing April 25<sup>th</sup> 2023
- **Purpose:**
  - Address reliability needs in the Dominion and APS zones primarily associated with Data Center Load forecasts (up to 7,500 MWs by 2027-28)
  - Seeking robust and flexible solutions to address the reliability needs in those specific areas

- **2027-28 Summer / Winter**
  - 2027-28 Summer
  - Baseline Thermal and Voltage N-1 Contingency Analysis
  - Generator Deliverability and Common Mode Reliability Analysis
  - N-1-1 Thermal and Voltage Analysis and Voltage Collapse
  - Load Deliverability Thermal and Voltage Analysis
  - Dynamic Stability Assessment
- **2027-28 Light Load\***
  - Baseline Thermal and Voltage N-1 Contingency Analysis
  - Generator Deliverability and Common Mode Reliability Analysis

\*PJM aims to provide the Light Load cases early in March 2023, on or before March 6<sup>th</sup>

- Immediate Need Exclusion
- Below 200kV Exclusion
- Substation Equipment Exclusion
- Supplemental Projects scope
- Areas external to the study area that will be covered part of upcoming 2023 RTEP

- Develop robust, holistic and expandable solutions that address the 2027-28 baseline violations associated with:
  - Local constraints: resulting from directly serving the data center loads in APS and Dominion zones through the respective 230 kV networks and into the points of delivery:
    - Goose Creek- Ashburn – Mars - Wishing Star and Brambleton
  - Regional constraints resulting from imports into load center areas (500 kV primarily):
    - Doubs - Goose Creek
    - Front Royal - Morrisville – Vint Hill – Loudoun/Mosby
    - Meadow Brook - Loudoun/Mosby
    - Morrisville – Bristers - Ox
    - Peach Bottom – Conastone – Brighton – Doubs
  - Needed reactive power VAR reinforcements, both static and dynamic as deemed necessary, to address the reactive power needs of the system for the 2027-28 baseline scenario

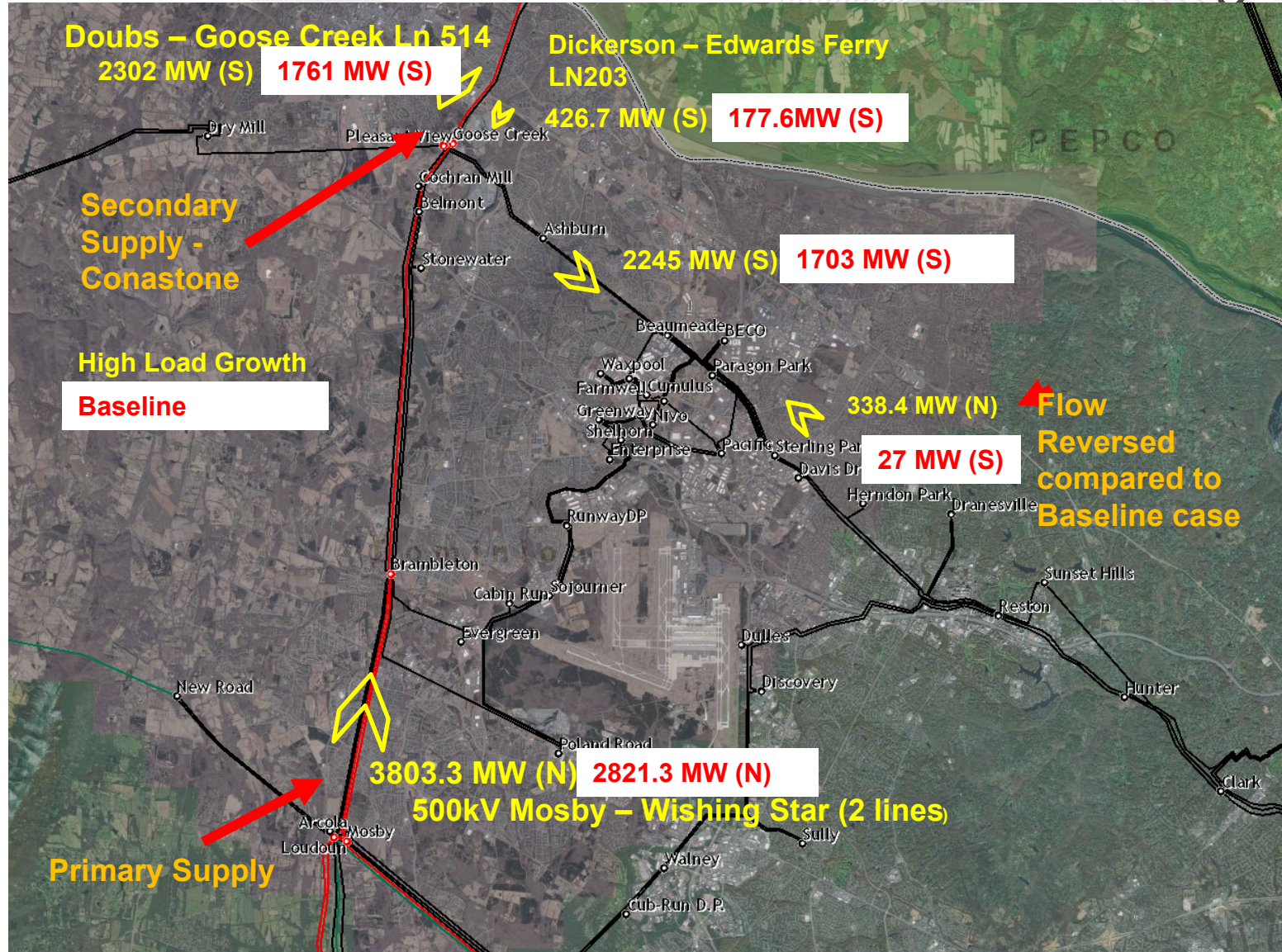
- Develop solutions to address all (if any) new criteria violations generated as a consequence of proposed solution. Solutions to these secondary violations are required for the proposal to be considered.
- Adhere to all applicable planning criteria, including PJM, NERC, SERC, RFC and Local Transmission Owner Criteria.

- Holistic solutions are to be designed such that they are robust and expandable as the load grows within the area.
- A scalable solution ensures, at a minimum, near-term reliability needs are addressed while also enabling future expansion (beyond the 2027-28 baseline levels) as data center load increases in the Dominion and APS zones.
  - Consider flexibility, robustness and scalability of 2027-28-baseline solutions against the Interim 2027-28 Summer, Winter and Light Load basecases.
  - Evaluate proposals for their effectiveness towards existing reactive interfaces in the area, particularly those supporting the Dominion and APS zones.
  - Evaluate the effectiveness of the proposed solutions towards the transmission system load deliverability into the Dominion and APS zones (CETL).









- **Preliminary Reactive Support:**

- The provided 2027-28 basecases include a set of reactive VAR support at existing/proposed substations to partially meet the system reactive load demand particularly under system normal, N-0 conditions.
- Already included at specific locations as indicated in PJM’s 2022 RTEP Window 3 Problem Statement document.
- They do not imply final VAR level, type or location.
  - Only adequate for need analysis purposes.
  - Should be removed and replaced consistent with an entity's proposal to provide the necessary VAR support.
- PJM expects that proposals will provide for the needed reactive VAR support through either transmission development or static/dynamic VAR support devices or a combination of both.
- A number of non-convergent contingencies due to deficient VAR support and excessive reactive power loss in the 2027-28 modeling basecases.
- Based on the preliminary VAR resource assumptions in the cases, the provided voltage performance results are for guiding purposes only.
  - Proposal developers are to re-evaluate the voltage performance part of their proposal development to ensure compliance with voltage performance requirements.

- **Basecase N-0 thermal Violations:**
  - 2027-28 baseline case(s) show thermal violations along the Peach Bottom-Conastone and Conastone-Brighton 500kV paths.
  - These 500 kV segments are also showing marginal overloads approaching 98% to 100% under N-1 conditions for the baseline summer conditions.
- **Non-Converged N-1 Contingencies:**
  - Key contingencies lead to voltage collapse on the 500kV system due to insufficient transmission system transfer capability and VAR support inadequacy.
  - Following development of VAR support enhancements, thermal loading on all system elements needs to be monitored and overloads, if any, need to be addressed part of the proposed solutions.

- **N-1-1 Analysis;**
  - Due to the significant load growth presented in the baseline 2027-28 basecases, a large number of N-1-1 contingencies lead to unsolvable security constraint redispatch conditions.
  - Hence, the provided N-1-1 results are to be reevaluated as part of the proposal solution development process.
  - PJM aims provide the interim 2027-28 basecase N-1-1 results by early March and no later than March 6<sup>th</sup> 2023 on the PJM website in the competitive planning section.
- **Load Deliverability analysis:**
  - PJM requires the proposed solutions are evaluated for their effectiveness towards load deliverability into the APS and Dominion zones.
  - PJM will provide the load deliverability modeling instructions and parameters during the week of March 6<sup>th</sup>.

- Non Converging Contingencies (Voltage Stability)

Contingency Name	Cont. Type	Analysis Type	Error Type
AP_P1-2_PE-500-001_SRT-SL	Single	Voltage Drop	Blown Up
AP_P1-2_WP-500-DRT17_SRT-SL	Single	Voltage Drop	Blown Up
PJM_500_BG_P1_5011_SRT-A	Single	Voltage Drop	Blown Up
AP_P2-3_PE-500-015_SRT-A	Line_FB	Voltage Drop	Blown Up
AP_P2-3_PE-500-016_SRT-SL	Line_FB	Voltage Drop	Blown Up
AP_P2-3_PE-500-018C_SRT-SL	Line_FB	Voltage Drop	Blown Up
AP_P2-3_PE-500-018D_SRT-SL	Line_FB	Voltage Drop	Blown Up
AP_P2-3_PE-500-019D_SRT-SL	Line_FB	Voltage Drop	Blown Up

Facilitator:  
Sue Glatz, [Suzanne.Glatz@pjm.com](mailto:Suzanne.Glatz@pjm.com)

Secretary:  
Tarik Bensala,  
Tarik [Bensala@pjm.com](mailto:Bensala@pjm.com)

SME/Presenter:  
Sami Abdulsalam,  
[Sami.Abdulsalam@pjm.com](mailto:Sami.Abdulsalam@pjm.com)

### Reliability Analysis Update



### Member Hotline

(610) 666 – 8980

(866) 400 – 8980

[custsvc@pjm.com](mailto:custsvc@pjm.com)



**PROTECT THE  
POWER GRID  
THINK BEFORE  
YOU CLICK!**



Be alert to  
malicious  
phishing emails.

**Report suspicious email activity to PJM.**  
(610) 666-2244 / [it\\_ops\\_ctr\\_shift@pjm.com](mailto:it_ops_ctr_shift@pjm.com)

