

Transmission Expansion Advisory Committee

November 10, 2010

Issues Tracking

Open Issues: None

New Issues:

Baseline Reliability Update



2012 Retool Update

- Update to September 2010 TEAC
- Reliability analysis performed without Susquehanna – Roseland
- 2012 Common Mode Outage procedure violations identified

Facility Overloaded	Contingency Type	% Loading
West Wharton - Greystone "J" 230 kV	Double circuit towerline	111.6%*
Newton - Lake Iliff 230 kV		106.5%*
Lake Iliff -Montville 230 kV		105.7%*
Kittatinny - Newton 230 kV		105.3%*
Portland - Greystone "Q" 230 kV		100.4%
Greystone - Whippany 230 kV		99.4%
Kittatinny - Pohatcong 230 kV		98.0%
Glen Gardner - Chester 230 kV		95.4%

* Conductor limited

- Incremental upgrades not practical given a number of the violations exceed conductor limits
- PJM evaluated the effectiveness of retaining Hudson 1 on RMR into 2012
- PJM performed preliminary market efficiency analysis of 2012 and 2013 to determine the impact of operating to double-circuit tower line contingencies due to the delay in Susquehanna – Roseland 500 kV

- Market efficiency analysis assumed Hudson 1 remained in-service in 2012 and 2013
- Study results
 - net increase in gross congestion in each year primarily in New Jersey
 - ~ \$160 Million in 2012 and ~ \$ 280 Million in 2013
 - Increase use of demand response to control constraints
 - Constraints could be controlled with the addition of Hudson 1 and the implementation of demand response

- PJM will develop plans to operate to the double-circuit tower line outages in real-time operation
- PJM will request the Hudson 1 unit be retained on RMR through at least 2012
- PJM will complete additional reliability and market efficiency analyses based on queued generation

Remaining 2010 RTEP Analysis

- 2014 Retool Analysis is in-progress
- Potential for voltage violations
- Core SVC locations (from MAAC alternative analysis)
 - Jacks Mountain, Doubs, Meadow Brook, Loudoun 230 kV
 - Welton Spring
- SVC Optimization
 - Juniata, T157, Mt Storm

- 2015 N-1-1 Voltage Studies
 - In-progress
- Continuing to test upgrade alternatives in the ComED zone

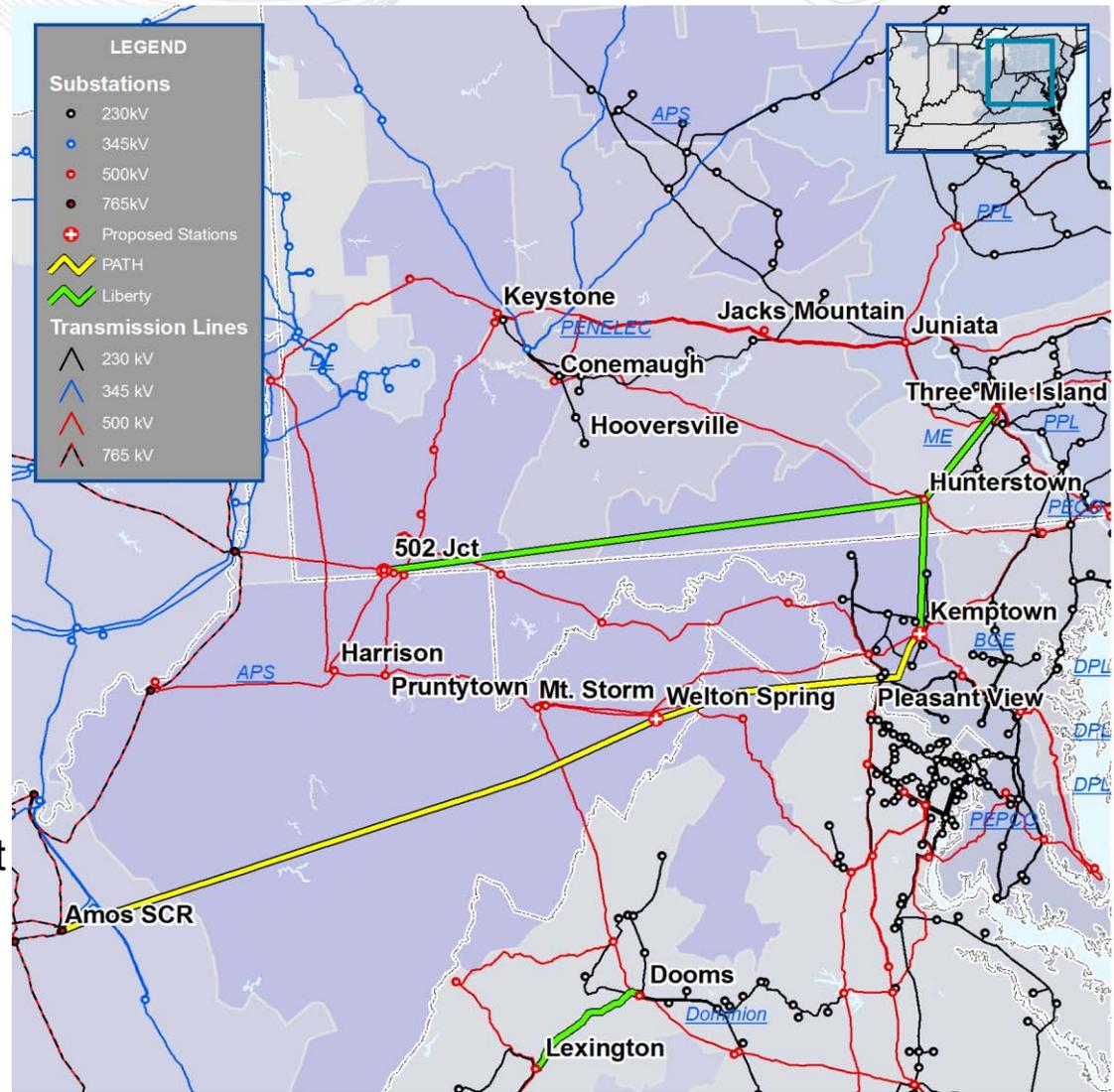
MAAC Alternative Analysis Update

Revised Liberty / LS Power

- 502J – Hunterstown 500 kV (includes 50% series compensation)
- Hunterstown – TMI 500 kV
- Hunterstown – Kemptown 500 kV
- Lexington – Doods 500 kV

PATH

- Amos – Welton Spring – Kemptown
- Includes baseline reactive upgrades of 1000 MVAR shunt and 500 MVAR SVC at Welton Spring and a 250 MVAR shunt at Kemptown 500kV



Dominion Alternative #1

- Rebuild Mt. Storm – Doubs
- 50% series compensation on Meadow Brook end of Trail
- Rebuild Mt. Storm – Pruntytown

Dominion Alternative #2

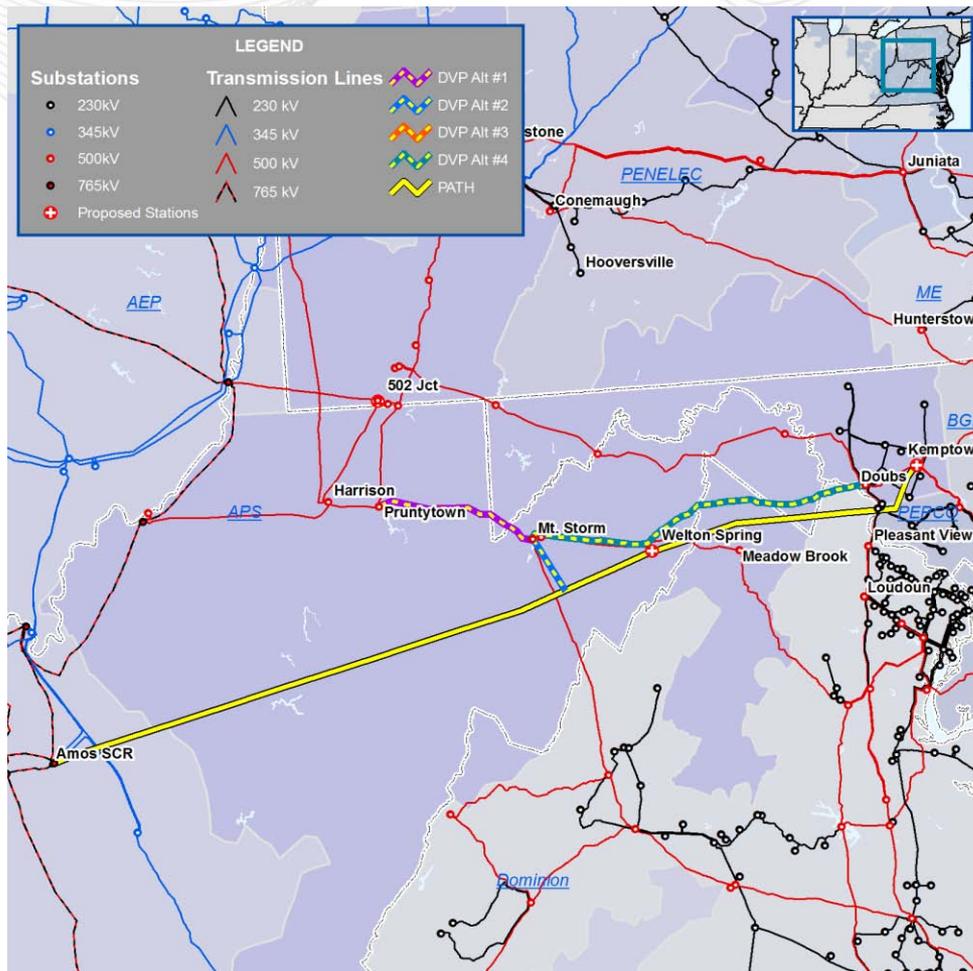
- Rebuild Mt. Storm – Doubs
- 50% series compensation on Meadow Brook end of Trail
- Build a portion of PATH stopping at Mt. Storm (requires a new 765/500 kV transformer)

Dominion Alternative #3

- Rebuild Mt. Storm – Doubs
- 50% series compensation on Meadow Brook end of Trail
- Build a portion of PATH stopping at Welton Spring (requires new 765/500 kV transformer)

Dominion Alternative #4

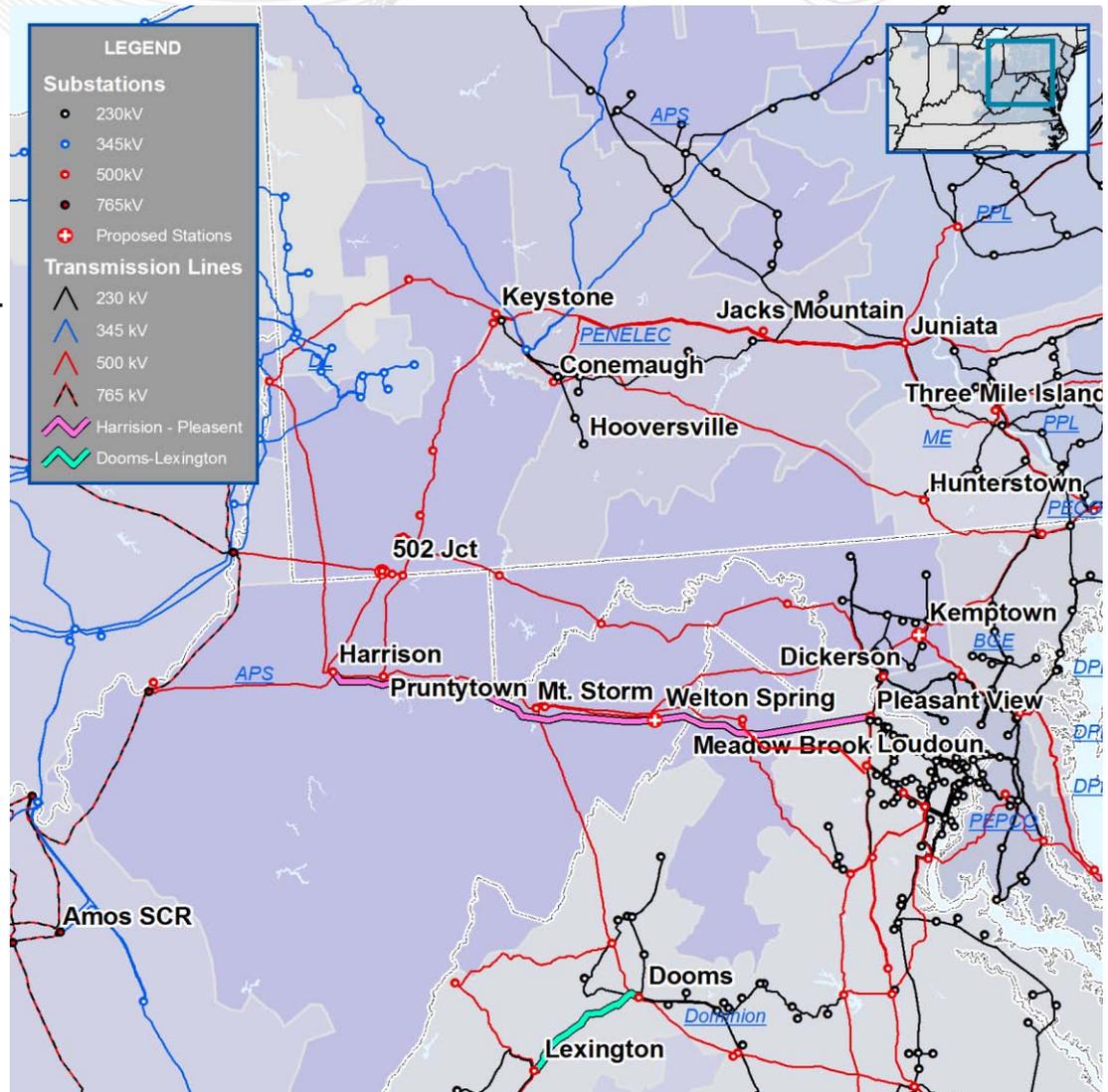
- Rebuild Mt. Storm – Doubs
- Build PATH proposal



* All Dominion alternatives include 900 MVAR SVC's at Loudoun 230 kV and T157 Tap 500 kV and 900 MVAR of static capacitors at other locations

Harrison – Dickerson Alternative

- Harrison – Dickerson New 500kV AC Line
- New Dickerson 500/230 kV Station
- Series Comp on Meadow Brook – Loudoun
- Lexington – Doods 500 kV



- PATH, Revised Liberty, Harrison Dickerson and Dominion Alternative 4 (which includes the full PATH project) all resolve the thermal violations through the 15 year planning horizon
- FCITC analysis showed PATH to be the most robust alternative for transfers between various areas
 - Harrison to Dickerson was significantly less than PATH or Liberty considering transfers between various areas
- PATH reduces real power losses on the system more than any of the alternatives
 - Harrison – Dickerson losses were at least 100 MW greater than PATH (190 MW for MAAC load deliverability scenario)

- Reactive only alternatives not effective beyond 2016
- Harrison – Dickerson and partial Liberty (502 Junction – Hunterstown) not as effective as full Liberty project or PATH project
- PATH project and Liberty project comparable from a reactive perspective
- For MAAC load deliverability scenario, PATH project reduces reactive losses by more than 1000 MVAR compared to Liberty.



Liberty Construction Feasibility Study

- Full report posted with the materials for today's meeting
- Study evaluated multiple potential routes for each line based on criteria such as:
 - length, state and federal land crossed, potentially displaced residences and businesses, road, railway, streams, and transmission line crossings, and proximity to sites listed on the National Register of Historic Places (NRHP)
- A single route for each segment was selected and cost estimates and overall project schedule were developed

- **Line Segments**

- 502 Junction to Hunterstown
 - 169 miles
 - Selected route located in Pennsylvania and Maryland
- Hunterstown to Three Mile Island
 - 35 miles
 - Located in Pennsylvania
- Hunterstown to Kemptown
 - 39 miles
 - Located in Pennsylvania and Maryland
- Lexington to Doods
 - 40.4 miles
 - Located in Virginia

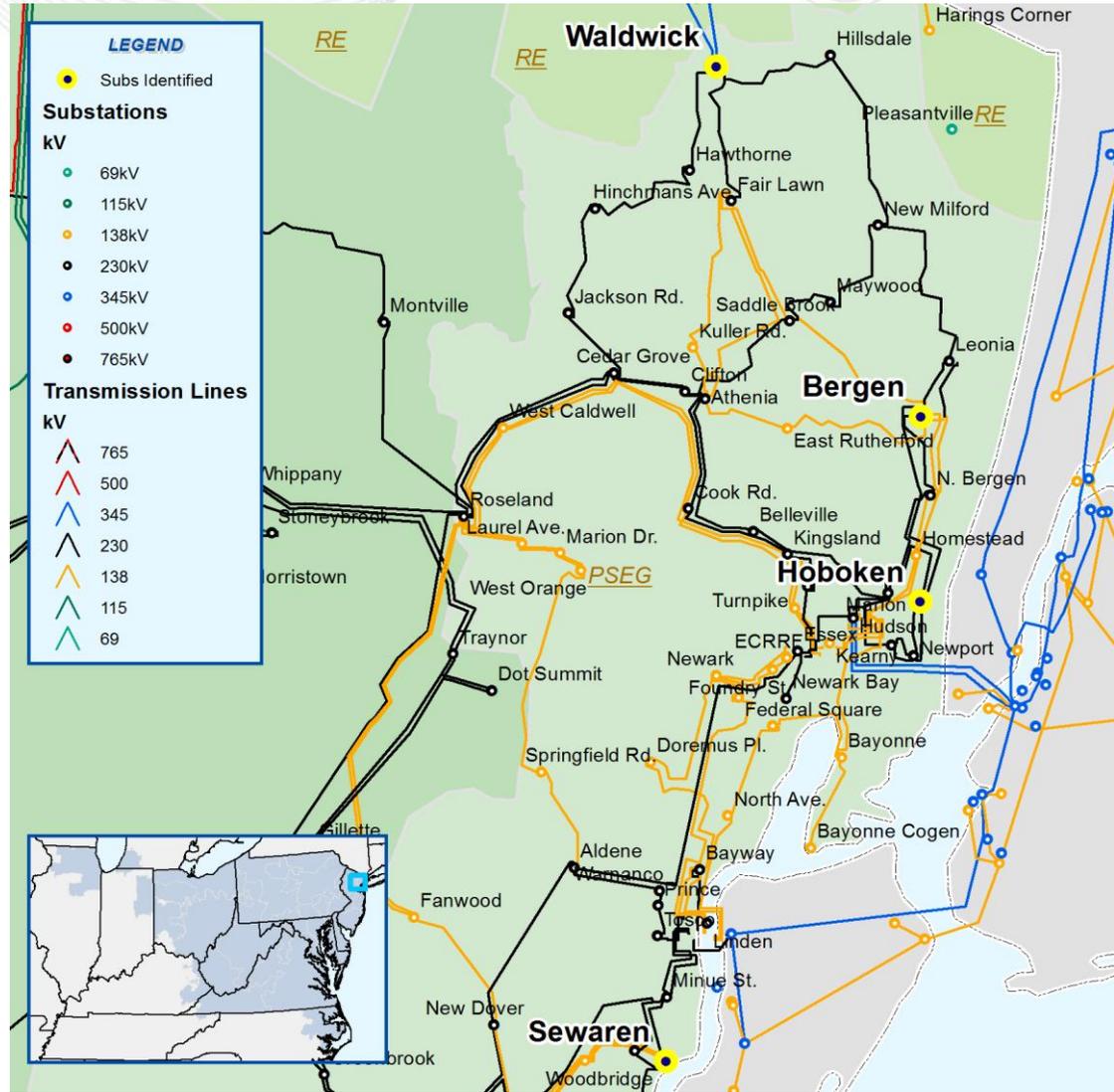
- Total line length for all segments – 283.4 miles
- Estimated cost - \$ 2.01 Billion to \$2.53 Billion
 - Includes substation engineering and construction for 7 substations, transmission line engineering and construction, land acquisition, routing, siting, permitting, wetland mitigation, construction management and contingency
- Estimated project duration – 7 years
 - Critical path items include routing, siting, NEPA approval, land acquisition, line and substation construction

- PATH total line length approximately 277 miles
 - 121 miles existing ROW adjacent other facilities
 - 156 miles new ROW
- Liberty total line length approximately 283 miles
 - All new ROW (some segments may parallel existing facilities)
- Cost estimates
 - PATH cost estimate (by PATH) = \$2.10 Billion
 - Liberty cost estimate (by LS Power) = \$1.336 Billion
 - Liberty cost estimate (by PJM consultant) = \$ 2.01 - \$2.53 Billion
- Schedule
 - PATH has been working on siting, permitting and engineering since 2007 and can be placed in-service by June 1, 2015
 - Liberty estimated project duration is 7 years

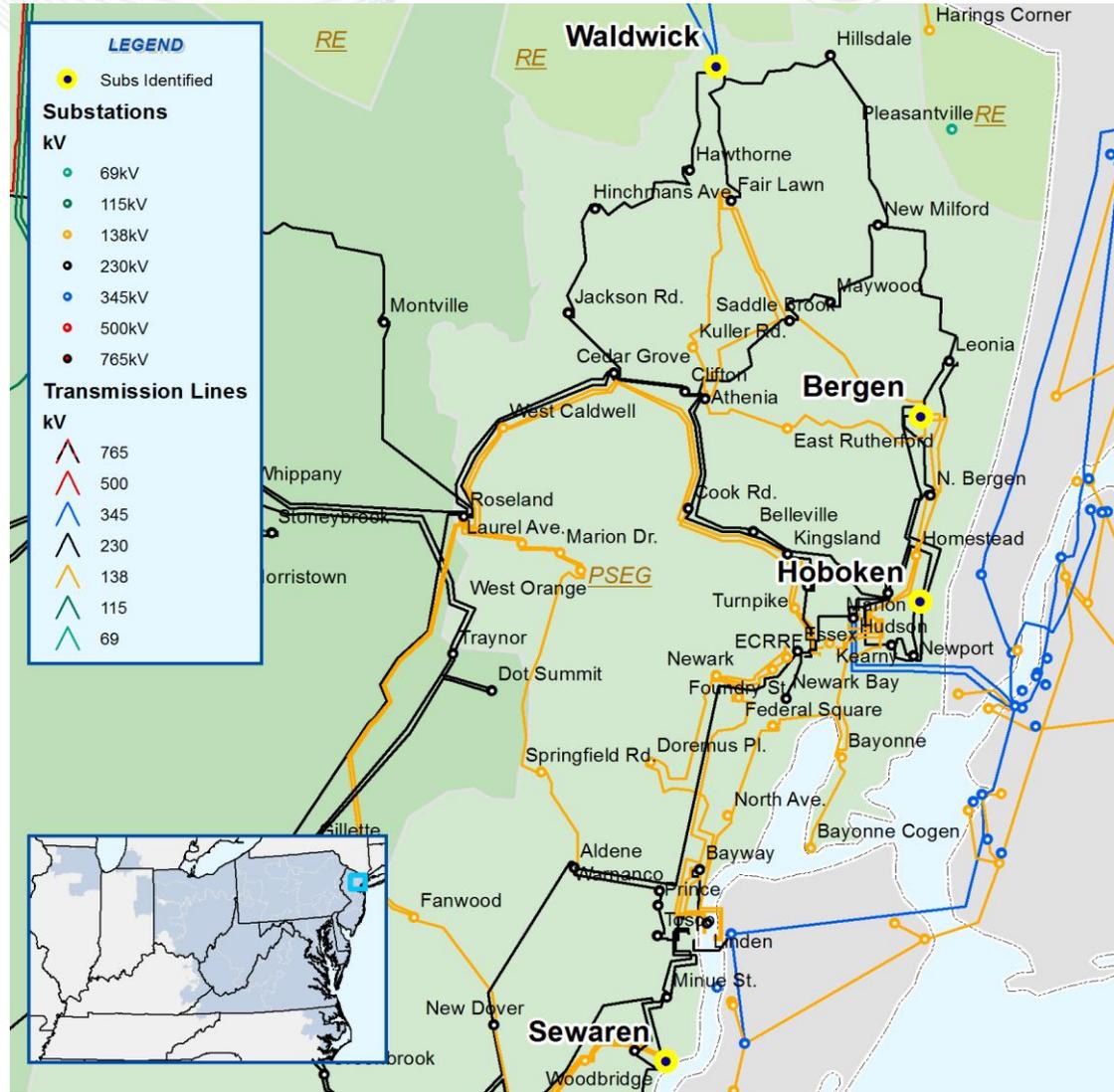
- PJM staff will be recommending to the PJM Board of Managers to continue with the PATH project as the preferred alternative
- The required in-service date for the project is June 1, 2015

Supplemental Projects

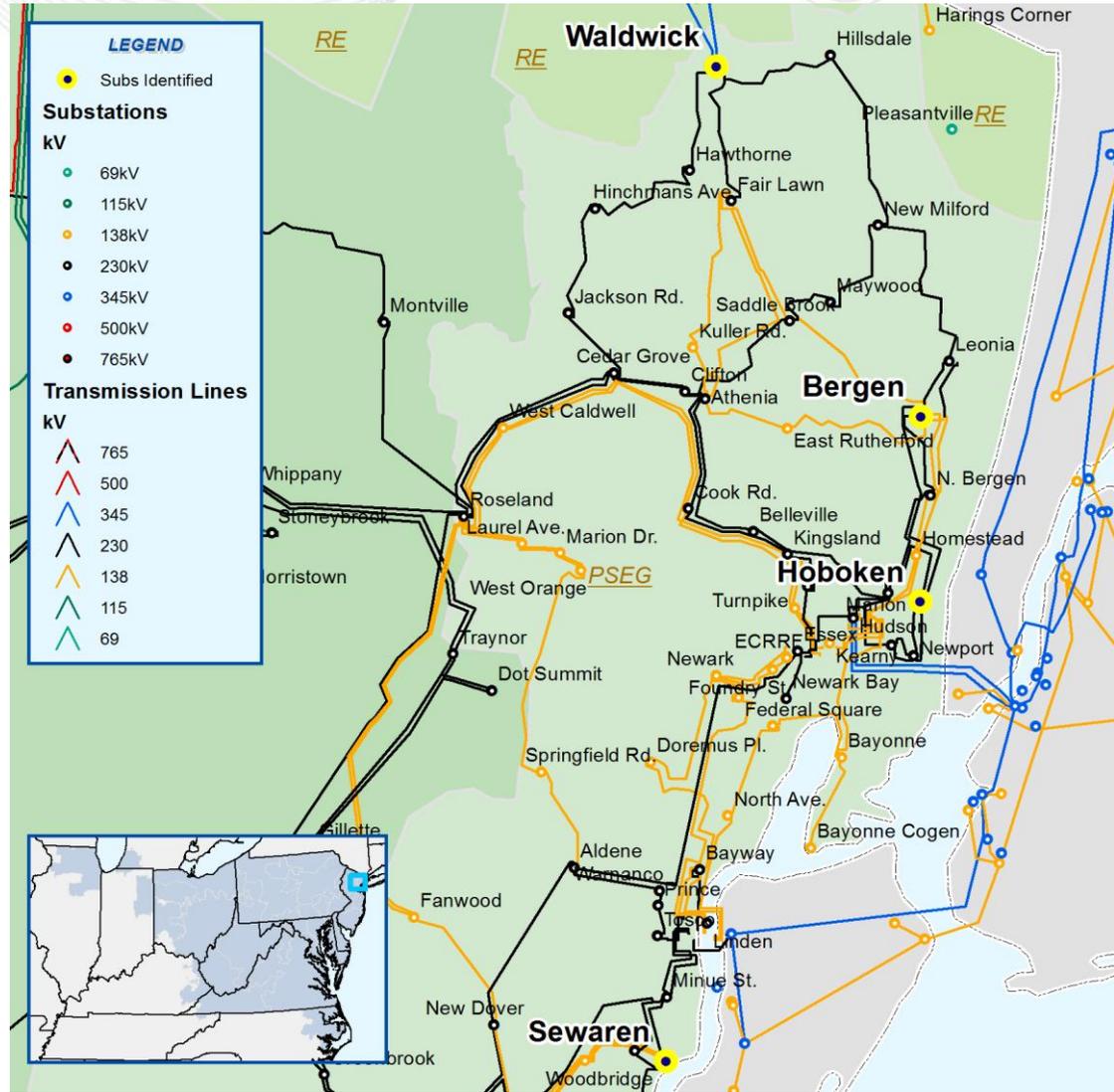
- At Bergen, existing distribution transformers currently fed from the 138 kV system will be moved to the 230 kV system
- Expected IS Date: 6/1/2013



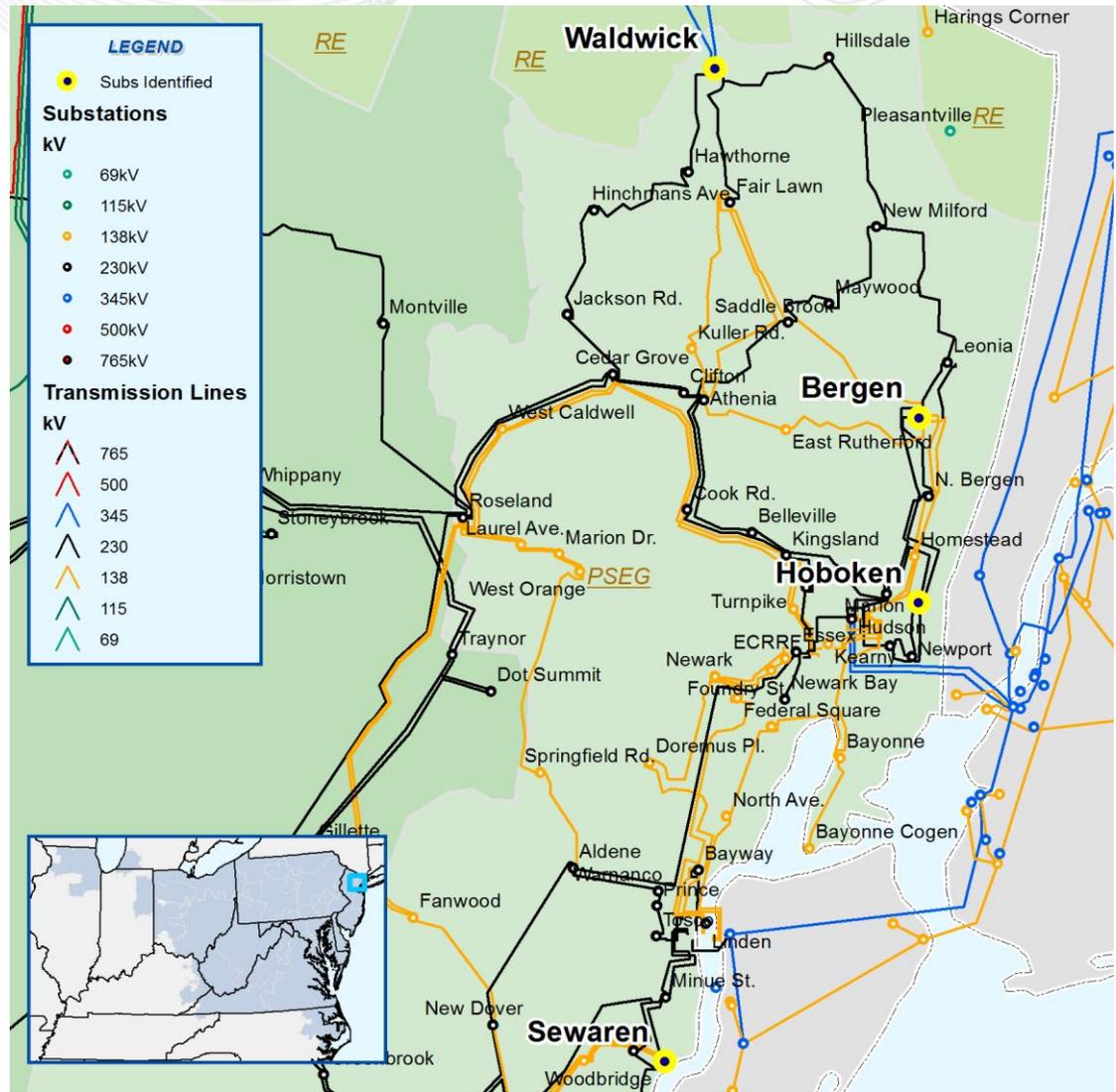
- Sewaren 230/138 kV transformer oil leakage
- Proposed Solution: Replace the Sewaren 230/138 kV transformer, add two 230 kV and one 138 kV breakers at Sewaren
- Expected IS Date: 6/1/2013



- Waldwick 345 kV breakers have gas leakage problems and the circuit switchers are defective due to age and are no longer produced
- Proposed Solution: Replace the four existing Waldwick 345 kV breakers and reconfigure the substation to breaker and half scheme by adding four new 345 kV breakers
- Expected IS Date: 6/1/2011



- Hoboken 230 kV substation has reliability issue due to circuit switcher performance leading to frequent outages
- Proposed Solution: Replace the existing Hoboken circuit switchers with GIS bus due to space limitation
- Expected IS Date: 6/1/2013



Market Efficiency Update

- Projects being evaluated in COMED area to address future congestion.
 - BCP Transmission Project submitted by LS Power for new single 345 kV line from Byron to Cherry Valley to Pleasant Valley.
 - Variations being considered to maximize Benefit/Cost
 - Variations of BCP project currently include Cherry Valley-Pleasant Valley 345 KV, Byron-Pleasant Valley 345 kV, and Byron-Wayne 345 kV.
 - LaSalle Transmission Project submitted by LS Power for new single or double 345 kV line from Pontiac Midpoint to Reynolds to Dumont (V4-026) with ISD of 6/1/2014.
 - La Fayette Transmission Project submitted by LS Power for new single or double 345 kV line from Quad Cities to Kewanee to Pontiac Midpoint to Reynolds to Dumont along with 345/138 kV transformers at Kewanee station with ISD of 6/1/2015.
 - Various configurations of LaSalle and LA Fayette Projects

- The 10-year analysis on 2010/11 Stage 1A ARR's resulted in infeasibility on the following facilities. Upgrades will be evaluated for inclusion into the PJM RTEP.
 - 155 Nelson 345 KV 15502 Line (Nelson to Electric Junction 345 KV line)
 - 12204 138 KV 12204 2 Line (Marengo to Pleasant Valley 138 KV line)
 - 151 Wood 138 KV 12205 2 (Woodstock to Marengo 138 KV line)
- The final Market Efficiency Upgrades will be evaluated against the 10-year ARR analysis to see if upgrades fix future ARR infeasibility.

Review Issues Tracking

Email RTEP@pjm.com with any comments