Transmission Expansion Advisory Committee
Market Efficiency Update

November 11, 2014

Market Efficiency Long Term Proposal Window

2014 RTEP Long Term Proposal Window: Market Efficiency

- Identify enhancements or expansion that could relieve PJM transmission constraints stemming from the 2014 Market Efficiency Analysis for which no reliability based project has already been identified.
- Perform and compare market simulations with and without proposed enhancements or expansions to evaluate if the Benefit/Cost Ratio is at least 1.25 using the criteria as defined in Schedule 6, Section 1.5.7 of the PJM Operating Agreement and PJM Manual 14B, Attachment E.
- Perform high level reliability analysis of proposed Market Efficiency enhancements or expansions to ensure the proposed enhancement or expansion does not create any reliability issues.

2014 RTEP Long Term Proposal Window: Market Efficiency

- Stakeholder feedback received on initial base congestion results
  - PJM incorporated appropriate changes
- Updated PROMOD case files and necessary documents provided at following link
  - Includes descriptions of changes from original posted case files

  http://pjm.com/planning/rtep-development/market-efficiency.aspx
- PJM identified recommended facilities for which proposals may be submitted
  - Recommended facilities provided in 2014 Market Efficiency Congestion Results file at following link:

    http://pjm.com/planning/rtep-development/market-efficiency.aspx
  - PJM to identify if any facilities may have potential low cost or simple solutions
- Additional feedback since window opened will result in new base congestion, recommended facilities, and updated PROMOD files

Market Efficiency Criteria

- Market Efficiency Criteria for facilities recommended for proposals:
  - Annual simulated congestion frequency of at least 25 hours in 2019 and 2022 study years.
  - Lower voltage facilities: Minimum of $1 million congestion in 2019 and 2022 study years.
  - Regional facilities: Minimum of $10 million congestion in 2019 and 2022 study years.
  - Facilities below these thresholds are not anticipated to pass the Benefit/Cost Criteria because of the expected cost of an upgrade. Congestion for 2025 study year is considered more speculative and therefore will be monitored in future analysis.

- RPM Criteria:
  - PJM will accept proposals to address the following corridor for which has had consistent capacity import limitations and thermal overloads.
    - Roseland-Cedar Grove-Clifton 230 kV corridor

Market Efficiency Criteria

Supplemental Projects

- Several submitted supplemental projects may fix Market Efficiency congestion
- Supplemental projects may be re-designated if pass B/C and still in Engineering/Design phase
  - Projects must be submitted during proposal window
- Supplemental projects will be added to base case if in construction phase

Long Term Proposal Window

- Update base congestion results and list of recommended facilities (November)
- Add notes for potential low cost upgrades, if any (November)
- Develop ARR mapping file (December)
- Create B/C user spreadsheet (December)
- Proposal window will NOT be extended

Market Efficiency Facilities Recommended for Long term Proposal Window

Market Efficiency Facilities: Regional

Constraint: AP SOUTH Interface l/o Black Oak-Bedington

- Area: Reactive Interface
- Congestion:
  - 2019: $112.4 million
  - 2022: $130.5 million

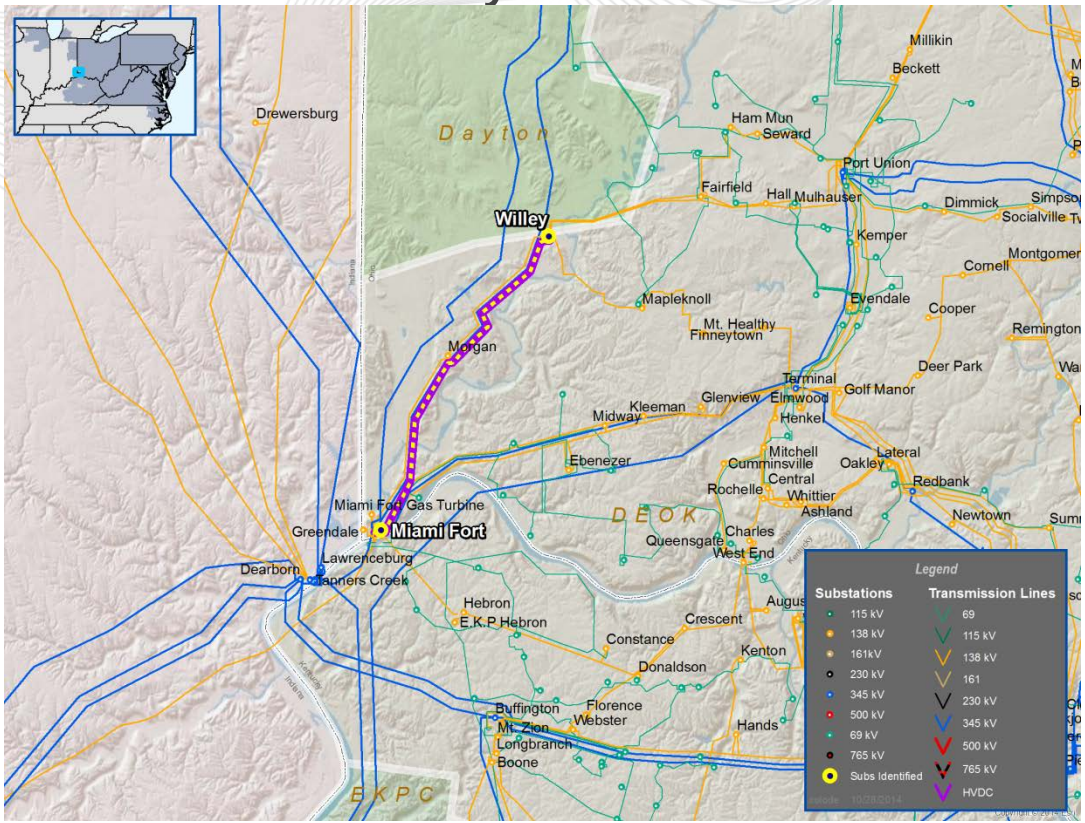
Constraint: AEP-DOM Interface l/o Black Oak-Bedington

- Area: Reactive Interface
- Congestion:
  - 2019: $22.6 million
  - 2022: $34.5 million

Market Efficiency Facilities: DEOK

Constraint:
Miami Fort to Willey 138 kV Line

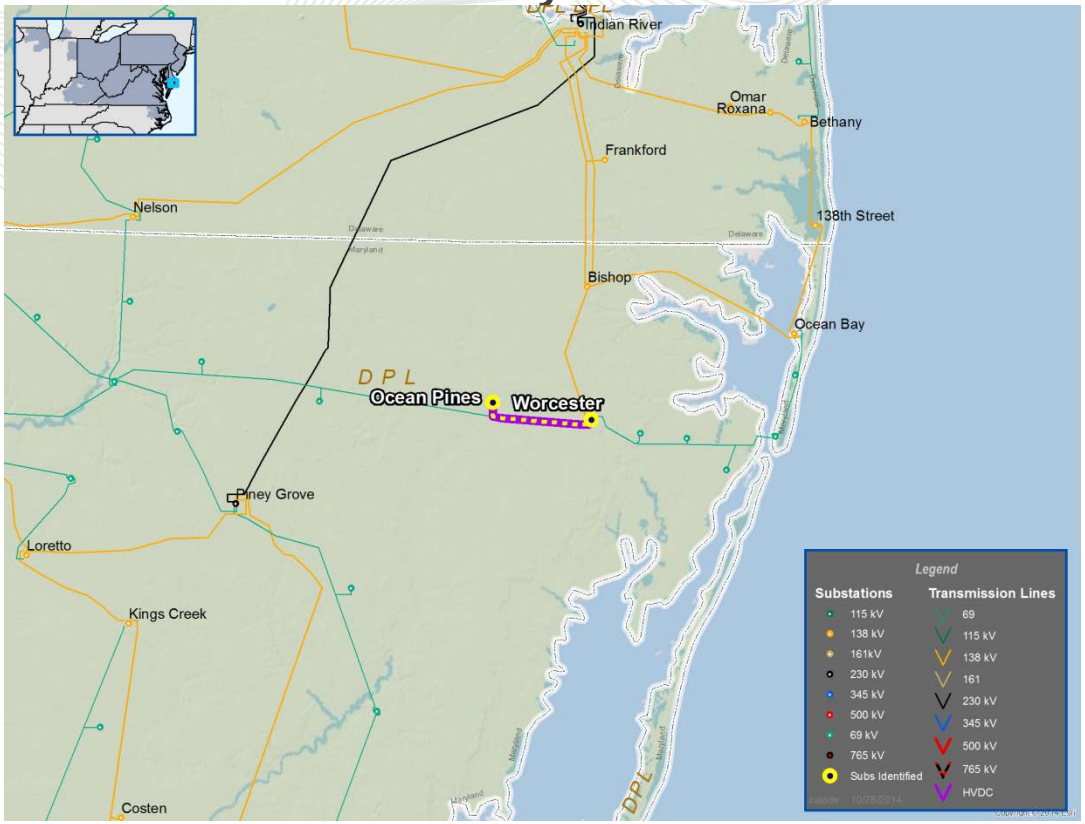
- Area: DEOK
- Congestion:
  - 2019: $22.7 million
  - 2022: $35.8 million



Market Efficiency Facilities: DPL

Constraint:
Worcester to Ocean Pines 69 kV Line

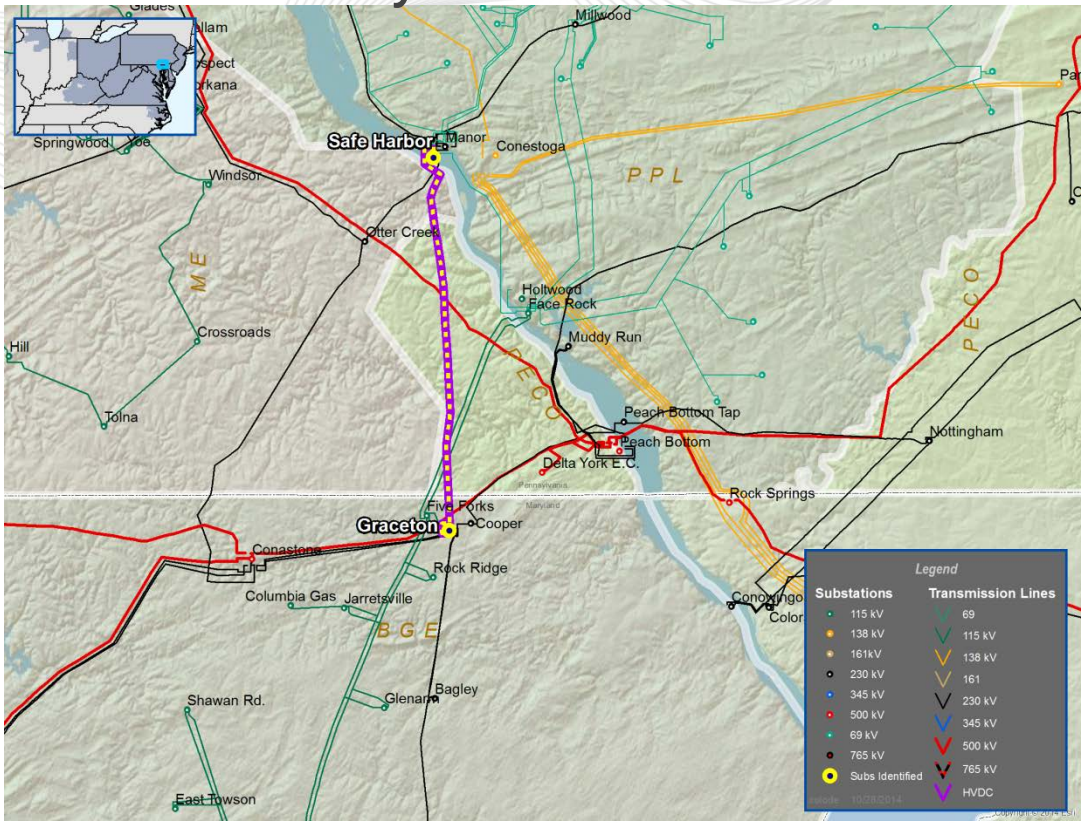
- Area: DPL
- Congestion:
  - 2019: $23.7 million
  - 2022: $26.8 million
- Potential Upgrade:
  - S0837: Rebuild the Worcester - Ocean City 69 kV circuit '6724'



Market Efficiency Facilities: PPL-BGE

Constraint:
Safe Harbor to Graceton 230 kV Line

- Area: PPL-BGE
- Congestion:
  - 2019: $28 million
  - 2022: $21.1 million
- Congestion will be impacted by below upgrade:
  - B0497: Install a second Conastone - Graceton 230 kV circuit and replace Conastone 230 kV breaker 2323/2302 will impact congestion
  - Upgrade will be added to base case and results will be updated

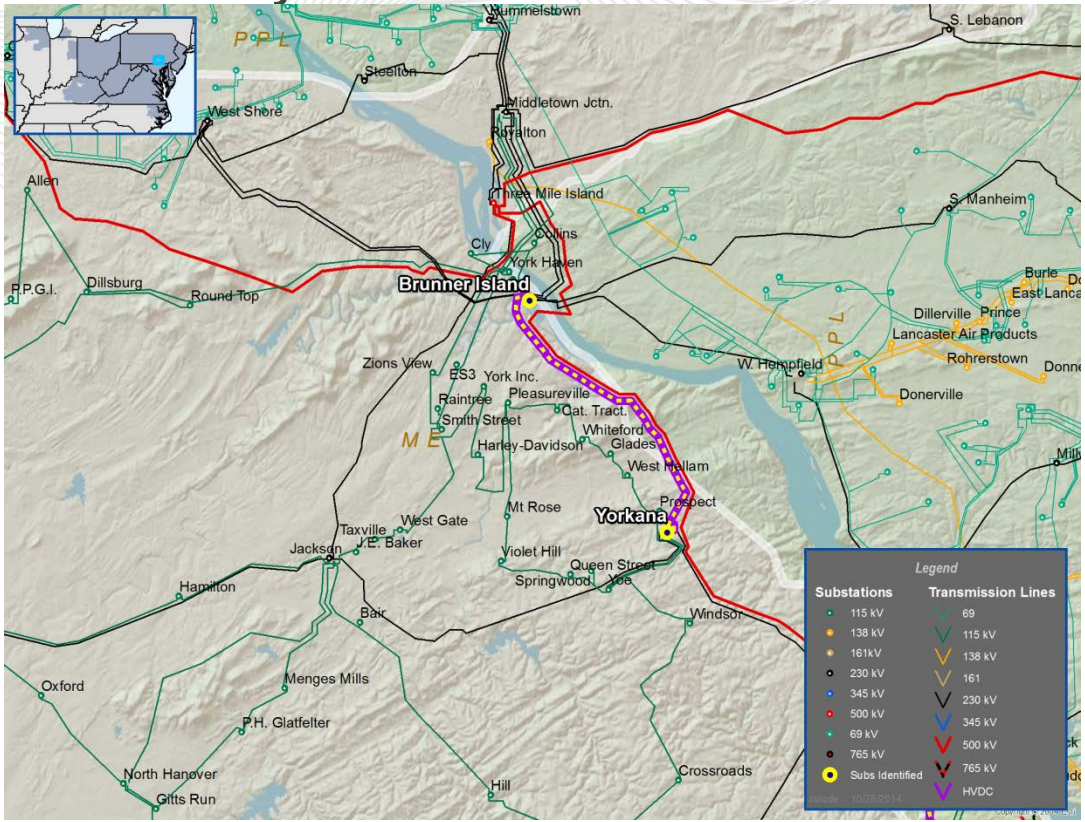


Market Efficiency Facilities: METED - PPL

Constraint:

Brunner Island to Yorkana 230 kV Line

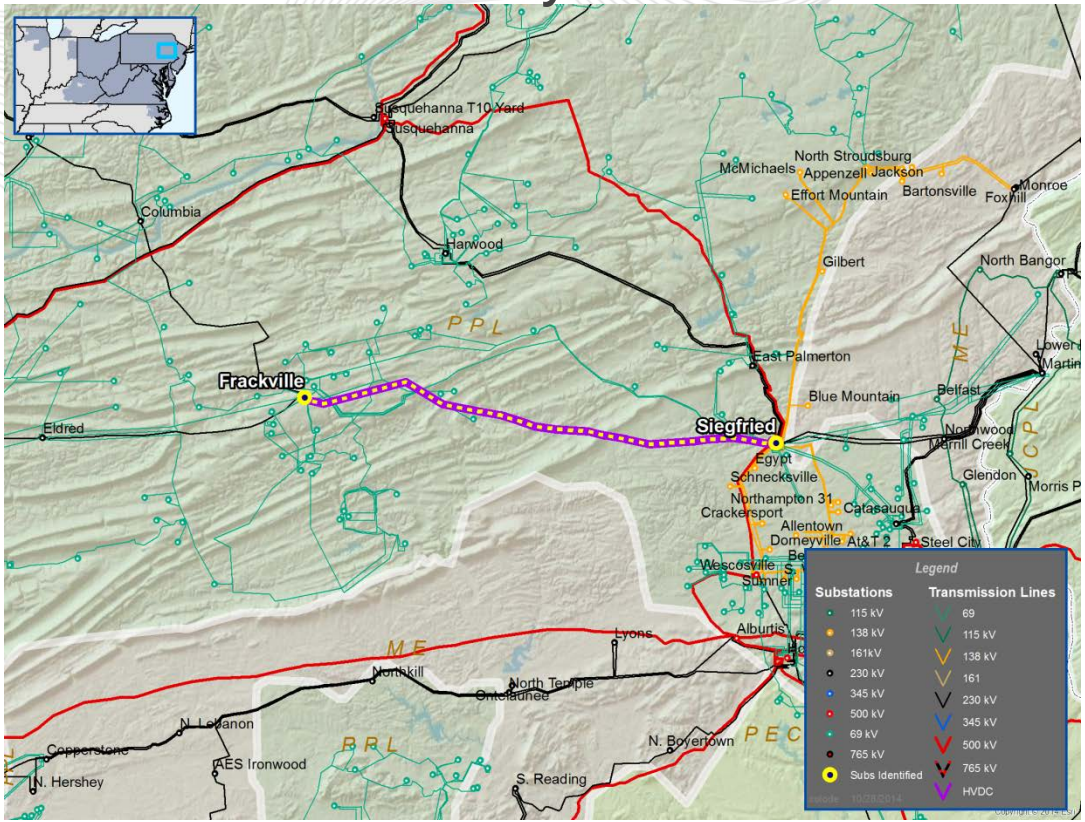
- Area: METED-PPL
- Congestion:
  - 2019: $28.2 million
  - 2022: $29 million



Market Efficiency Facilities: PPL

Constraint:
Frackville to Siegfried 230 kV Line

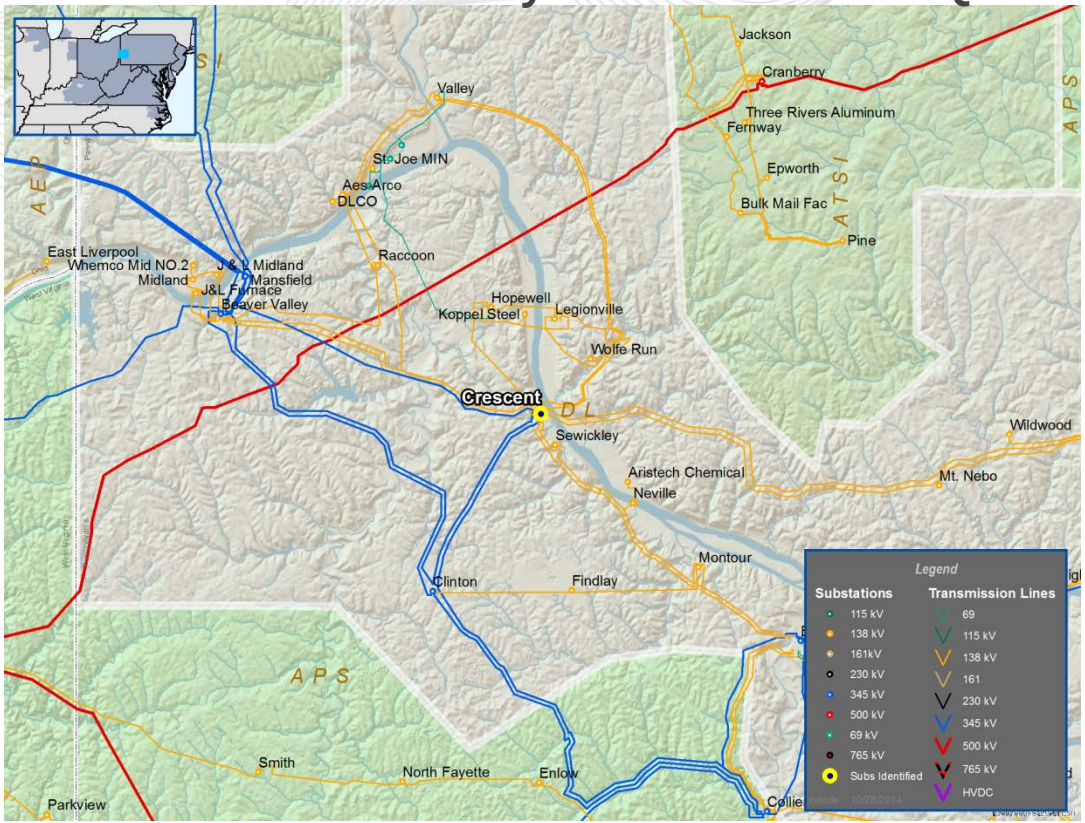
- Area: PPL
- Congestion:
  - 2019: $13 million
  - 2022: $14.5 million
- Congestion may be impacted by below upgrade that is under construction
  - S0148: New substation at Sunbury may eliminate the contingency causing congestion
  - Upgrade will be added to base case and results will be updated



Market Efficiency Facilities: DUQ

Constraint:
Crescent 345 kV Transformer

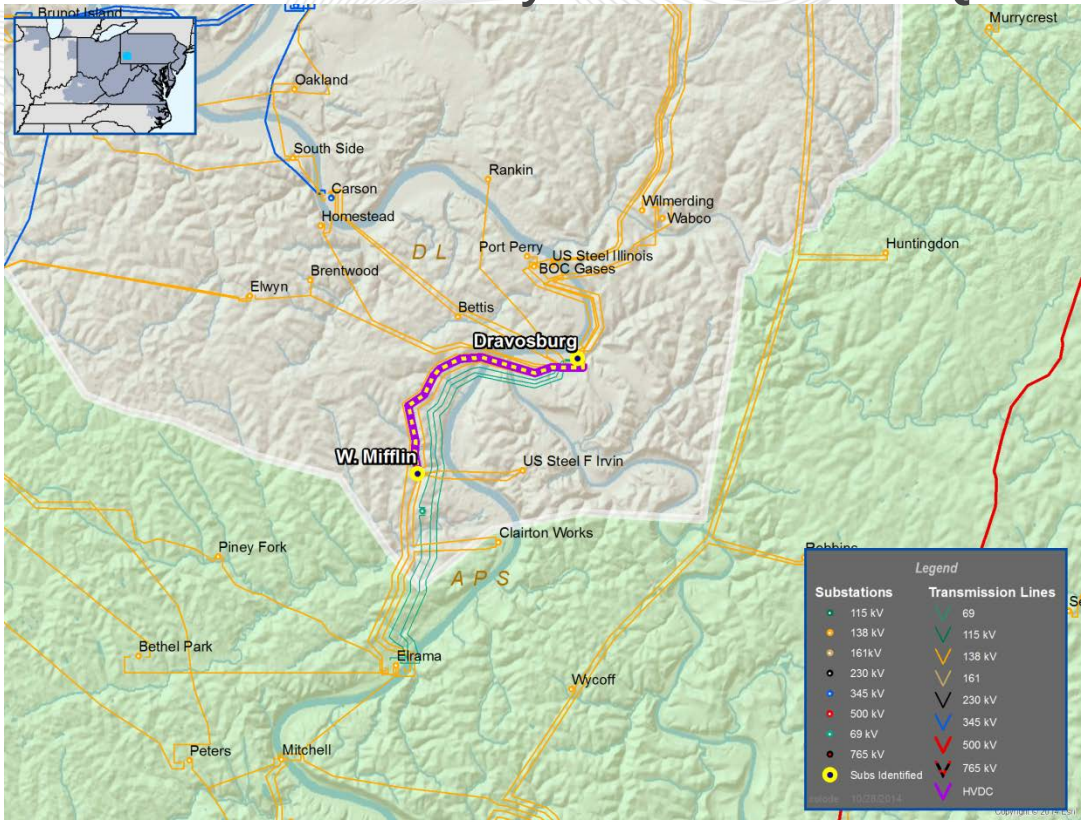
- Area: DUQ
- Congestion:
  - 2019: $8.9 million
  - 2022: $30.7 million
- Congestion will be impacted by below upgrade:
  - Operate with the Crescent 345/138 kV #3 autotransformer in-service by replacing 8 over dutied 138 kV breakers at Crescent, 3 138 kV breakers at Beaver Valley, install #1 section 345 kV breaker for 331 circuit at Crescent
  - Upgrade will be added to base case and results will be updated



Market Efficiency Facilities: DUQ

Constraint:
Dravosburg to West Mifflin 138 kV Line

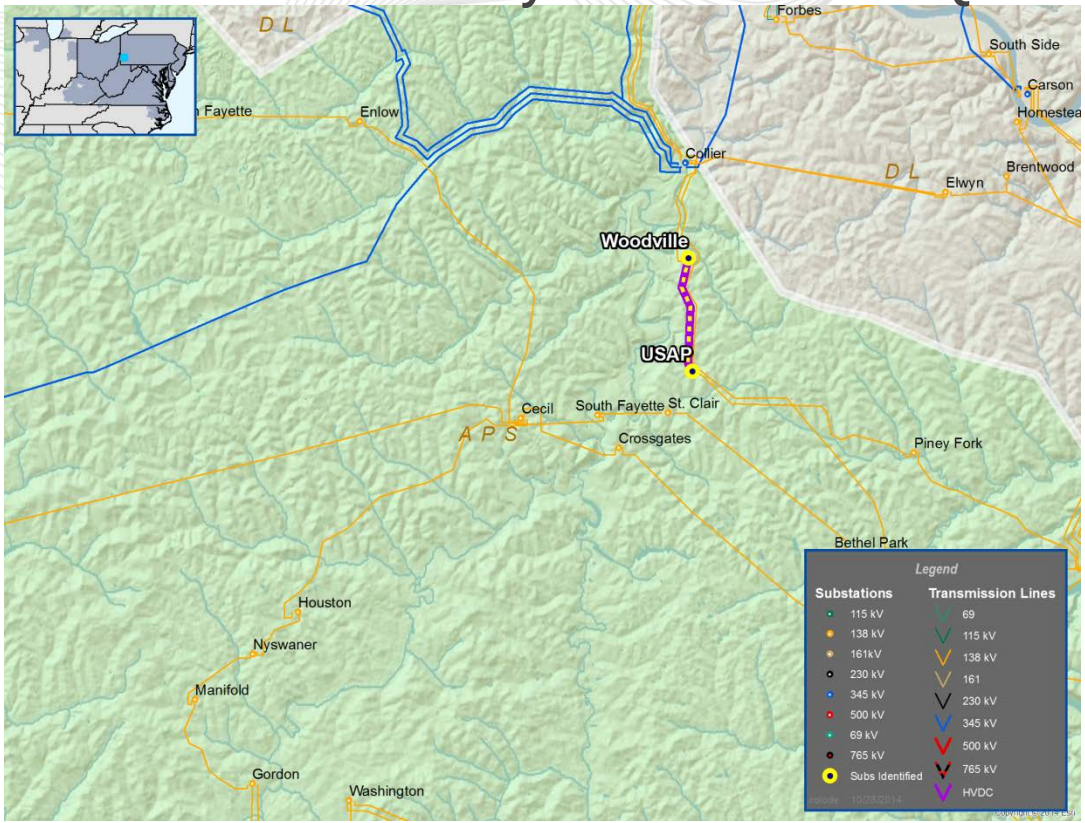
- Area: DUQ
- Congestion:
  - 2019: $4 million
  - 2022: $5.9 million



Market Efficiency Facilities: DUQ

Constraint:
Woodville to 15USAP 138 kV Line

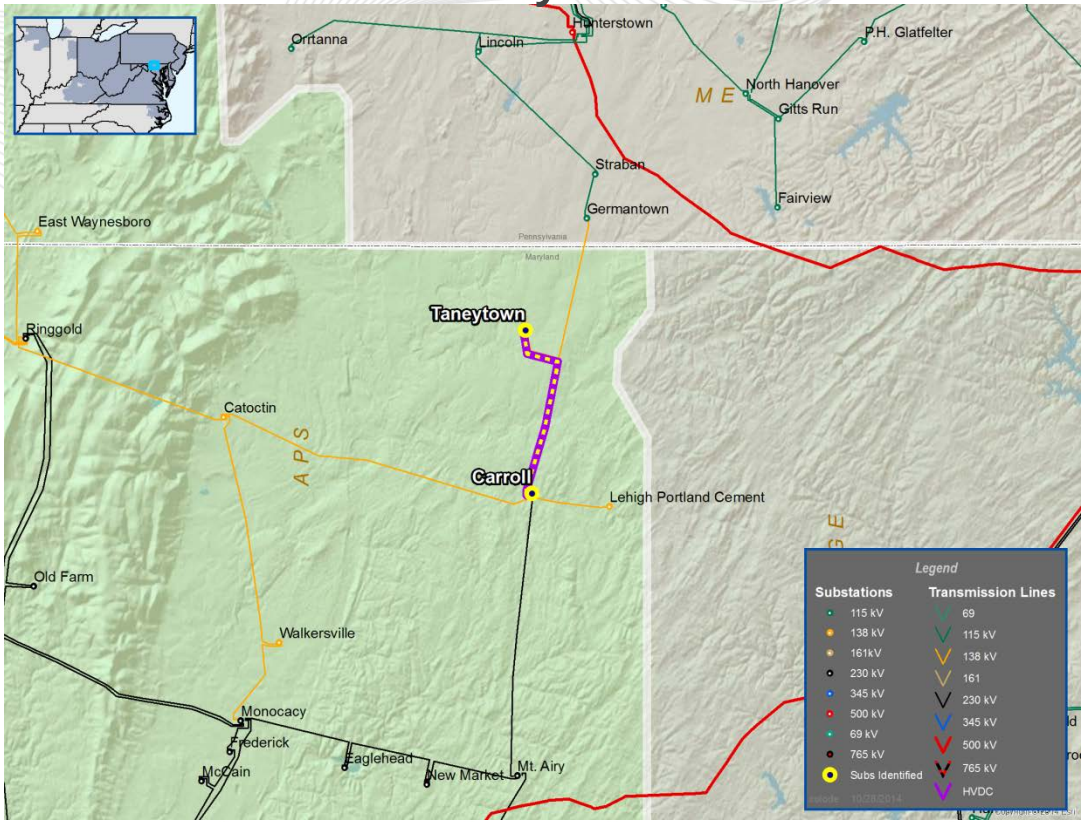
- Area: DUQ
- Congestion:
  - 2019: $1.8 million
  - 2022: $4.7 million



Market Efficiency Facilities: APS

Constraint:
Taneytown to Carroll 138 kV Line

- Area: APS
- Congestion:
  - 2019: $24.6 million
  - 2022: $13.6 million

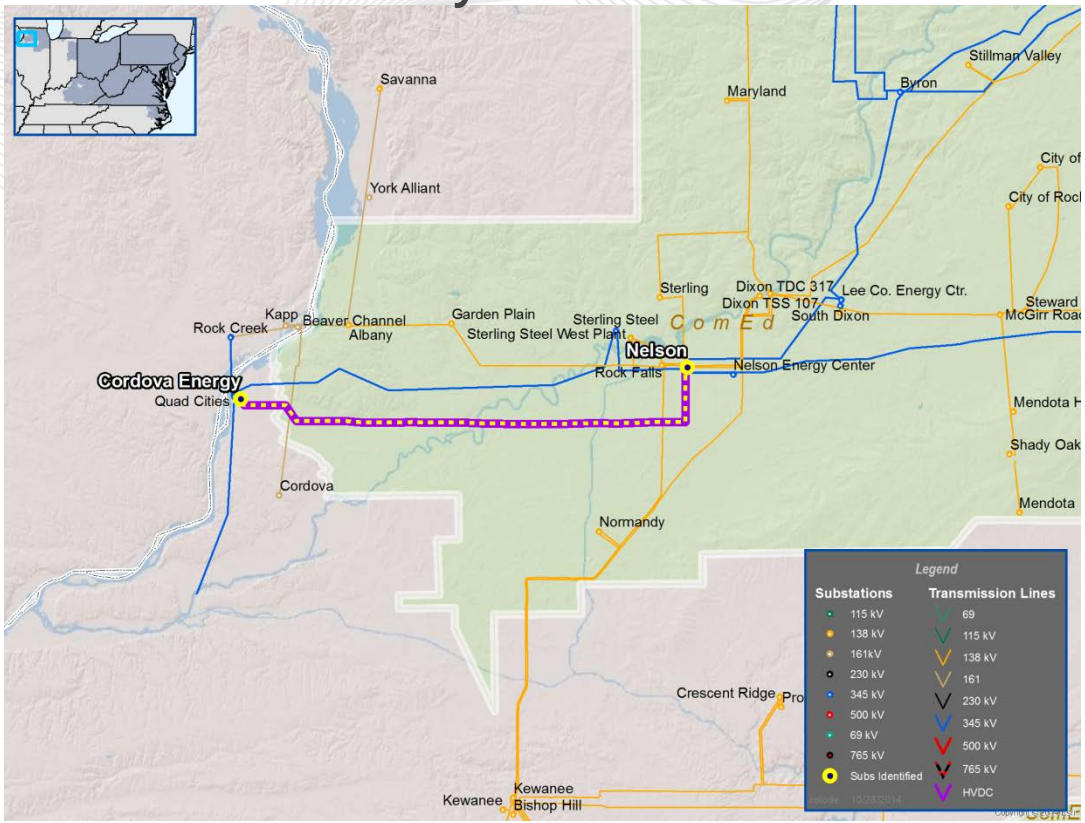


Market Efficiency Facilities: ComEd

Constraint:
Cordova to Nelson 345 kV Line

- Area: ComEd
- Congestion:
  - 2019: $9.7 million
  - 2022: $12.4 million
- Potential Upgrade:

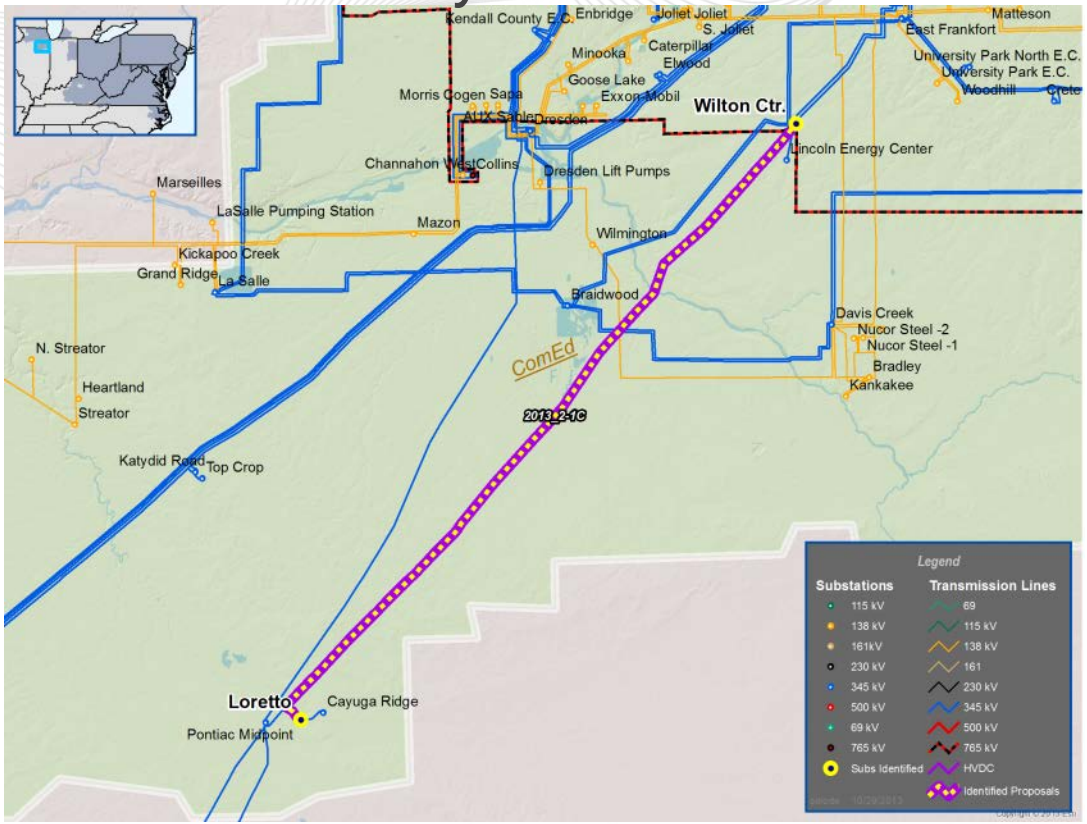
  S0704: Reconductor 0.4 miles of 345 kV line 15503 from Cordova to Nelson and replace breaker leads at Nelson



Market Efficiency Facilities: ComEd

Constraint:
Lorreto to Wilton CTR 345 kV Line

- Area: ComEd
- Congestion:
  - 2019: $2.8 million
  - 2022: $8 million



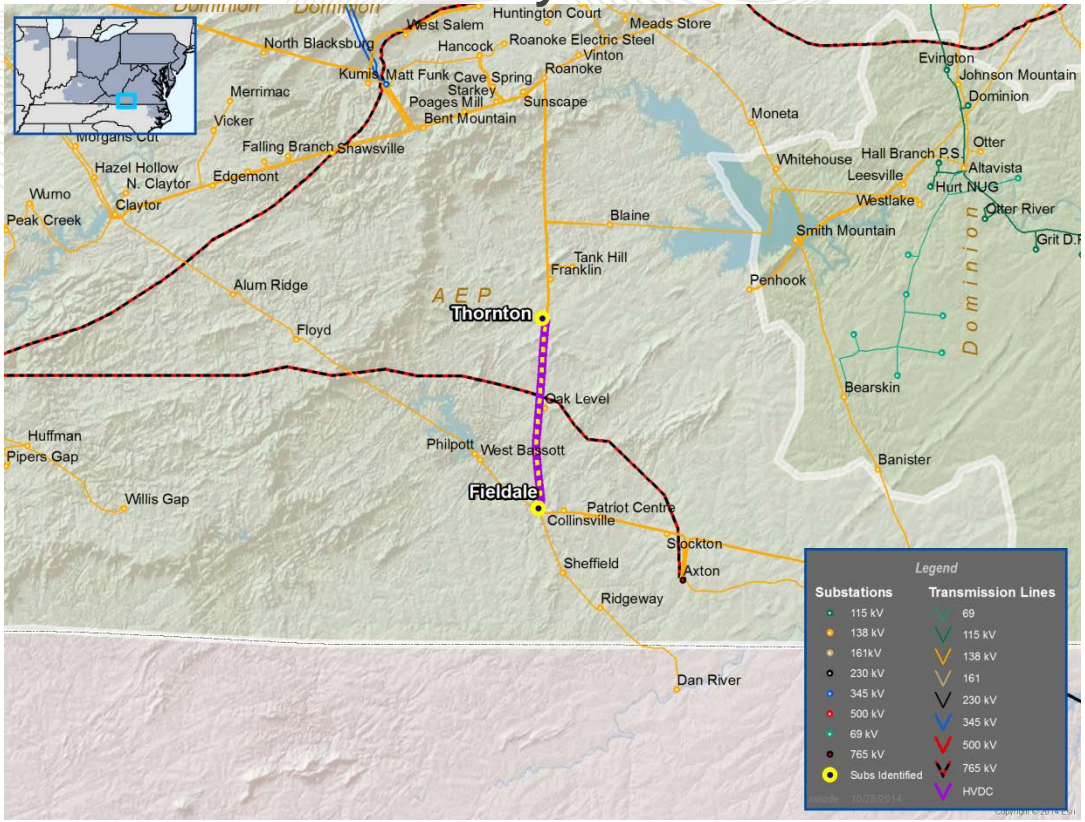
Market Efficiency Facilities: AEP

Constraint:

Fieldale to Thornton 138 kV Line

- Area: AEP
- Congestion:
  - 2019: $2.1 million
  - 2022: $8.5 million
- Notes:

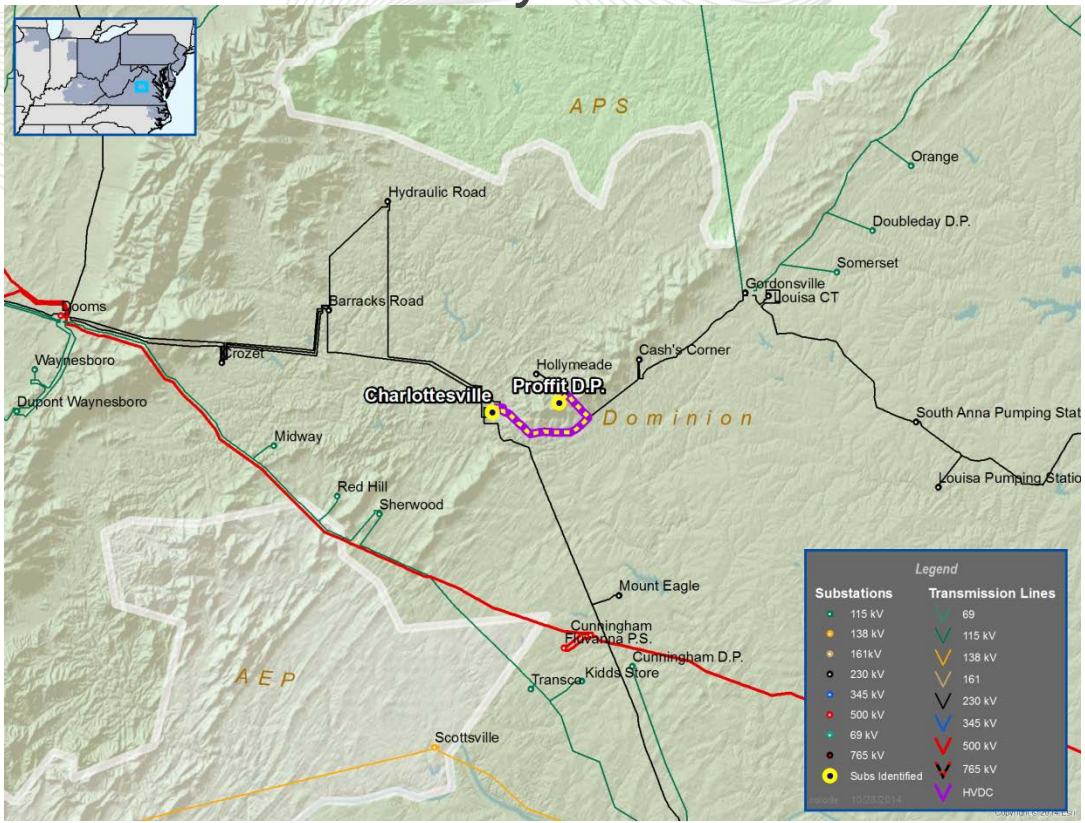
  Circuit from Fieldale-Thornton-Franklin would need to be upgraded



Market Efficiency Facilities: DOM

Constraint:
Charlottesville to Proffit DP 230 kV Line

- Area: DOM
- Congestion:
  - 2019: $1.4 million
  - 2022: $2.9 million

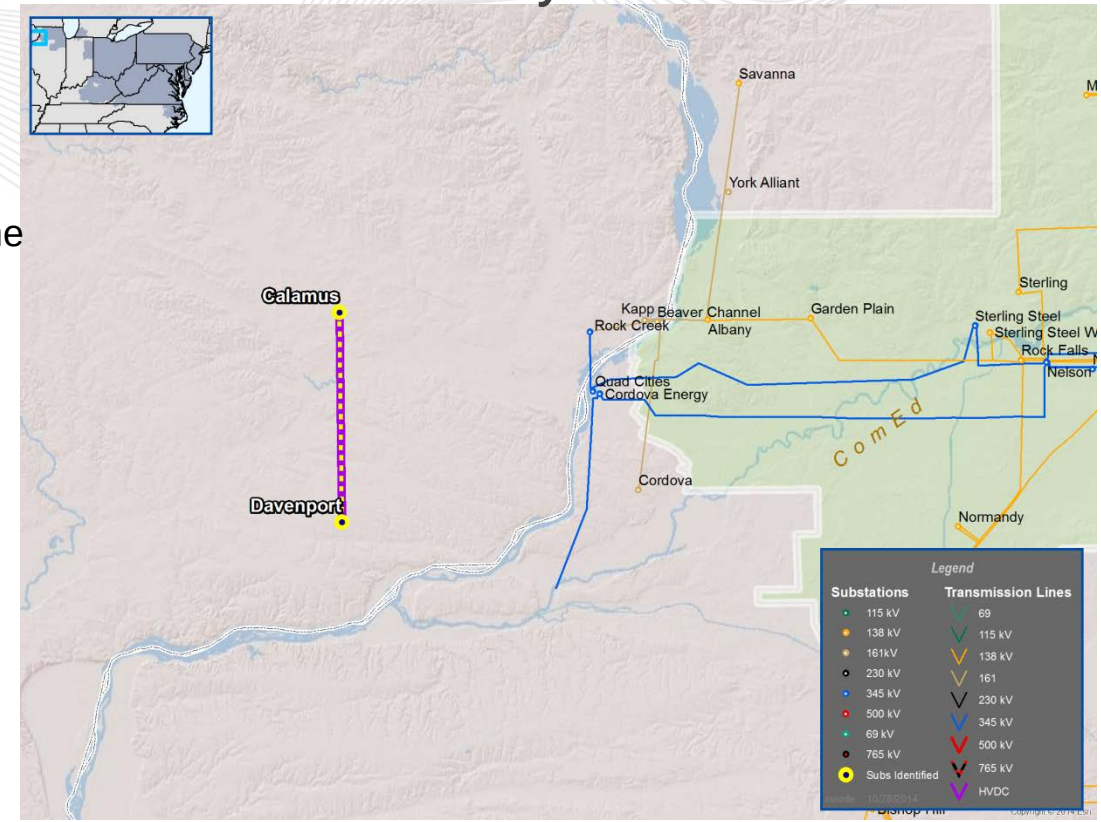


Market Efficiency Facilities: M2M

Constraint:

Sub 56 (Davenport) to East Calamus 161 kV Line

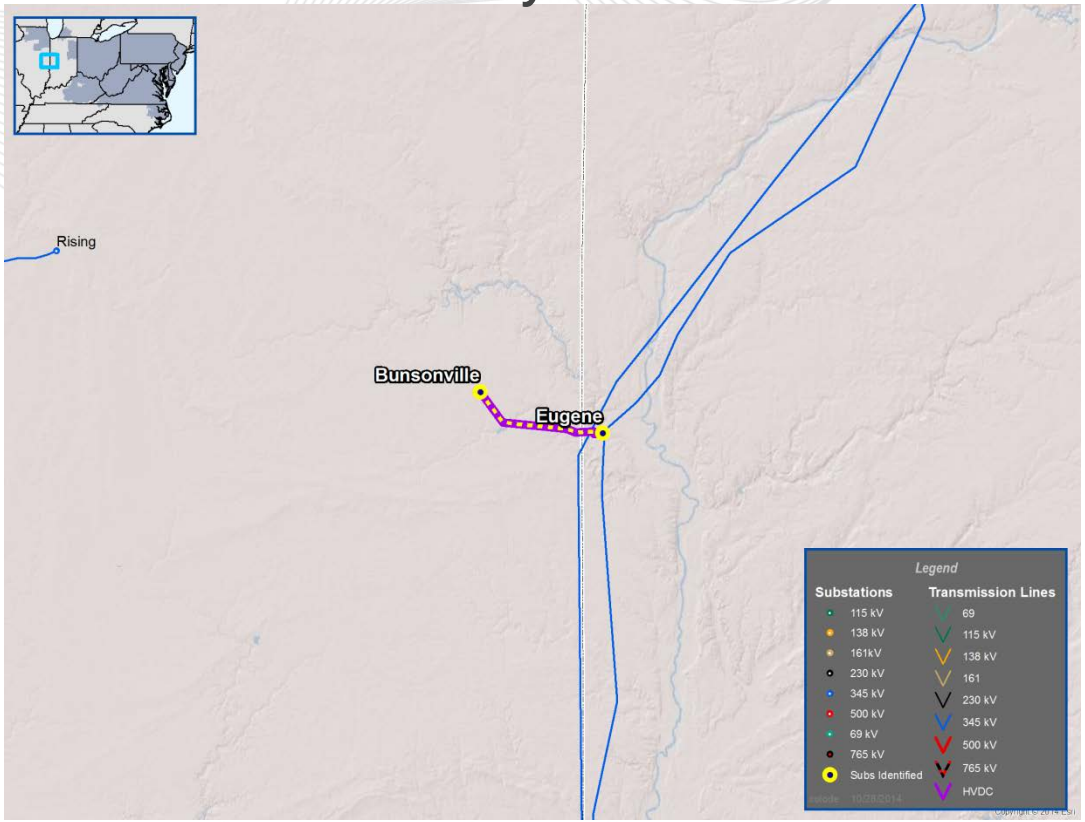
- Area: M2M
- Congestion:
  - 2019: $3.5 million
  - 2022: $19.3 million



Market Efficiency Facilities: M2M

Constraint:
Bunsonville to Eugene 345 kV Line

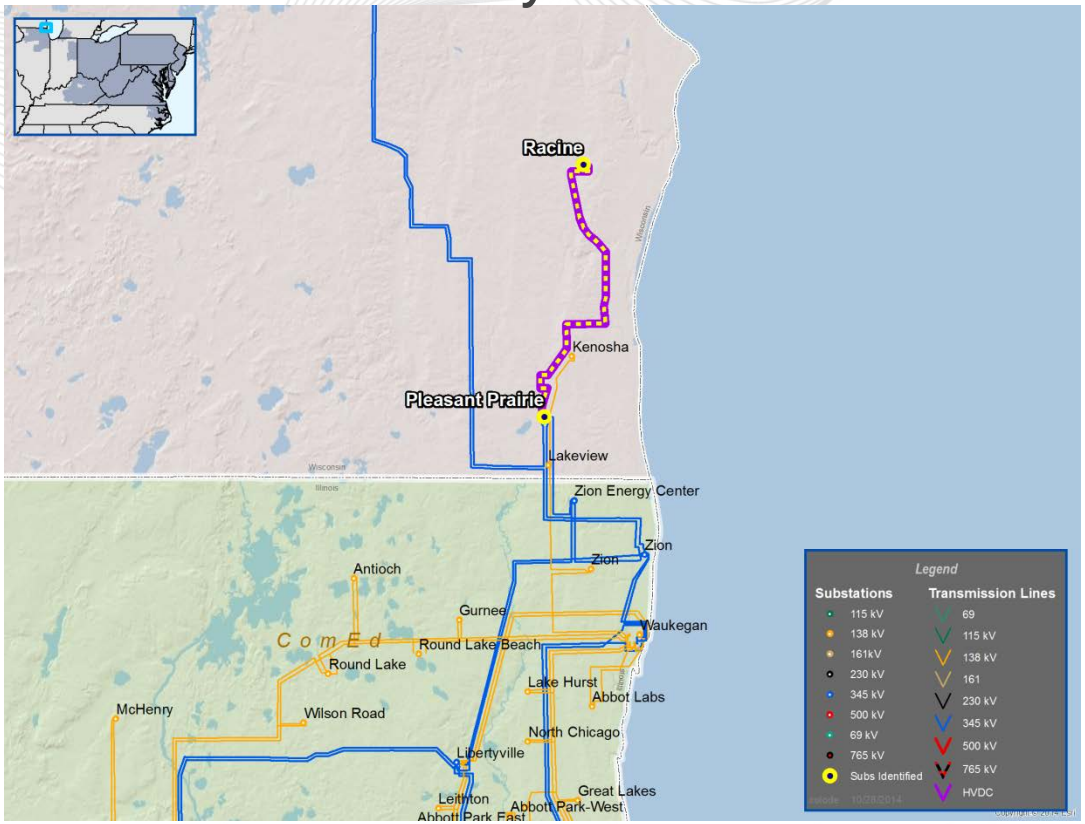
- Area: M2M
- Congestion:
  - 2019: $4.6 million
  - 2022: $12.9 million
- AMEREN and AEP upgrade in 2015 anticipated to remove this congestion
- Upgrade will be added to base case and results will be updated



Market Efficiency Facilities: M2M

Constraint:
Racine to Pleasant Prairie 345 kV Line

- Area: M2M
- Congestion:
  - 2019: $1.6 million
  - 2022: $3.2 million
- ATC uprating line expected in February 2015
- Upgrade will be added to base case and results will be updated

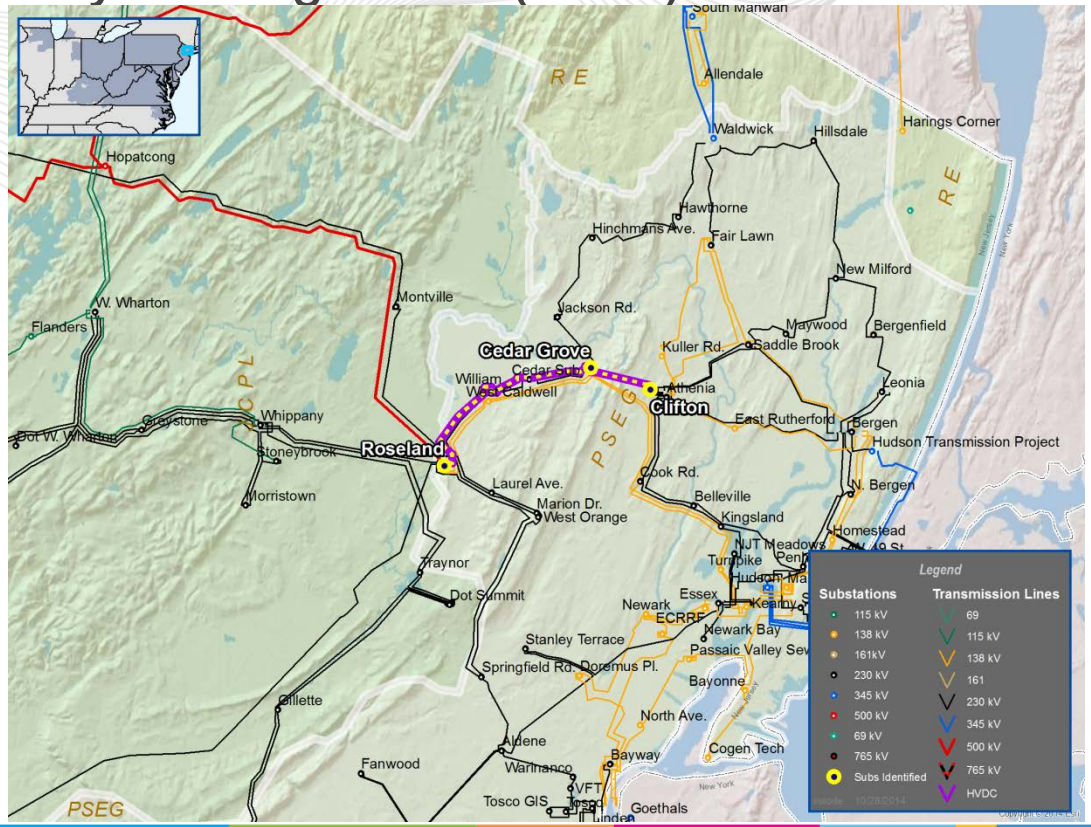


Reliability Pricing Model(RPM) Constraint

Constraint:

Roseland-Cedar Crove-Clifton230 kV corridor

- Area: PSEG
- Capacity import limitations and thermal overloads at the CETL for following modeled LDAs
  - PS
  - PS North



2014 Market Efficiency Acceleration Candidates

- Study of approved RTEP projects for accelerations and modifications
  - Compare congestion for near term vs. future topology
  - Estimate economic impact of accelerating planned upgrades

- No previously approved RTEP projects subject to B/C acceleration analysis
  - Approved projects with impact are either already under construction or can't be advanced

- Investigating if ISD of Crescent transformer can be advanced
  - Operate with the Crescent 345/138 kV #3 autotransformer in-service by replacing 8 over dutied 138 kV breakers at Crescent, 3 138 kV breakers at Beaver Valley, install #1 section 345 kV breaker for 331 circuit at Crescent
  - Listed as Market Efficiency congested facility

Questions?

Email: RTEP@pjm.com