Transmission Expansion Advisory Committee
Market Efficiency Update

August 13, 2015

Market Efficiency Long Term Proposal Window Update

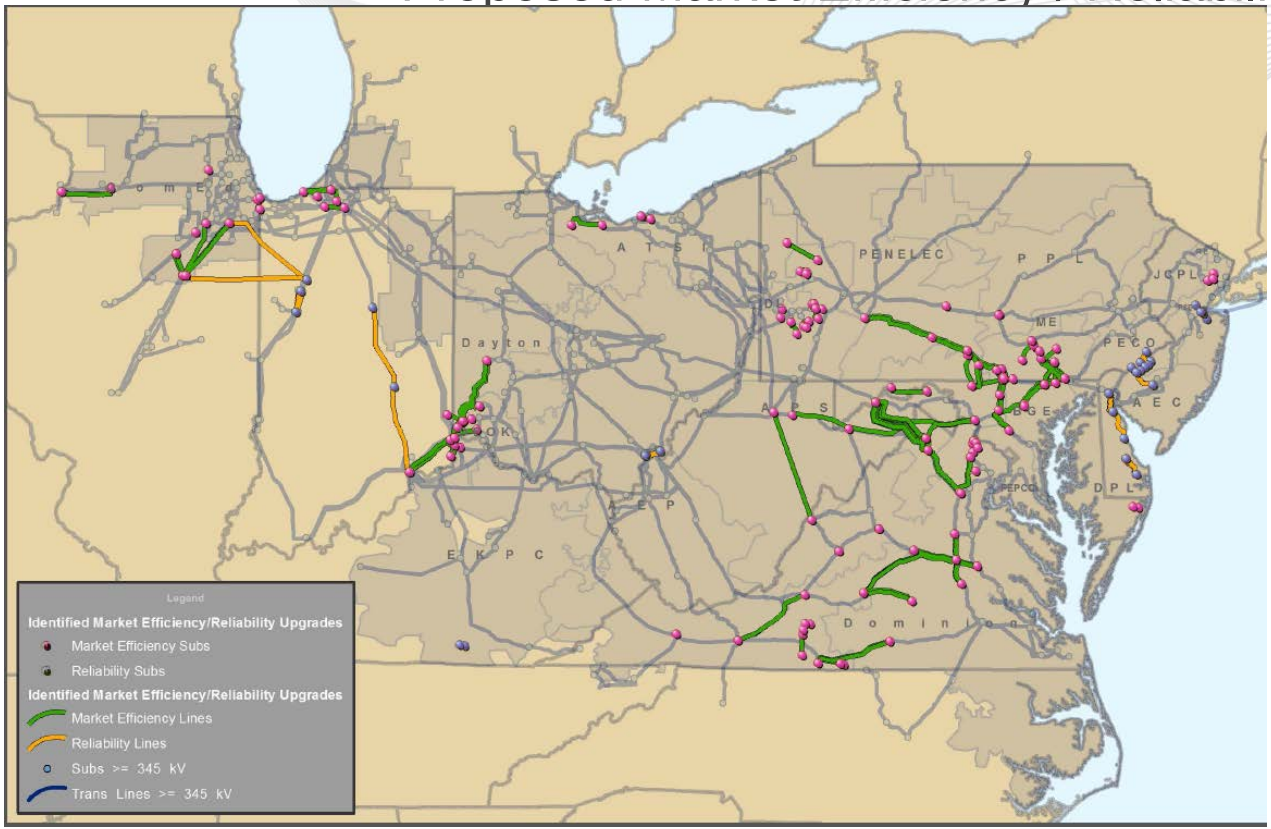
2014/15 RTEP Long Term Proposal Window: Market Efficiency

- 93 Market Efficiency Proposals
  - 35 Transmission Owner Upgrades
    - Cost range of $0.1M to $68M
  - 58 Greenfield Projects
    - Cost range of $9.2M to $432.5M

2014/15 RTEP Long Term Proposal Window: Market Efficiency

AREA of Proposal	Number of proposals
AEP	2
APS	6
APSOUTH and/or AEP-DOM Area	41
ATSI	4
BGE/PPL	4
ComEd	15
DEOK	8
DPL	1
DUQ	4
PECO	5
PSEG	3
Grand Total	93

Proposed Market Efficiency / Reliability Upgrades



2014/15 RTEP Long Term Proposal Window – Progress Update

Completed:

- ✓ Step 1: Review projects
- ✓ Step 2: Benefit/Cost tests
  - ➢ Completed first round of runs using the 2014 published assumptions.
  - ➢ Completed sensitivity runs using updated 2015 assumptions: load forecast, fuel forecast, generation, etc.
- ✓ Step 3: Recommendations for projects from Groups 2 thru 19 (non AP-South/AEP-DOM projects)
- ✓ Step 4: Reduced list for projects from Group 1 (AP-South/AEP-DOM projects)

Next steps:

September TEAC:

1. Update for Group 1 (AP-South/AEP-DOM projects)

2014/15 RTEP Long Term Proposal Window – Data Posting

Reactive Interfaces

- Modeling practices document: Section 2.11 describes reactive ratings determination.
  - http://www.pjm.com/~/media/planning/rtep-dev/market-efficiency/pjm-market-efficiency-modeling-practices.ashx

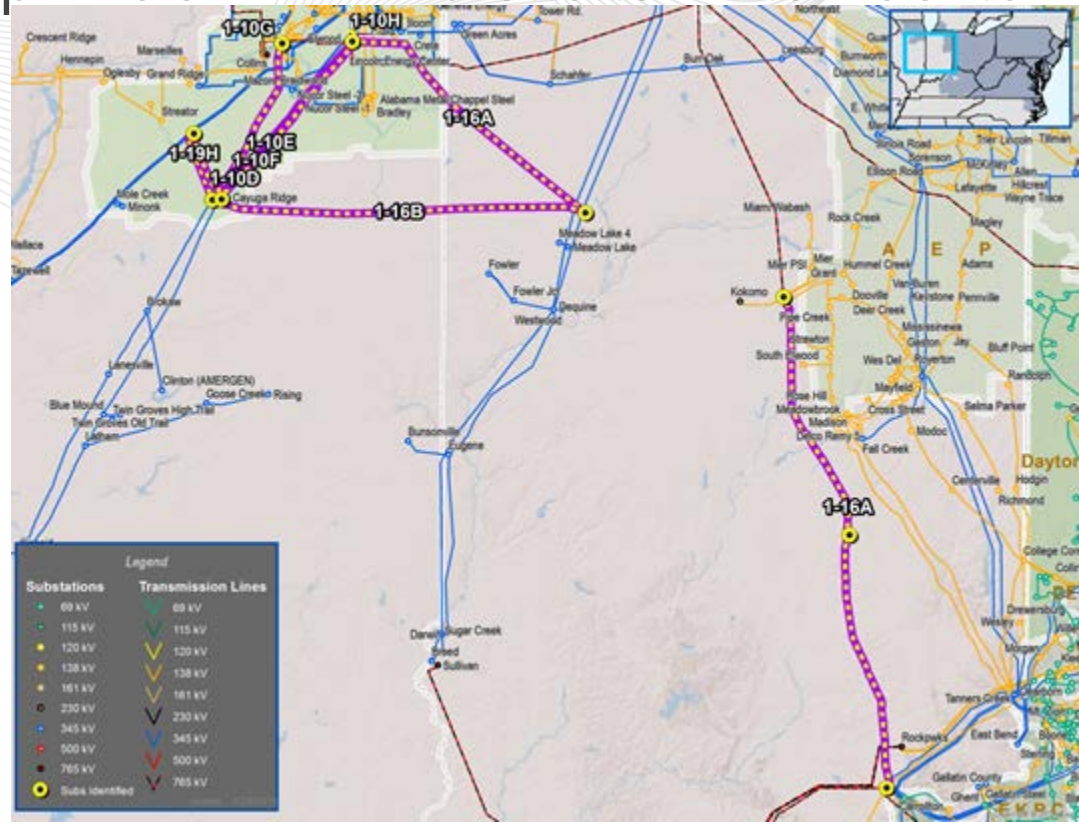
- Power flow and contingency file
  - Location: RTEP Development > Modeling Data> Baseline Cases

- Project impacts on reactive interface ratings
  - Spreadsheet shows the delta in reactive interface ratings as a result of impacted proposed project
  - RTEP Development > Market Efficiency > Model Information > CEII > 2014-2015 RTEP Long Term Proposal Window Additional documents

Project Recommendations
Groups 2 thru 19
(non AP-South/AEP-DOM Projects)

Group 2: COMED - Loretto to Wilton Center

- 9 Projects:
  - 1-10C,1-10D,1-10E, 1-10F,1-10G,1-10H, 1-16A,1-16B,1-19H
- Cost:
  - From $11.5M to $290M
- Constraints:
  - Loretto to Wilton CTR 345 kV



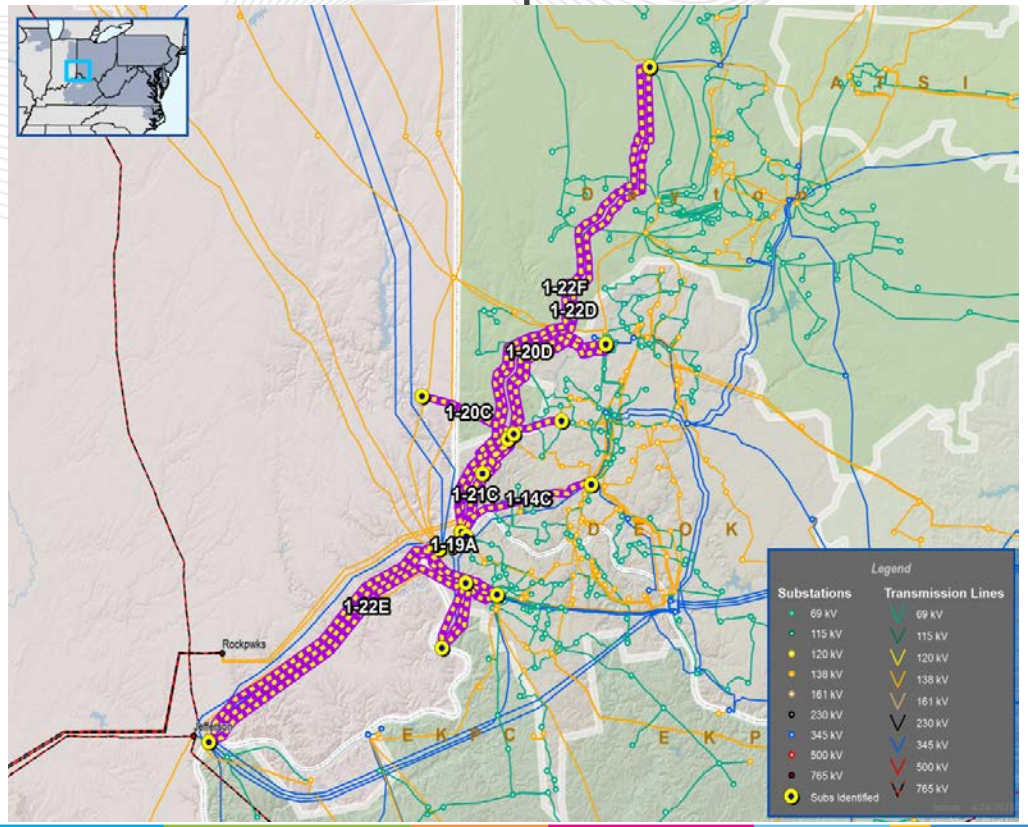
Group 2 Analysis

Project ID	Upgrade/ Greenfield	Cost ($M)	Target Zone	kV Level	ME Constraints Identified	Evaluation Type	B/C Ratio Base	B/C Ratio 2015 Sens.	Status
201415_1-10D	Upgrade	11.50	ComEd	345	Lorreto to Wilton CTR 345 kV	Lower Voltage	1.79	1.14	Not Recommended
201415_1-10F	Upgrade	14.00	ComEd	345	Lorreto to Wilton CTR 345 kV	Lower Voltage	1.38	0.79	Not Recommended
201415_1-16A	Greenfield	240.00	AEP/CE/NIPS	345	None Specified	Lower Voltage	0.04	N/A	Not Recommended
201415_1-16B	Greenfield	290.00	AEP/CE/NIPS	345	Lorreto to Wilton CTR 345 kV	Regional	0.14	N/A	Not Recommended
201415_1-10C	Greenfield	37.80	ComEd	345	Lorreto to Wilton CTR 345 kV	Lower Voltage	1.63	0.73	Not Recommended
201415_1-19H	Greenfield	42.90	Comed	345	Lorreto to Wilton CTR 345 kV	Lower Voltage	1.16	0.9	Not Recommended
201415_1-10E	Upgrade	17.40	ComEd	345	Lorreto to Wilton CTR 345 kV	Lower Voltage	1.17	0.93	Not Recommended
201415_1-10G	Upgrade	19.90	ComEd	345	Lorreto to Wilton CTR 345 kV	Lower Voltage	1.02	0.81	Not Recommended
201415_1-10H	Upgrade	25.90	ComEd	345	Lorreto to Wilton CTR 345 kV	Lower Voltage	0.78	0.62	Not Recommended

No Projects Recommended: Constraint will be monitored in future analysis

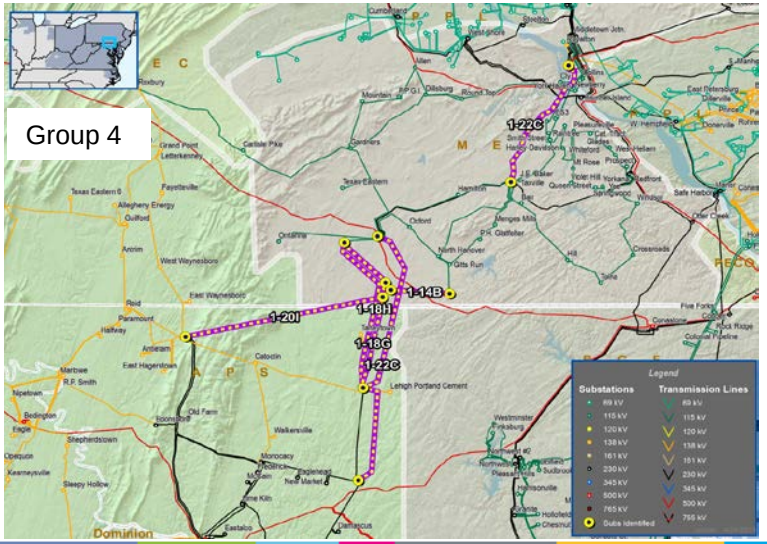
Group 3: DEOK / ATSI

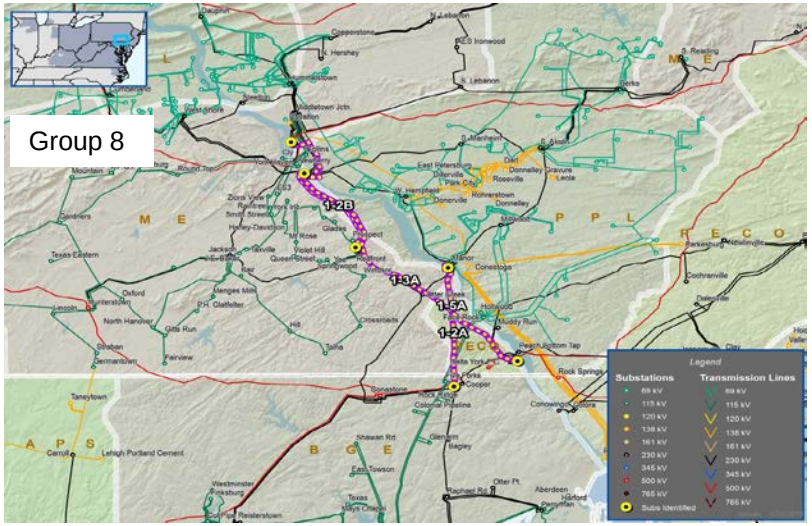
- 8 Projects:
  - 1-14C,1-19A,1-20C, 1-20D,1-21C,1-22D, 1-22E,1-22F
- Cost:
  - From $11.4M to $91M
- Constraints:
  - Miami Fort to Willey 138 kV
  - Miami Fort to 08HEBTAP 138 kV
- Notes:
  - Congestion removed due to base line upgrades required by retirement of Miami Fort 6.
  - Proposals submitted will not be evaluated



Groups 4 and 8: APS/METED/PPL

- 9 Projects: 1-14B,1-18G,1-18H,1-20I,1-22C, 1-2A, 1-2B, 1-3A, 1-5A
- Cost: From $1.1M to $107M
- Constraints: Brunner Island to Yorkana 230 kV, Safe Harbor to Graceton 230 kV, Taneytown to Carroll 138 kV





Group 4 & 8 Analysis

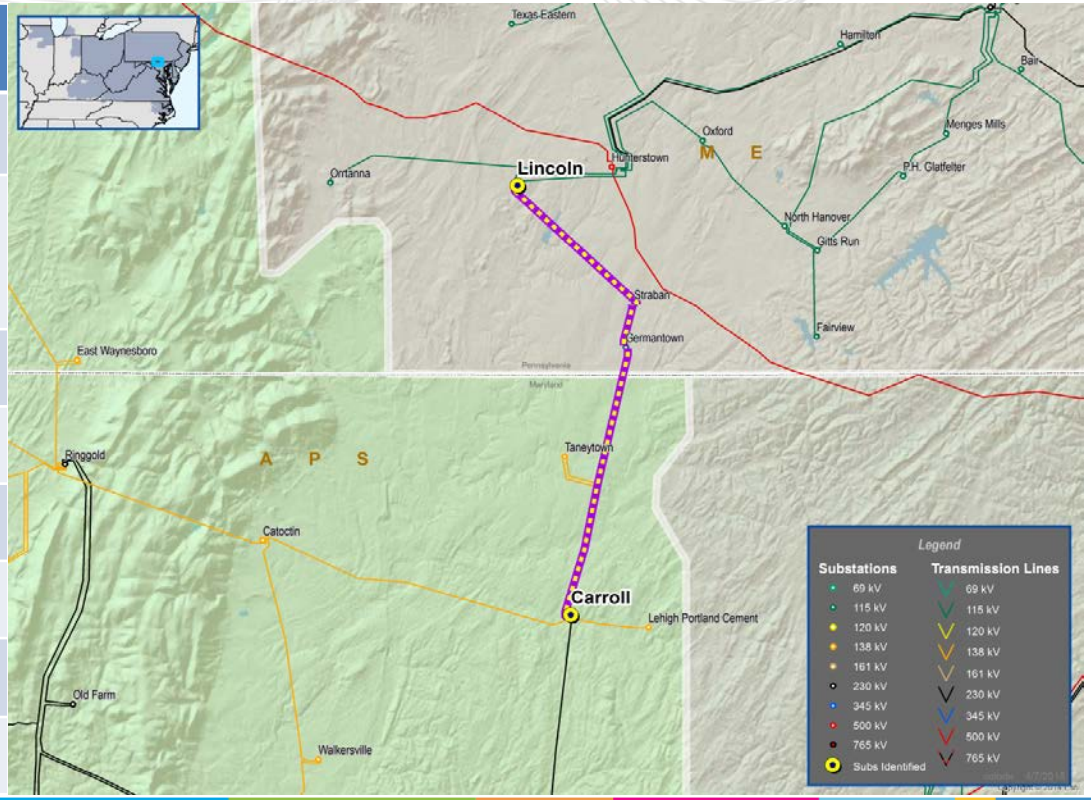
Project ID	Upgrade/ Greenfield	Cost ($M)	Target Zone	kV Level	ME Constraints Identified	Evaluation Type	B/C Ratio Base	B/C Ratio 2015 Sens.	Status	Comments
201415_1-18G	**Upgrade**	**5.20**	**APS/Meted**	**138**	**Taneytown to Carroll 138 kV**	**Lower Voltage**	**55.74**	**90.14**	**Recommended**	**Removes Congestion Driver**
201415_1-14B	Greenfield	21.11	Meted	115	Taneytown to Carroll 138 kV	Lower Voltage	11.68	23.14	Not Recommended	Removes Congestion Driver
201415_1-18H	Upgrade	58.00	APS/Meted	138	Taneytown to Carroll 138 kV	Lower Voltage	4.97	5.62	Not Recommended	Removes Congestion Driver
201415_1-20I	Greenfield	70.80	APS/Dominion	138	Taneytown to Carroll 138 kV Brunner Island to Yorkana 230 kV Safe Harbor to Graceton 230 kV	Lower Voltage	2.63	5.36	Not Recommended	Removes Congestion Driver
201415_1-22C	Greenfield	107.20	APS/Meted	230	Taneytown to Carroll 138 kV	Lower Voltage	34.66	34.21	Not Recommended	Removes Congestion Driver: Increases RTO Congestion

Group 4 & 8 Analysis

Project ID	Upgrade/ Greenfield	Cost ($M)	Target Zone	kV Level	ME Constraints Identified	Evaluation Type	B/C Ratio 2015 Sens.	Status
201415_1-2A	**Upgrade**	**1.10**	**PPL/BGE**	**230**	**Safe Harbor to Graceton 230 kV**	**Lower Voltage**	**14.42**	**Recommended**
201415_1-2B	**Upgrade**	**3.10**	**PPL/Meted**	**230**	**Brunner Island to Yorkana 230 kV**	**Lower Voltage**	**22.16**	**Recommended**
201415_1-3A	Upgrade	40.20	PPL/Meted	500	Brunner Island to Yorkana 230 kV	Lower Voltage	1.85	Not Recommended
201415_1-5A	Upgrade	5.60	BGE/PPL	230	Safe Harbor to Graceton 230 kV	Lower Voltage	0.63	Not Recommended

Group 4 & 8 Recommended Project: 1-18G

Project ID: 201415_1-18G
Proposed by: FirstEnergy
Proposed Solution: Upgrade terminal equipment on the Lincoln - Carroll 115/138kV path.
kV Level: 138
Cost ($M): 5.2
IS Date: 2019
Target Zone: APS/Meted
ME Constraints: Taneytown to Carroll 138 kV
Notes: Recommended



Group 4 & 8 Recommended Project: 1-2A

Project ID: 201415_1-2A

Proposed by: PPL

Proposed Solution: Reconductor two spans of the Graceton-Safe Harbor 230kV transmission line. Includes termination point upgrades

kV Level: 230

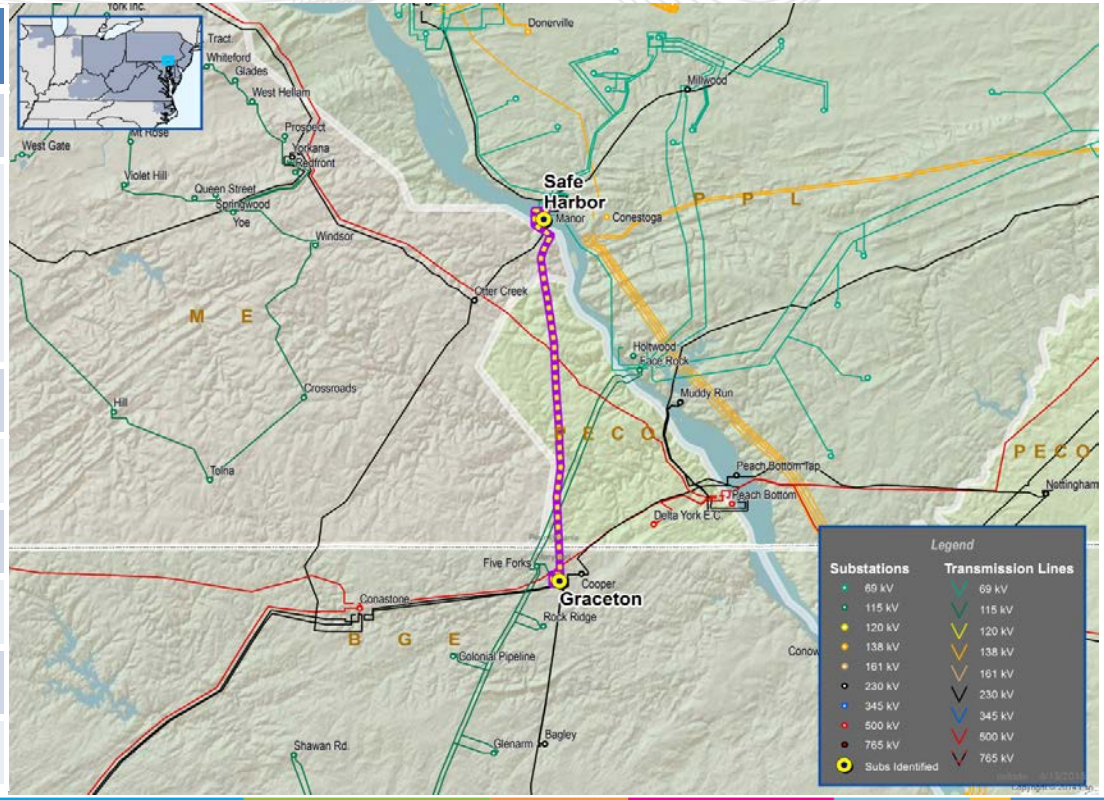
Cost ($M): 1.1

IS Date: 2019

Target Zone: PPL/BGE

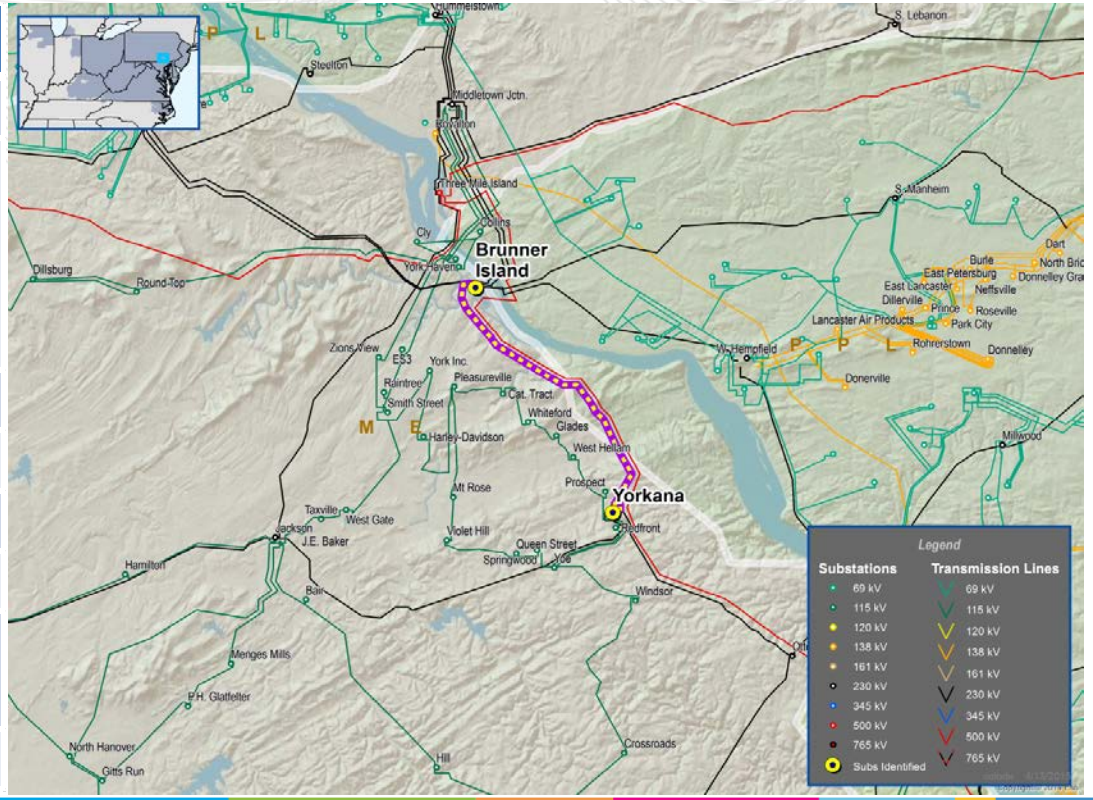
ME Constraints: Safe Harbor to Graceton 230 kV

Notes: Recommended



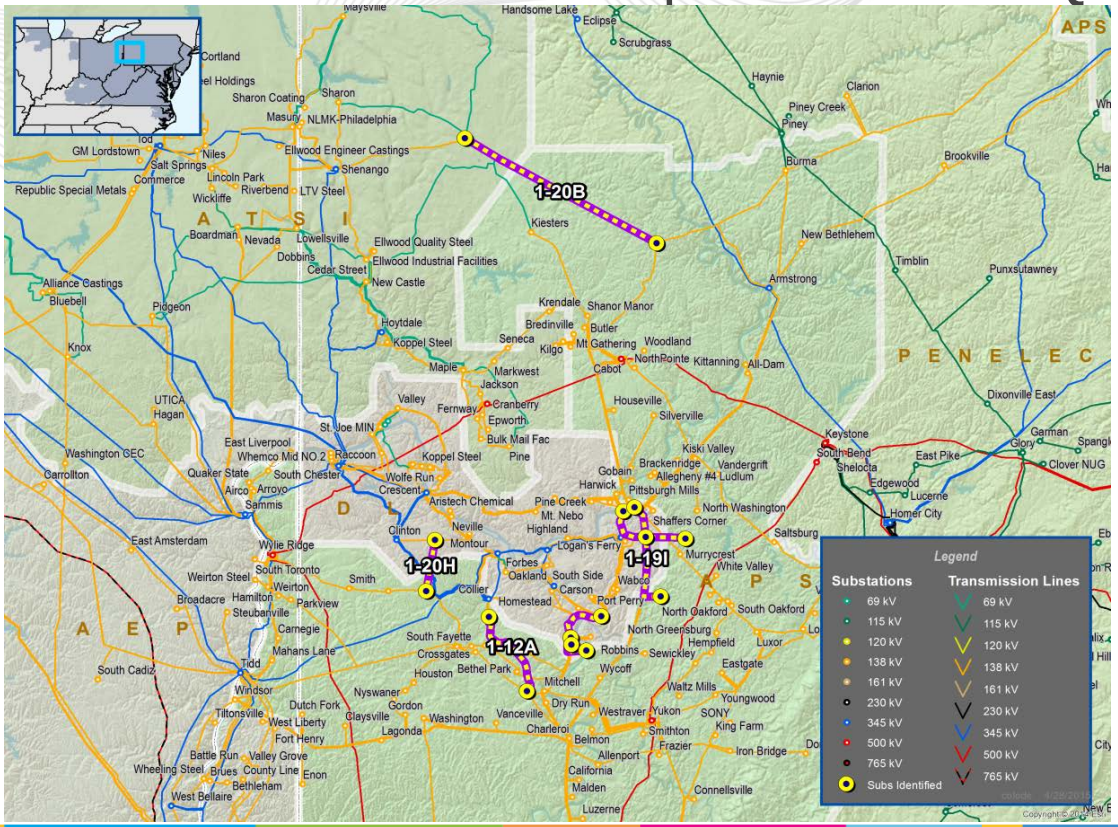
Group 4 & 8 Recommended Project: 1-2B

Project ID: 201415_1-2B
Proposed by: PPL
Proposed Solution: Reconductor three spans limiting the Brunner Island - Yorkana 230kV line, add 2 breakers to Brunner Island Switchyard, upgrade associated terminal equipment
kV Level: 230
Cost ($M): 3.1
IS Date: 2019
Target Zone: PPL/Meted
ME Constraints: Brunner Island to Yorkana 230 kV
Notes: Recommended



Group 5: APS / DUQ

- 4 Projects:
  - 1-12A, 1-19I,1-20B
    1-20H
- Cost:
  - From $1M to $64M
- Constraints:
  - Dravosburg to West Mifflin 138 kV
  - Krendale to Shanor Manor 138 kV
  - Woodville to 15USAP 138 kV



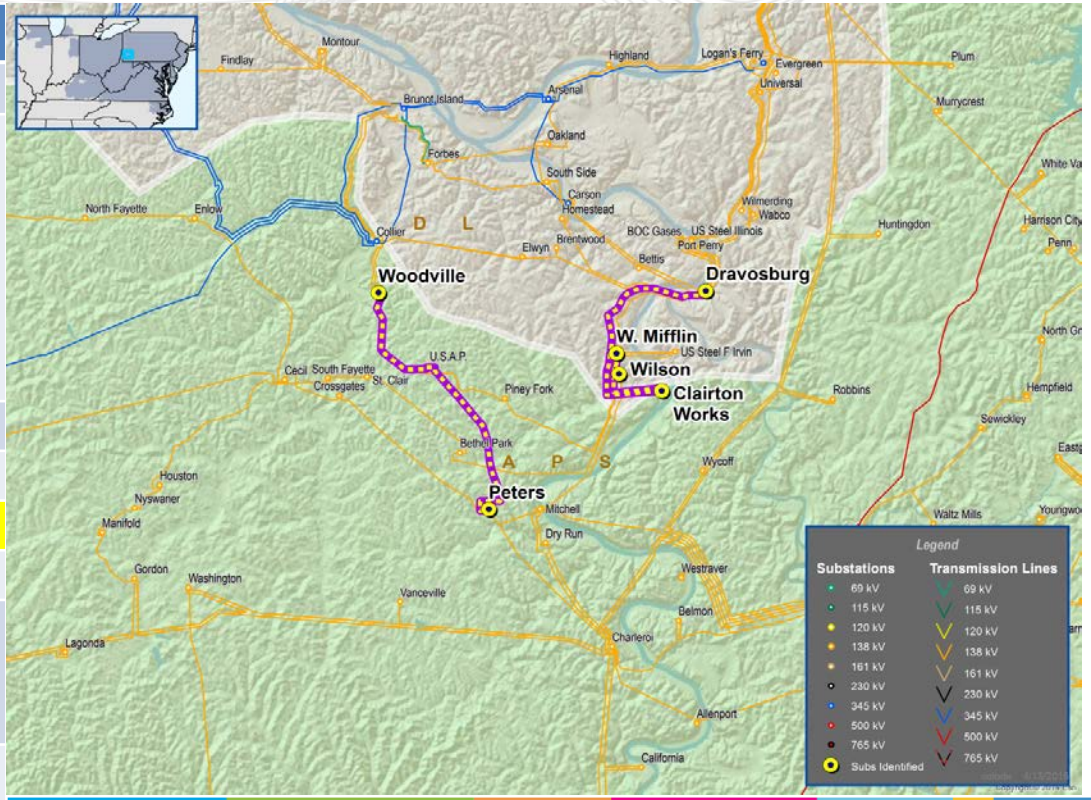
Group 5 Analysis

Project ID	Upgrade/ Greenfield	Cost ($M)	In Service date	Target Zone	kV Level	B/C Ratio 2015 Sens.	Total PJM Congestion Delta ($millions) (2019 + 2022)	Comments	Status
201415_1-12A	**Upgrade**	**11.18**	**2018**	**DUQ**	**138**	**1.98**	**-10**	**Removes DUQ congestion**	**Recommended**
201415_1-19I	Greenfield	9.20	2020	APS/DUQ	138	48.5	10.9	Residual congestion remains on congestion drivers. Required new monitored events.	Not Recommended
201415_1-19I with Cheswick-Springdale 138 kV Line Closed	Greenfield	9.20	2020	APS/DUQ	138	41.61	7.6	Removes DUQ congestion drivers. Required new monitored events.	Not Recommended
201415_1-20B	Greenfield	70.98	2019	APS/DUQ	138	3.33	-1.9	Residual congestion remains on congestion drivers.	Not Recommended
201415_1-20H	Greenfield	14.40	2020	APS/DUQ	138	0.93	Failed B/C	Failed B/C	Not Recommended

* Dravosburg to West Mifflin 138 kV actual congestion in 2015 through June was approximately $12 million

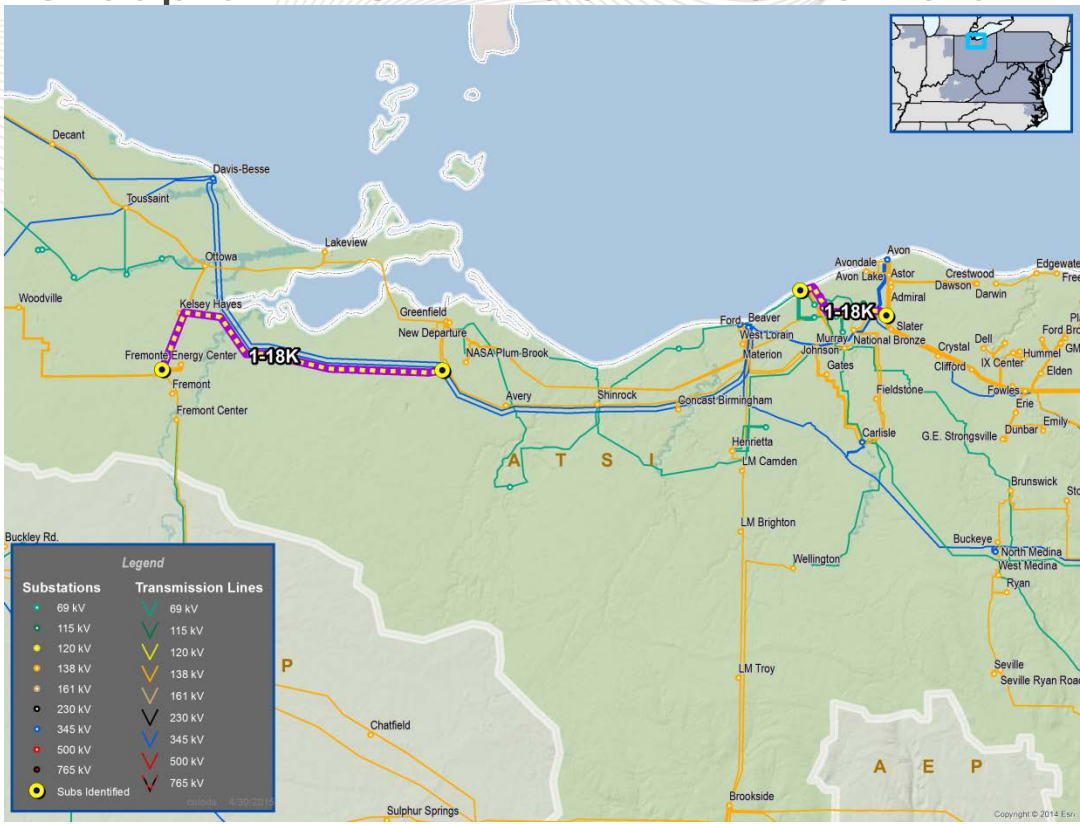
Group 5 Recommended Project: 1-12A

Project ID: 201415_1-12A
Proposed by: Duquesne Light
Proposed Solution: Reconductor approximately 7 miles of the Woodville-Peters (Z-117) 138kV circuit, reconfigure the West Mifflin-USS Clairton (Z-15) 138kV circuit to establish the Dravosburg-USS Clairton (Z-14) 138kV circuit and the West Mifflin-Wilson (Z-15) 138kV circuit
kV Level: 138
Cost ($M): 11.184
IS Date: 2018
Target Zone: DUQ
ME Constraints: Dravosburg to West Mifflin 138 kV Woodville to 15USAP 138 kV
Notes: 2018 in-service date allows for earlier congestion mitigation. Reduces overall PJM congestion. Recommended



Group 6: ATSI – Black River to Lorain

- 1 Project:
  - 1-18K
- Cost:
  - $9.6M
- Constraints:
  - 02Blkrvr to Lorain 138 kV
- Duplicate of Baseline Reliability Upgrade (B2559)
- Proposal will not be evaluated.

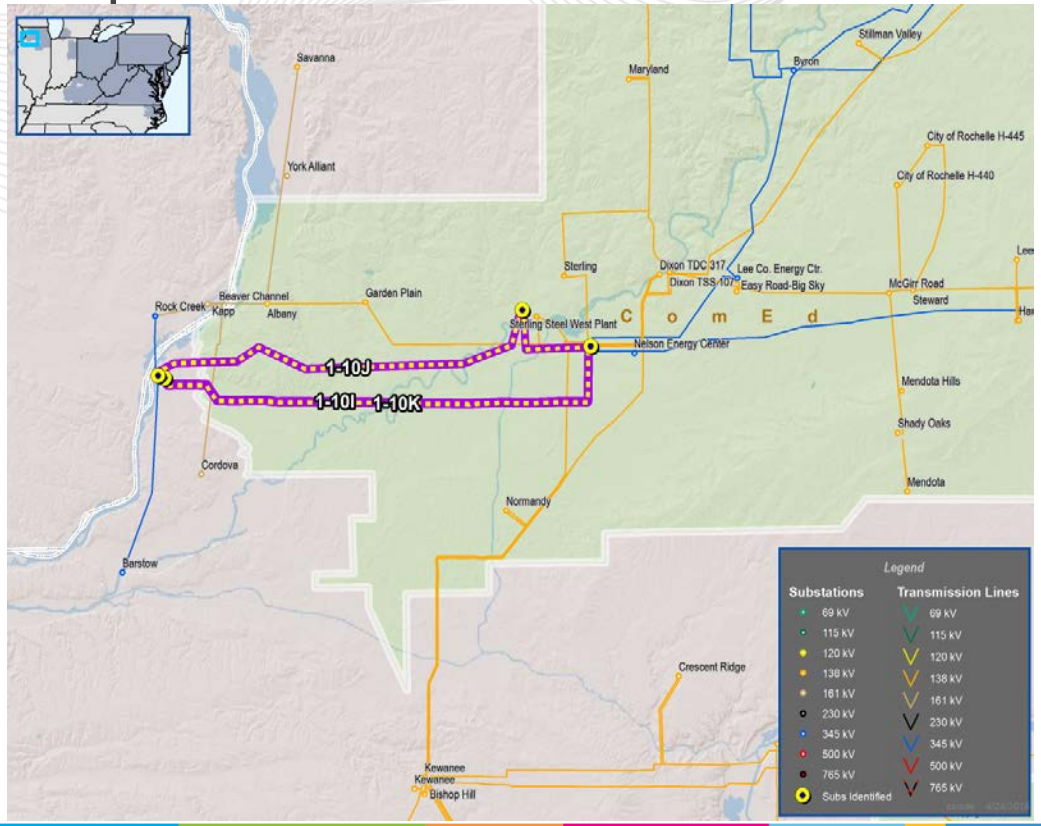


Group 7: ATSI - Crestwood to Astor

- 1 Project:
  - 1-18L – no upgrade required
- Cost:
  - No cost information
- Constraints:
  - Crestwood to Astor 138 kV
- Notes:
  - Transmission owner rating update removes congestion.
  - Proposal will not be evaluated.

Group 9: COMED - Cordova to Nelson

- 3 Projects:
  - 1-10I,1-10J,1-10K
- Cost:
  - $2M to $25M
- Constraints:
  - Cordova to Nelson 345 kV

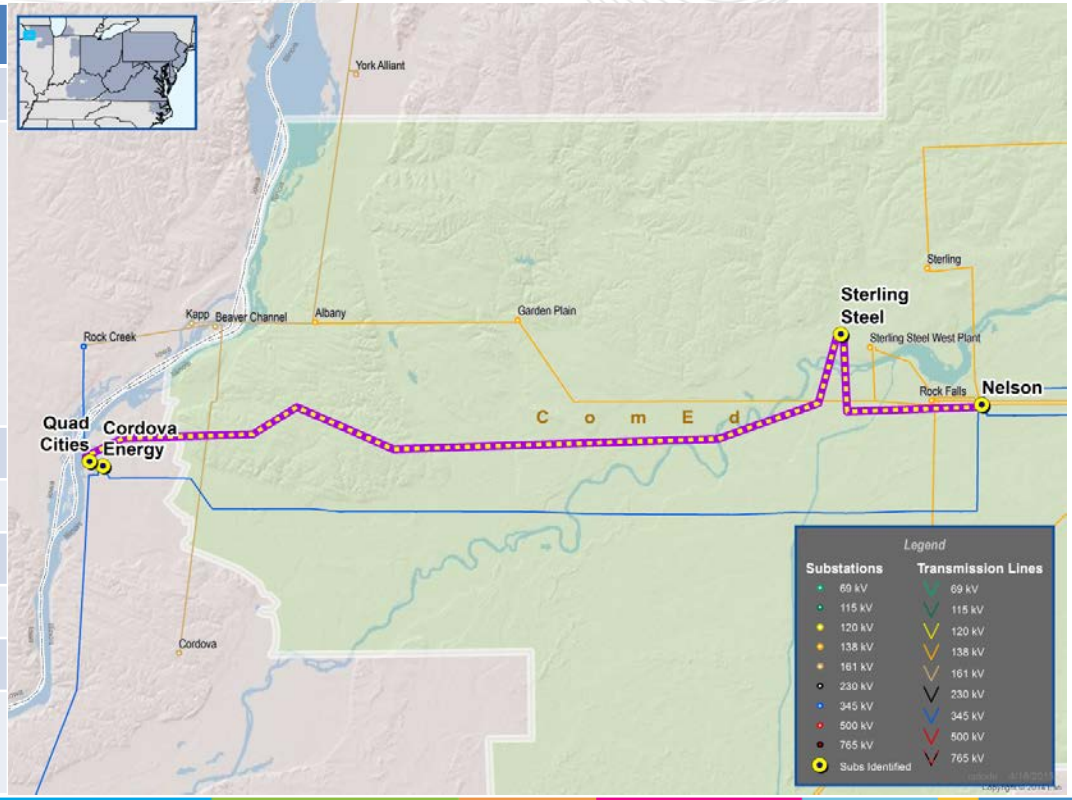


Group 9 Analysis

Project ID	Upgrade/ Greenfield	Cost ($M)	Target Zone	kV Level	ME Constraints Identified	Evaluation Type	B/C Ratio 2015 Sens.	Status	Comments
201415_1-10I	Upgrade	2.00	ComEd	345	Cordova to Nelson 345 kV	Lower Voltage			Already in service
201415_1-10K	Upgrade	15.50	ComEd	345	Cordova to Nelson 345 kV	Lower Voltage	1.18	Not Recommended	Failed B/C
201415_1-10J	**Upgrade**	**24.60**	**ComEd**	**345**	**Cordova to Nelson 345 kV**	**Lower Voltage**	**1.94**	**Recommended**	**Passes B/C and Removes congestion driver**

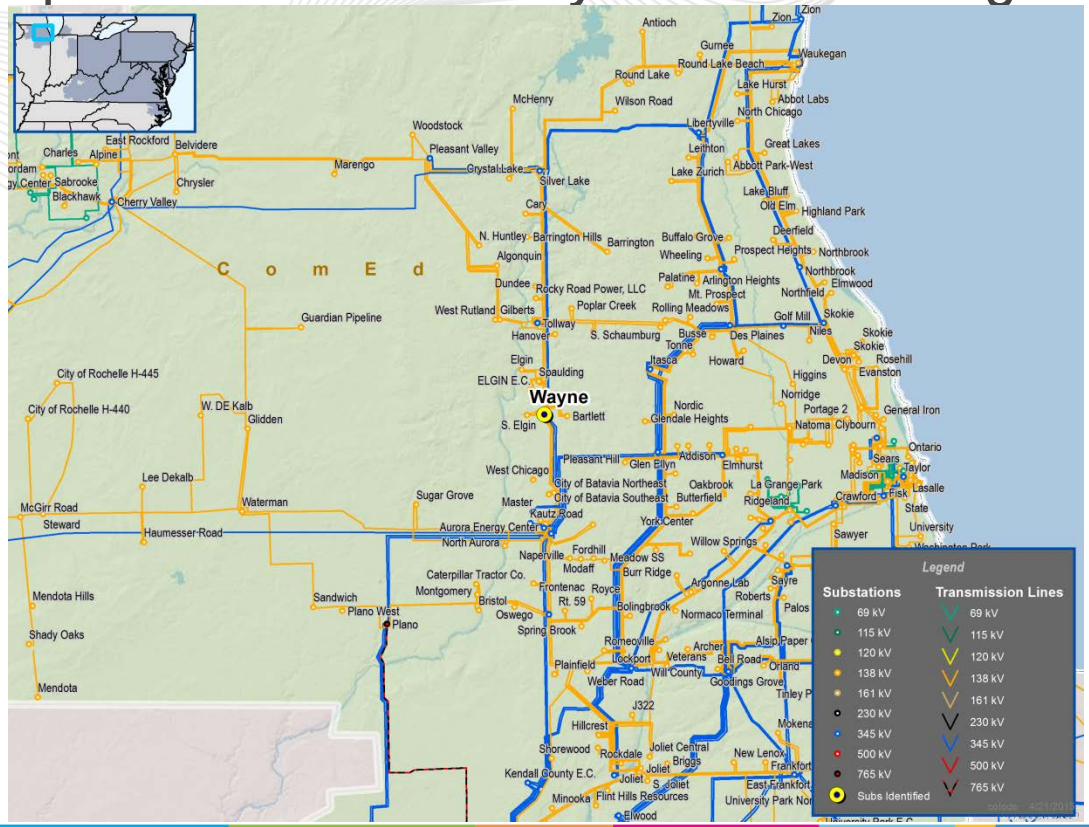
Group 9 Recommended Project: 1-10J

Project ID: 201415_1-10J
Proposed by: ComEd
Proposed Solution: Replace station equipment at three stations and upgrade conductor rating of three lines by re-conductoring and mitigating sag limitations. NOTE: Component 1 of this project (s0704) is scheduled to complete on March 13, 2015
kV Level: 345
Cost ($M): 24.6
IS Date: 2019
Target Zone: ComEd
ME Constraints: Cordova to Nelson 345 kV
Notes: Recommended



Group 10: COMED - Wayne to South Elgin

- 1 Project:
  - 1-10B
- Cost:
  - $0.1M
- Constraints:
  - Wayne to South Elgin 138 kV



Group 10 Analysis

Project ID	Upgrade/ Greenfield	Cost ($M)	Target Zone	kV Level	ME Constraints Identified	Evaluation Type	B/C Ratio Base	B/C Ratio 2015 Sens.	Status
201415_1-10B	Upgrade	0.10	ComEd	138	Wayne to South Elgin 138 kV	Lower Voltage	7.23	6.43	Recommended

Group 10 Recommended Project: 1-10B

Project ID: 201415_1-10B

Proposed by: ComEd

Proposed Solution: Replace L7815 B phase line trap at Wayne substation

kV Level: 138

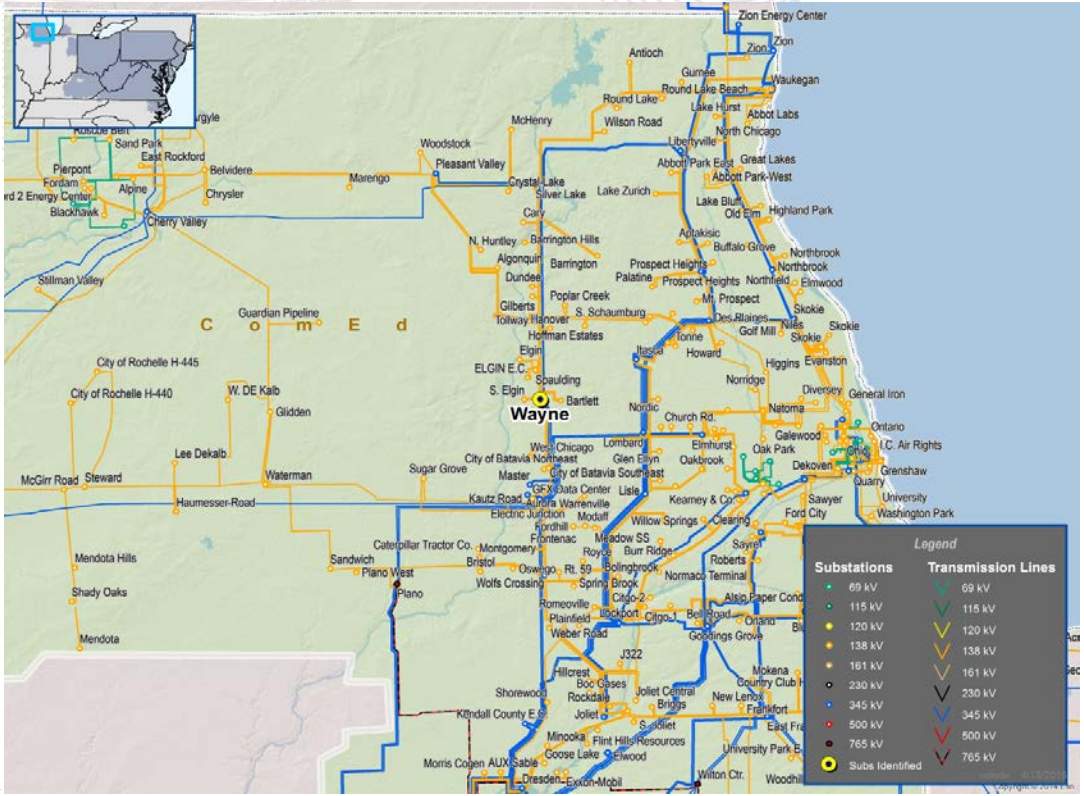
Cost ($M): 0.1

IS Date: 2019

Target Zone: ComEd

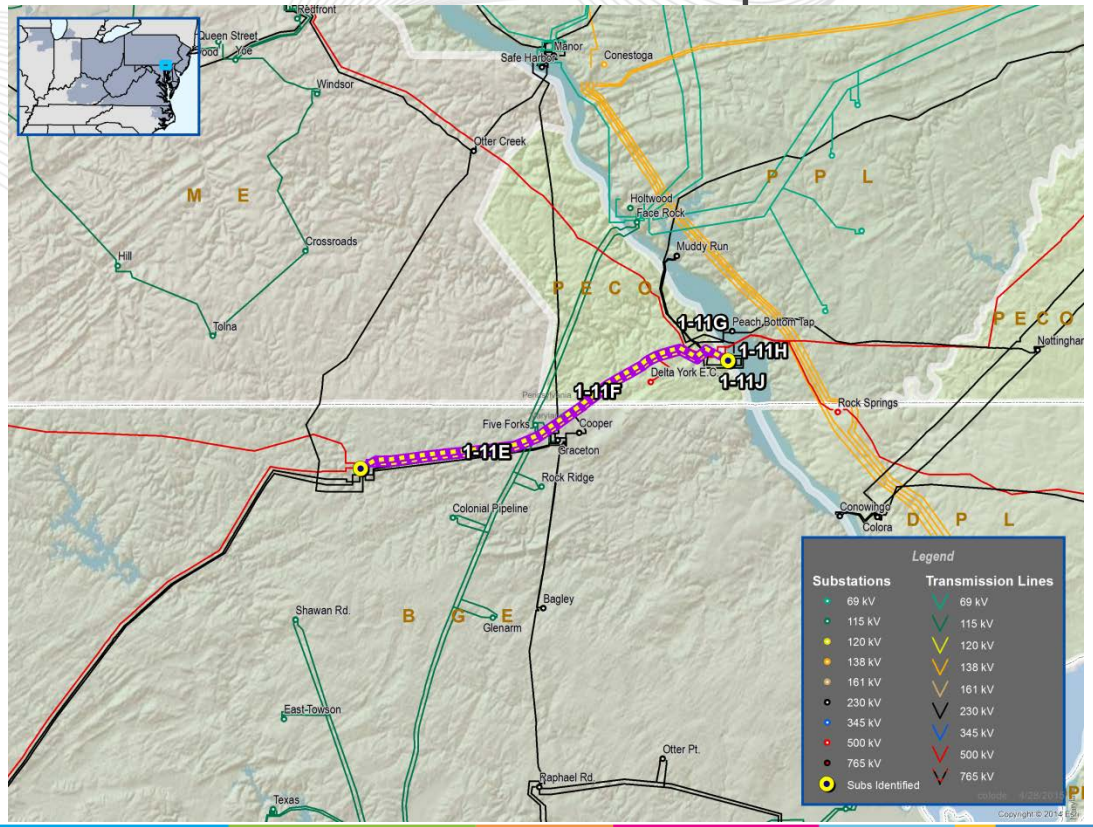
ME Constraints: Wayne to South Elgin 138 kV

Notes: Recommended



Group 11: PECO

- 5 Projects:
  - 1-11E,1-11F,
    1 11G, 1-11H,1-11I
- Cost:
  - From $0.2M to $21M
- Constraints:
  - Peach Bottom 500 kV
  - Peach Bottom to Conastone 500 kV



Group 11 Analysis

Project ID	Upgrade/ Greenfield	Cost ($M)	Target Zone	kV Level	ME Constraints Identified	Evaluation Type	B/C Ratio 2015 Sens.	Comments	Status
201415_1-11G	Upgrade	0.20	PECO	230	Peach Bottom 500 kV	Lower Voltage	72.97	Partially removes congestion driver	Not Recommended
201415_1-11E	Upgrade	1.80	PECO	500	Peach Bottom to Conastone 500 kV	Regional	0.24	Failed B/C	Not Recommended
201415_1-11F	Upgrade	8.70	PECO	500	Peach Bottom to Conastone 500 kV	Regional	0.18	Failed B/C	Not Recommended
201415_1-11H	**Upgrade**	**9.70**	**PECO**	**230**	**Peach Bottom 500 kV**	**Lower Voltage**	**3.03**	**Removes Congestion Driver**	**Recommended**
201415_1-11I	Upgrade	21.10	PECO	230	Peach Bottom 500 kV	Lower Voltage	3.07	Removes Congestion Driver	Not Recommended

Group 11 Recommended Project: 1-11H

Project ID: 201415_1-11H

Proposed by: PECO

Proposed Solution: Increase ratings of Peach Bottom 500-230 kV transformer to 1479 MVA normal / 1839 MVA emergency

kV Level: 230

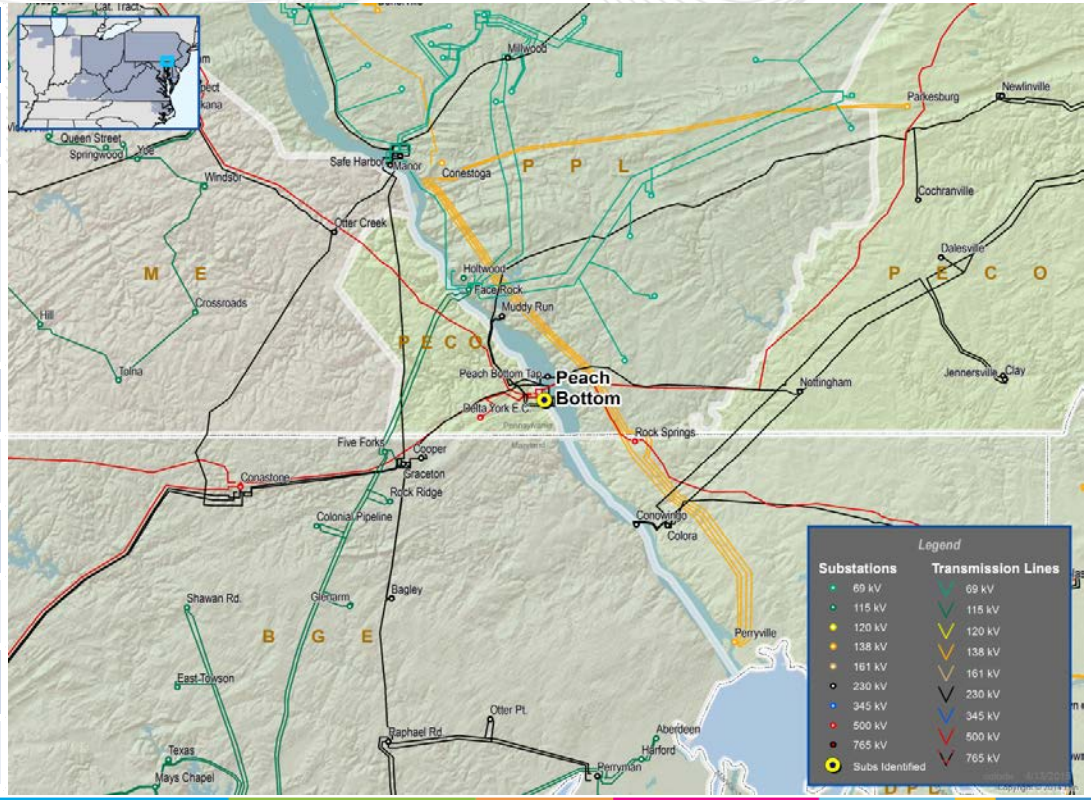
Cost ($M): 9.7

IS Date: 2019

Target Zone: PECO

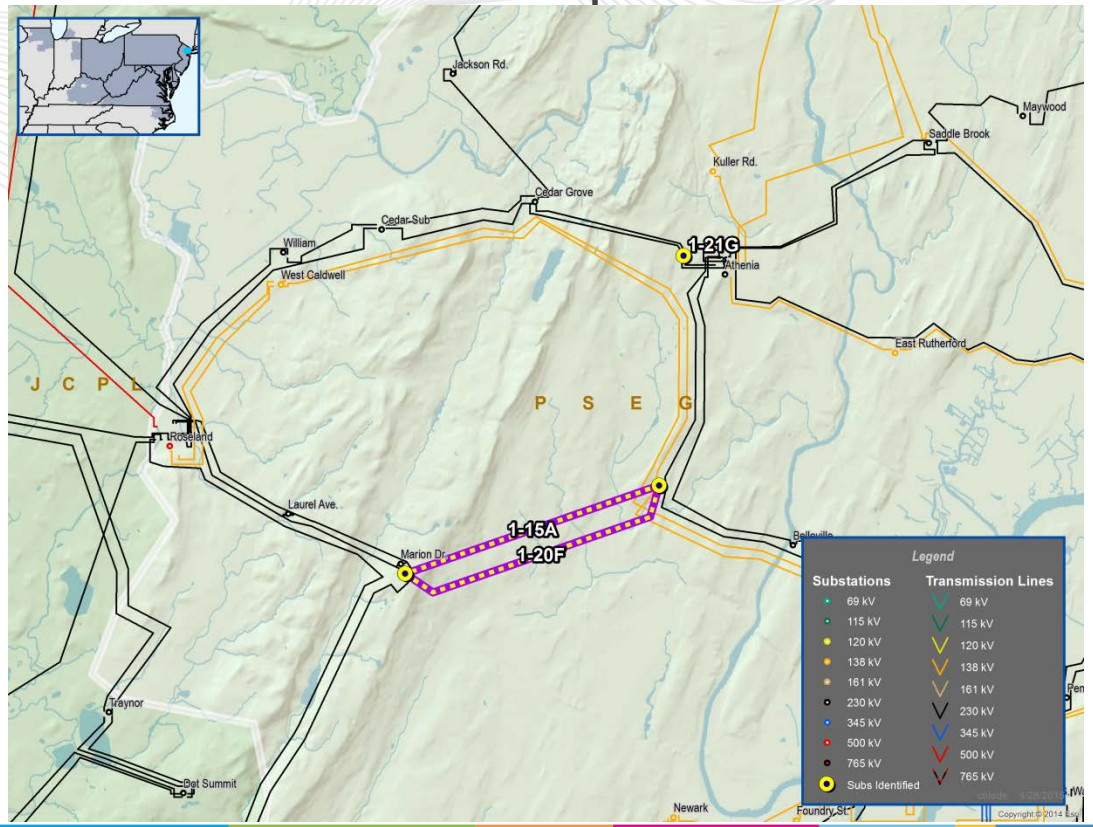
ME Constraints: Peach Bottom 500 kV

Notes: Recommended



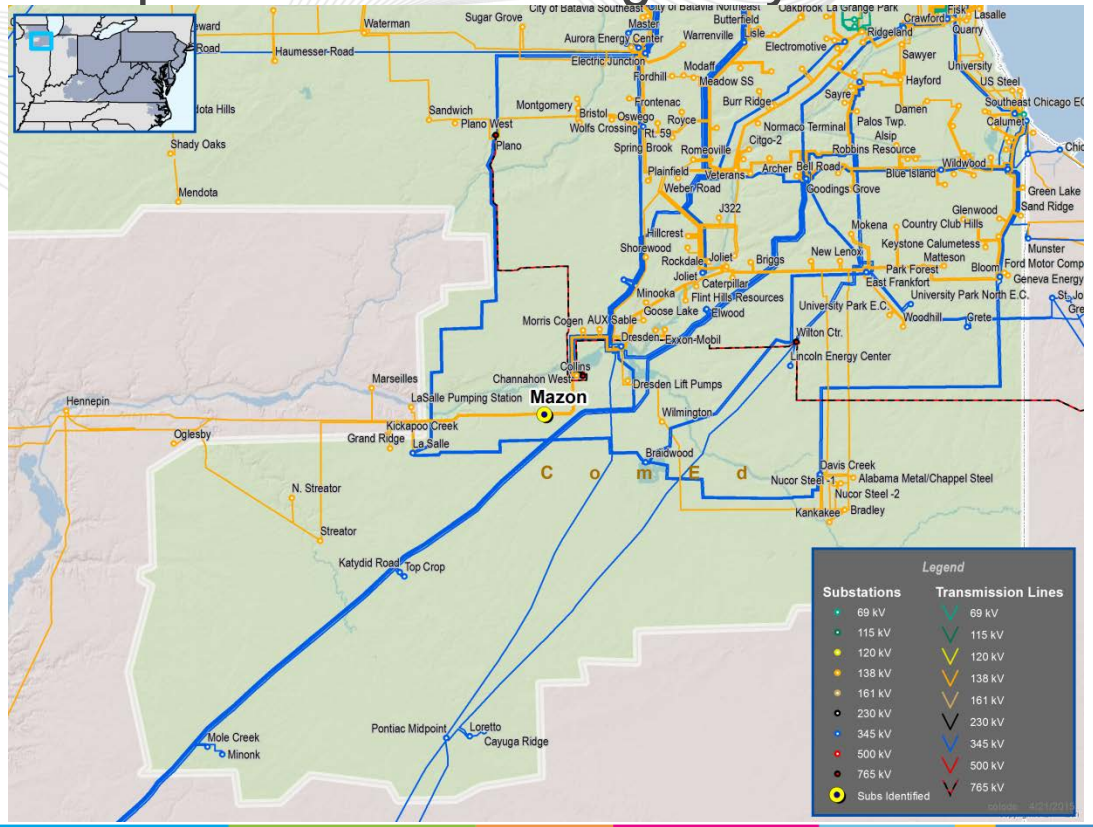
Group 12: PSEG RPM

- 3 Projects:
  - 1-15A,1-20F,
    1-21G
- Cost:
  - From $2.8M to $125M
- Constraints:
  - Roseland-Cedar Grove-Clifton 230 kV corridor
- Note:
  - RPM project pending BRA results.



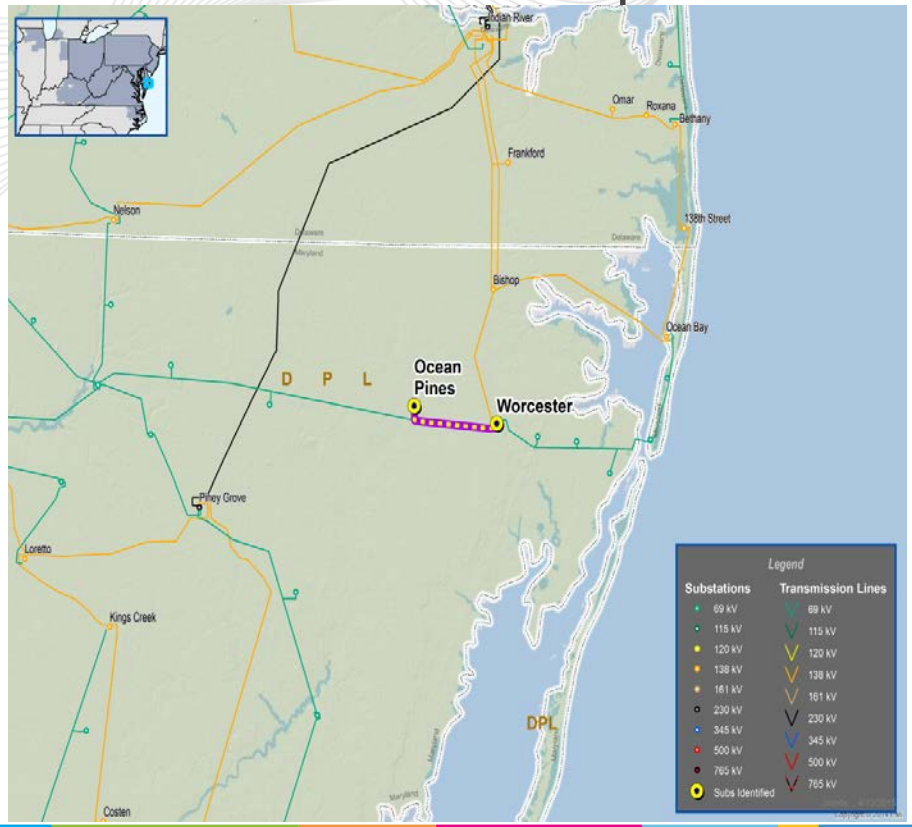
Group 13: COMED - Oglesby to Mazon

- 1 Project:
  - 1-10A
- Cost:
  - From $0.7M to $1M
- Constraints:
  - Oglesby to Mazon 138 kV
- Duplicate of B2613 baseline upgrade.
- Proposal will not be evaluated.



Group 14: DPL

- 1 Project:
  - 1-13E
- Cost:
  - $2.4M
- Constraints:
  - Worcester to Ocean Pines 69 kV



Group 14 Analysis

Project ID	Upgrade/ Greenfield	Cost ($M)	Target Zone	kV Level	ME Constraints Identified	Evaluation Type	B/C Ratio Base	B/C Ratio 2015 Sens.	Status
201415_1-13E	Upgrade	2.40	DPL	69	Worcester to Ocean Pines 69 kV	Lower Voltage	82.68	65.30	Recommended

Group 14 Recommended Project: 1-13E

Project ID: 201415_1-13E

Proposed by: PHI

Proposed Solution: Rebuild Worcester - Ocean Pine 60 kV ckt 1 to 1400A capability summer emergency

kV Level: 69

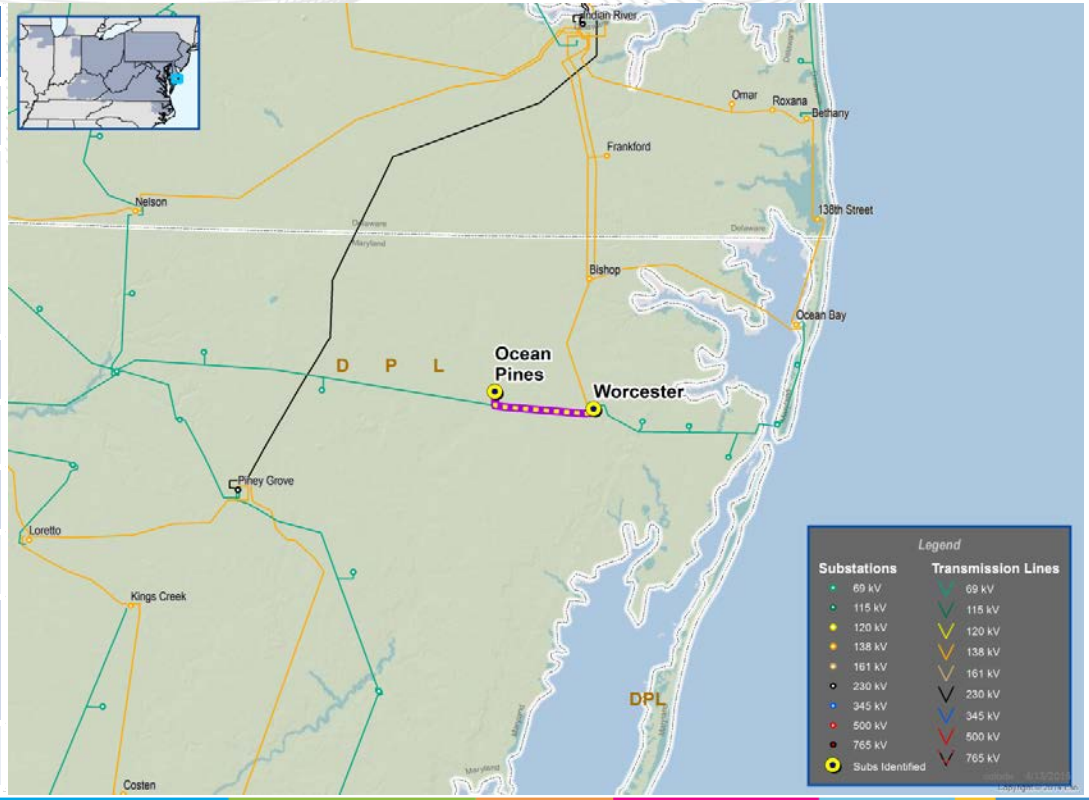
Cost ($M): 2.4

IS Date: 2016

Target Zone: DPL

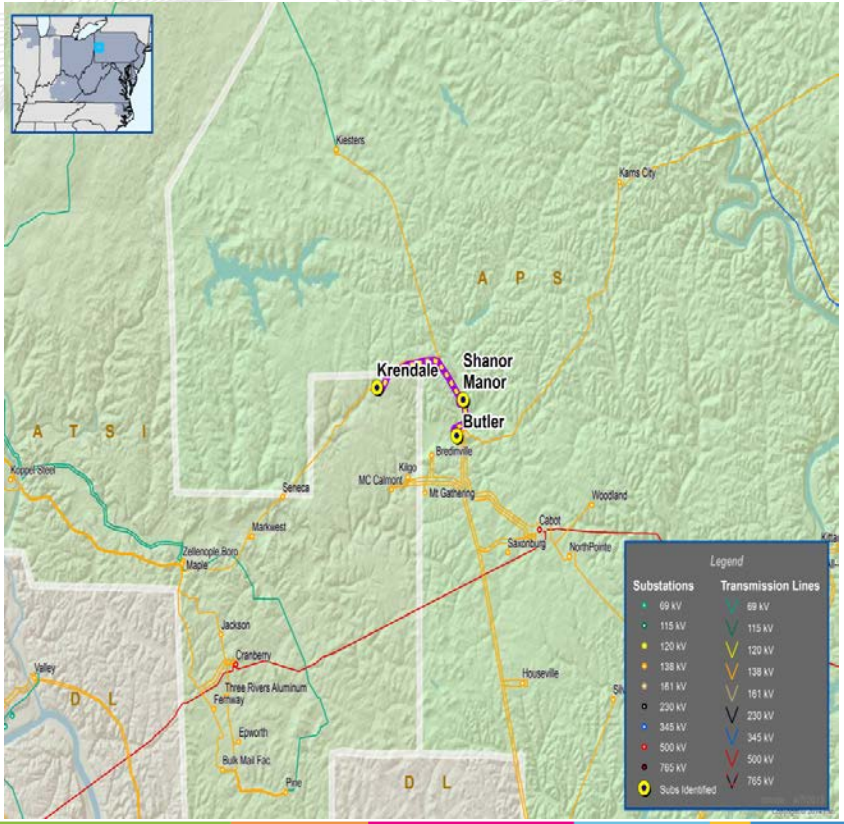
ME Constraints: Worcester to Ocean Pines (I) 69 kV

Notes: Recommended



Group 15: APS/ATSI - Krendale to Shanor Manor

- 1 Project:
  - 1-18I
- Cost:
  - $0.6M
- Constraints:
  - Krendale to Shanor Manor 138 kV

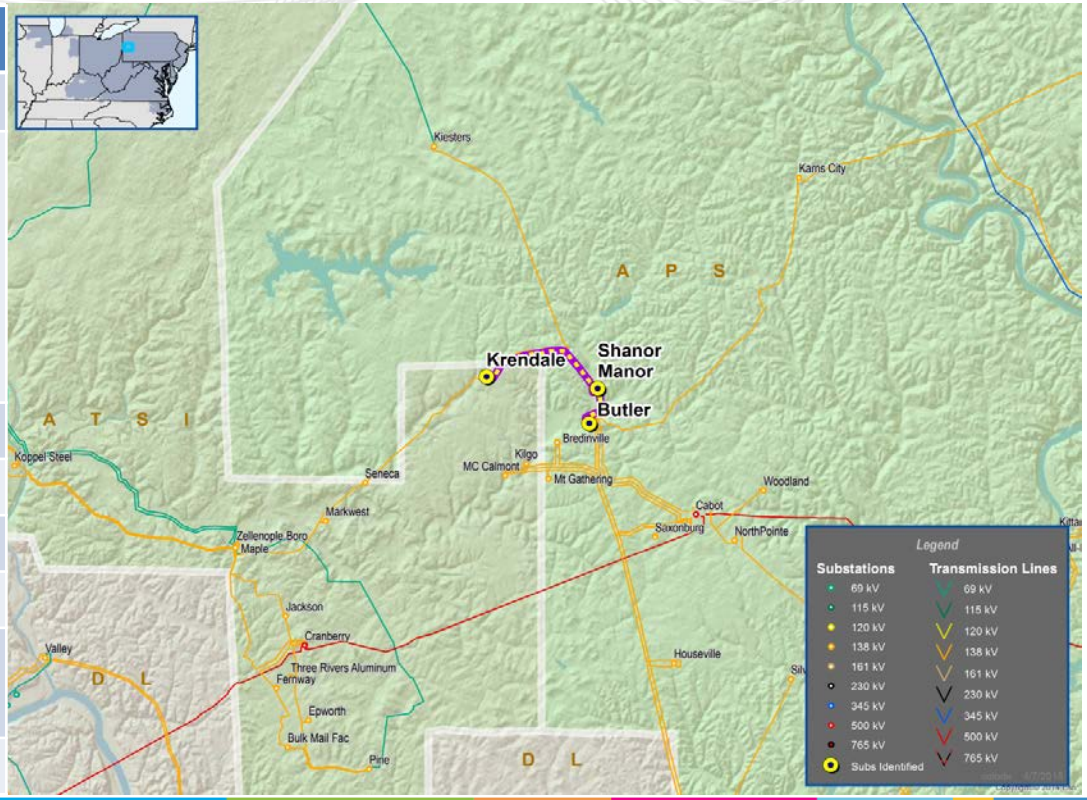


Group 15 Analysis

Project ID	Upgrade/ Greenfield	Cost ($M)	Target Zone	kV Level	ME Constraints Identified	Evaluation Type	B/C Ratio Base	B/C Ratio 2015 Sens.	Status
201415_1-18I	Upgrade	0.60	APS/ATSI	138	Krendale to Shanor Manor 138 kV	Lower Voltage	35.81	123.39	Recommended

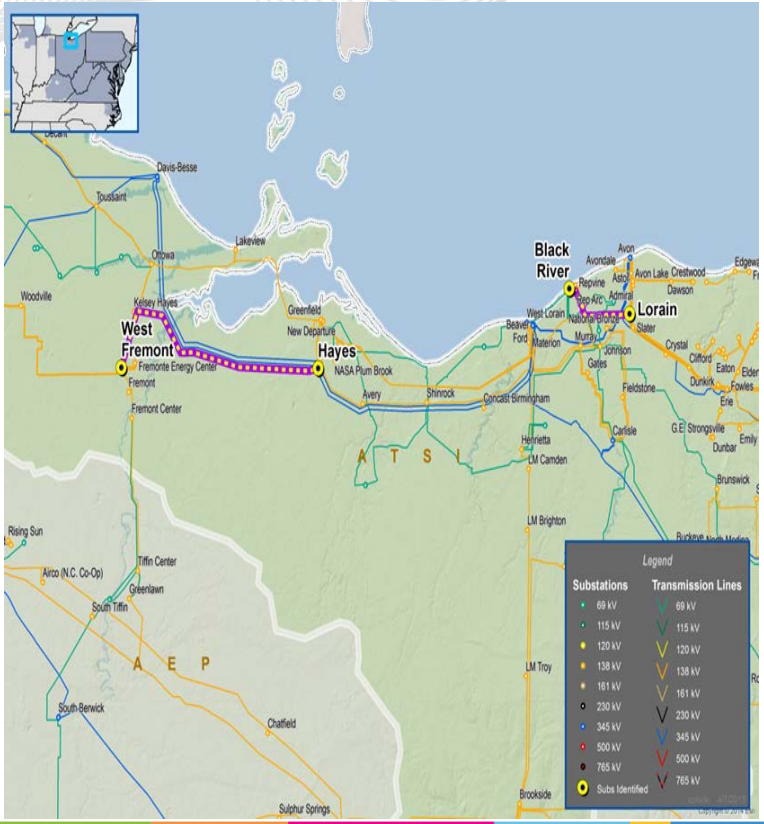
Group 15 Recommended Project: 1-18I

Project ID: 201415_1-18I
Proposed by: FirstEnergy
Proposed Solution: Upgrade 138 kV substation equipment at Butler, Shanor Manor, and Krendale substations. New rating of the line will be 353 MVA summer normal and 422 MVA summer emergency
kV Level: 138
Cost ($M): 0.6
IS Date: 2019
Target Zone: APS/ATSI
ME Constraints: Krendale to Shanor Manor 138 kV
Notes: Recommended



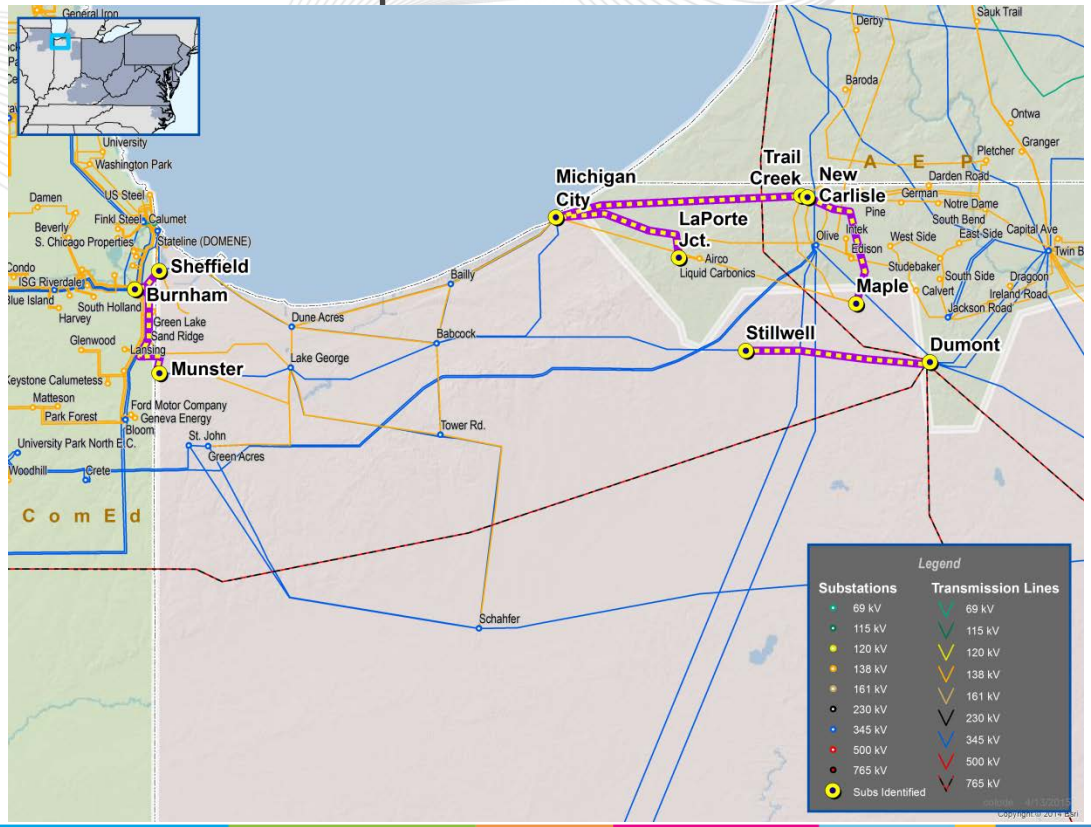
Group 16: ATSI - CLEVELAND INTERFACE

- 1 Project:
  - 1-18J
- Cost:
  - $22.4M
- Constraints:
  - CLEVELAND Interface
- Baseline projects b2557,b2559, and b2560 remove driver
  - B2557: At Avon substation, replace the existing 345/138kV #92 transformer
  - B2559: Re-conductor the Black River-Lorain 138kV line
  - B2560: Second138kV line between West Fremont and Hayes substation



Group 17: AEP / CE / NIPS

- 1 Project:
  - 1-16C
- Cost:
  - $81.2M
- Constraints:
  - Various M2M Facilities



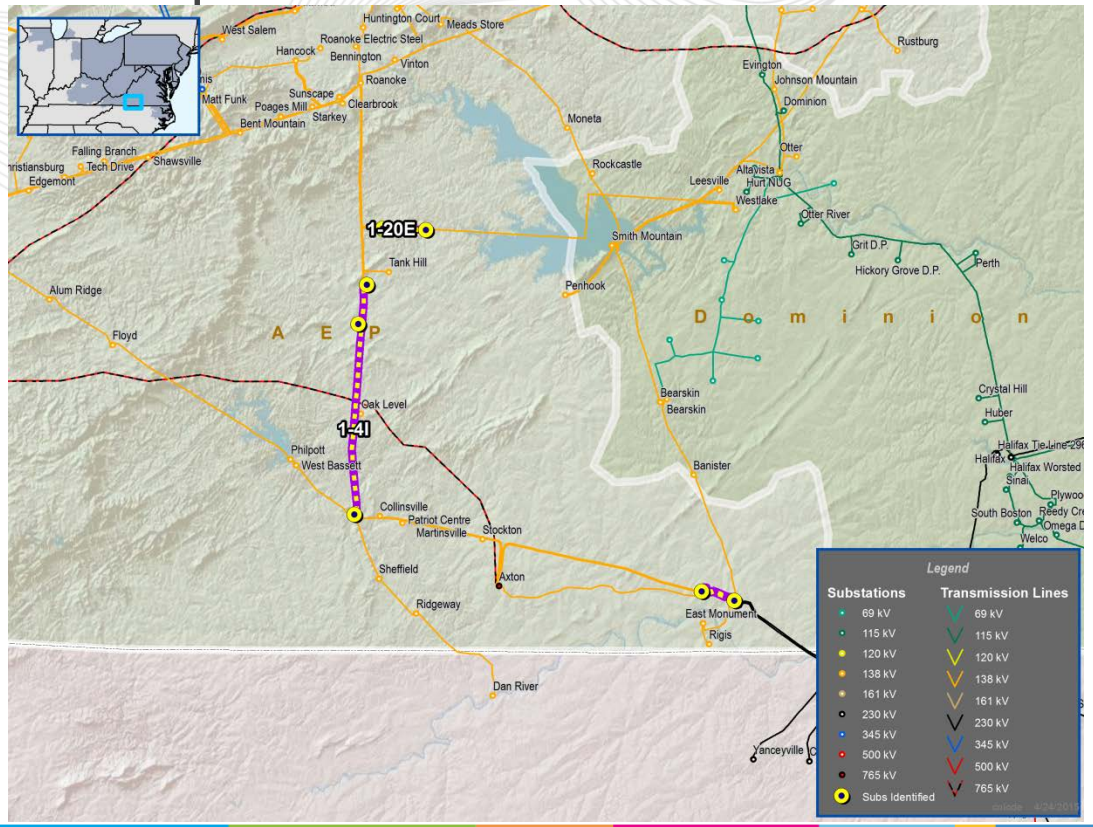
Group 17 Analysis

Project ID	Upgrade/ Greenfield	Cost ($M)	Target Zone	kV Level	ME Constraints Identified	Evaluation Type	B/C Ratio Base	B/C Ratio 2015 Sens.	Status
201415_1-16C	Upgrade	81.16	AEP/CE/NIPS	345	None Specified	Lower Voltage	0.11	0.47	Not Recommended

No Projects Recommended: Constraints will be monitored in future analysis

Group 18: AEP - Fieldale to Thornton

- 2 Projects:
  - 1-4I,1-20E
- Cost:
  - From $0.8M to $19M
- Constraints:
  - Danville to East Danville 138 kV
  - Fieldale to Thornton 138 kV

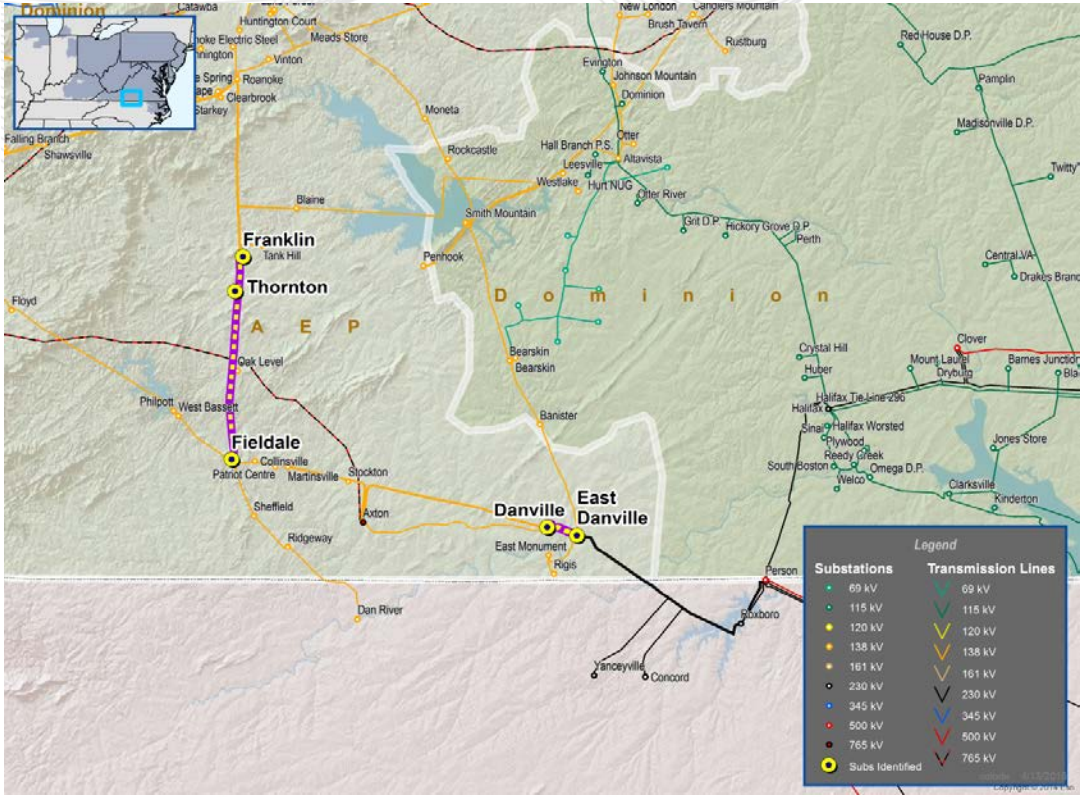


Group 18 Analysis

Project ID	Upgrade/ Greenfield	Cost ($M)	Target Zone	kV Level	Evaluation Type	B/C Ratio 2015 Sens.	Comments	Status
201415_1-4I	**Upgrade**	**0.75**	**AEP**	**138**	**Lower Voltage**	**101.19**	**Removes Congestion Driver**	**Recommended**
201415_1-20E	Greenfield	19.00	AEP	138	Lower Voltage	2.67	Removes Congestion Driver	Not Recommended

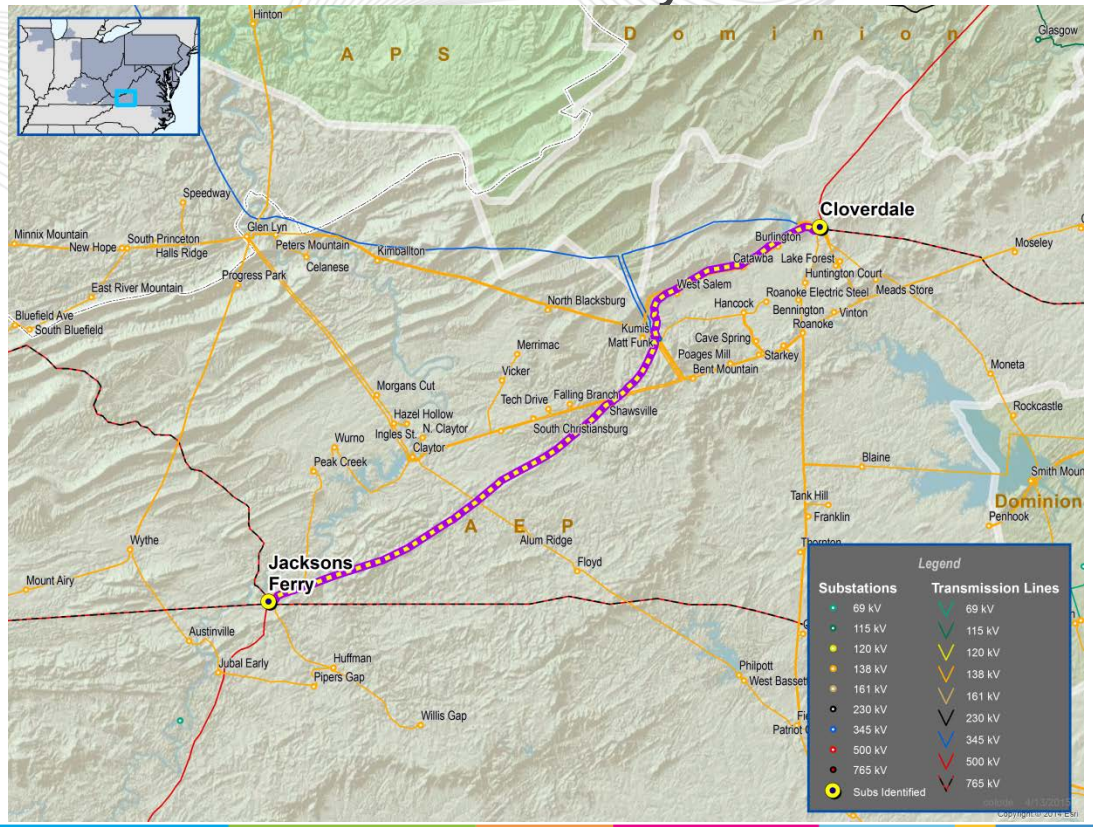
Group 18 Recommended Project: 1-4l

Project ID: 201415_1-4l
Proposed by: AEP
Proposed Solution: Operate the Fieldale - Thornton - Franklin overhead at maximum operating temperature. Replace terminal equipment at Danville and East Danville substations.
kV Level: 138
Cost ($M): 0.75
IS Date: 2019
Target Zone: AEP
ME Constraints: Fieldale to Thornton 138 kV Danville to East Danville 138 kV
Notes: Recommended



Group 19: AEP – Jackson's Ferry to Cloverdale

- 1 Project:
  - 1-4J
- Cost:
  - $0.5M
- Constraints:
  - Jackson's Ferry to Cloverdale 765 KV

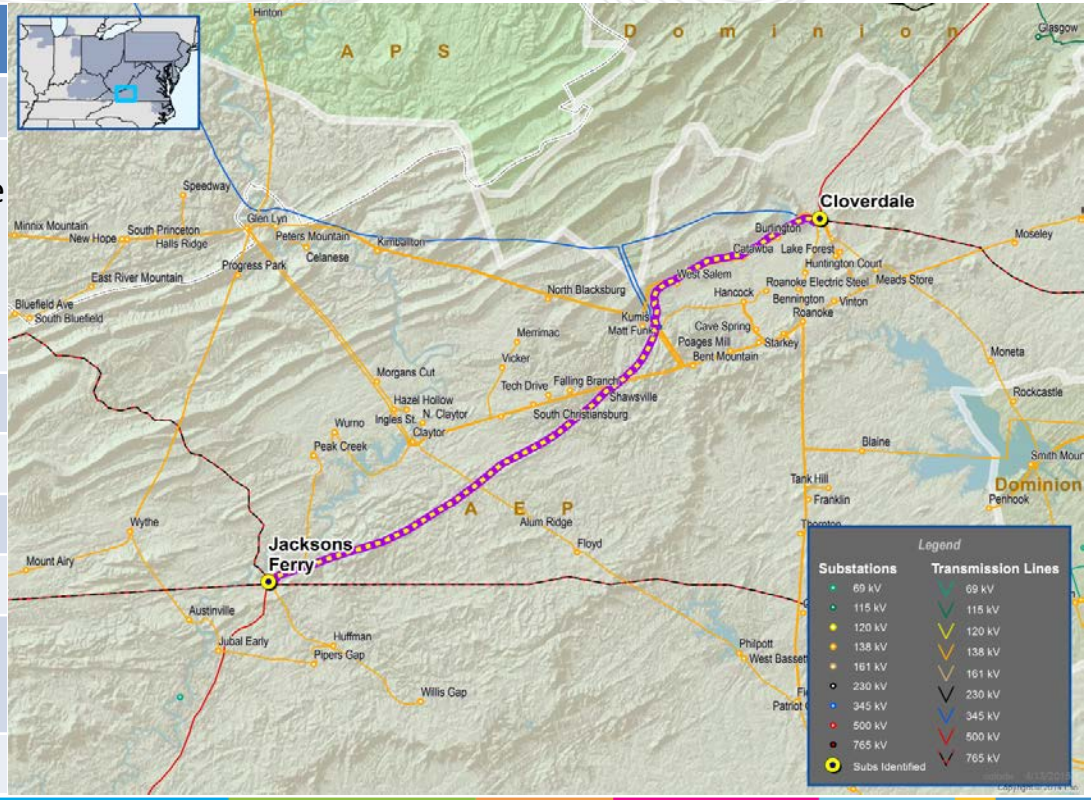


Group 19 Analysis

Project ID	Upgrade/ Greenfield	Cost ($M)	Target Zone	kV Level	ME Constraints Identified	Evaluation Type	B/C Ratio Base	B/C Ratio 2015 Sens.	Status
201415_1-4J	Upgrade	0.50	AEP	765	Jacksons Ferry to Cloverdale 765 KV	Regional	15.81	61.98	Recommended

Group 19 Recommended Project: 1-4J

Project ID: 201415_1-4J
Proposed by: AEP
Proposed Solution: Replace relays at AEP's Cloverdale and Jackson's Ferry substation to improve the thermal capacity of Cloverdale - Jackson's Ferry 765 kV line
kV Level: 765
Cost ($M): 0.5
IS Date: 2019
Target Zone: AEP
ME Constraints: Jackson's Ferry to Cloverdale 765 KV
Notes: Recommended



Summary: Recommended Projects from Groups 2 thru 19

Group	Project ID	Area	Constraint	Cost ($millions)	Type	In-service date	B/C 2014 Base	B/C 2015 Sensitivity	Does Project address congestion on Driver?
Group 4	201415_1-18G	APS	Taneytown to Carroll 138 kV	5.2	Upgrade	2019	55.7	90.1	Yes
Group 5	201415_1-12A	DUQ	Dravosburg to West Mifflin 138 kV	11.18	Upgrade	2018	5.8	2.0	Yes
Group 8	201415_1-2A	PPL - BGE	Safe Harbor to Graceton 230 kV	1.1	Upgrade	2019	4.3	14.4	Yes
Group 8	201415_1-2B	ME - PPL	Brunner Island to Yorkana 230 kV	3.1	Upgrade	2019	73.3	22.2	Yes
Group 9	201415_1-10J	COMED	Cordova to Nelson 345 kV	24.6	Upgrade	2019	1.7	1.9	Yes
Group 10	201415_1-10B	COMED	Wayne to South Elgin 138 kV	0.1	Upgrade	2019	7.2	6.4	Yes
Group 11	201415_1-11H	PECO	Peach Bottom 500 kV	9.7	Upgrade	2019	2.6	3.0	Yes
Group 14	201415_1-13E	DPL	Worcester to Ocean Pines (I) 69 kV	2.4	Upgrade	2019	82.7	65.3	Yes
Group 15	201415_1-18I	APS/ATSI	Krendale to Shanor Manor 138 kV	0.6	Upgrade	2019	35.8	123.4	Yes
Group 18	201415_1-4I	AEP	Fieldale to Thornton 138 kV	0.75	Upgrade	2019	114.2	101.2	Yes
Group 19	201415_1-4J	AEP	Jacksons Ferry to Cloverdale 765 KV	0.5	Upgrade	2019	15.8	62.0	Yes

Total Cost **59.23**

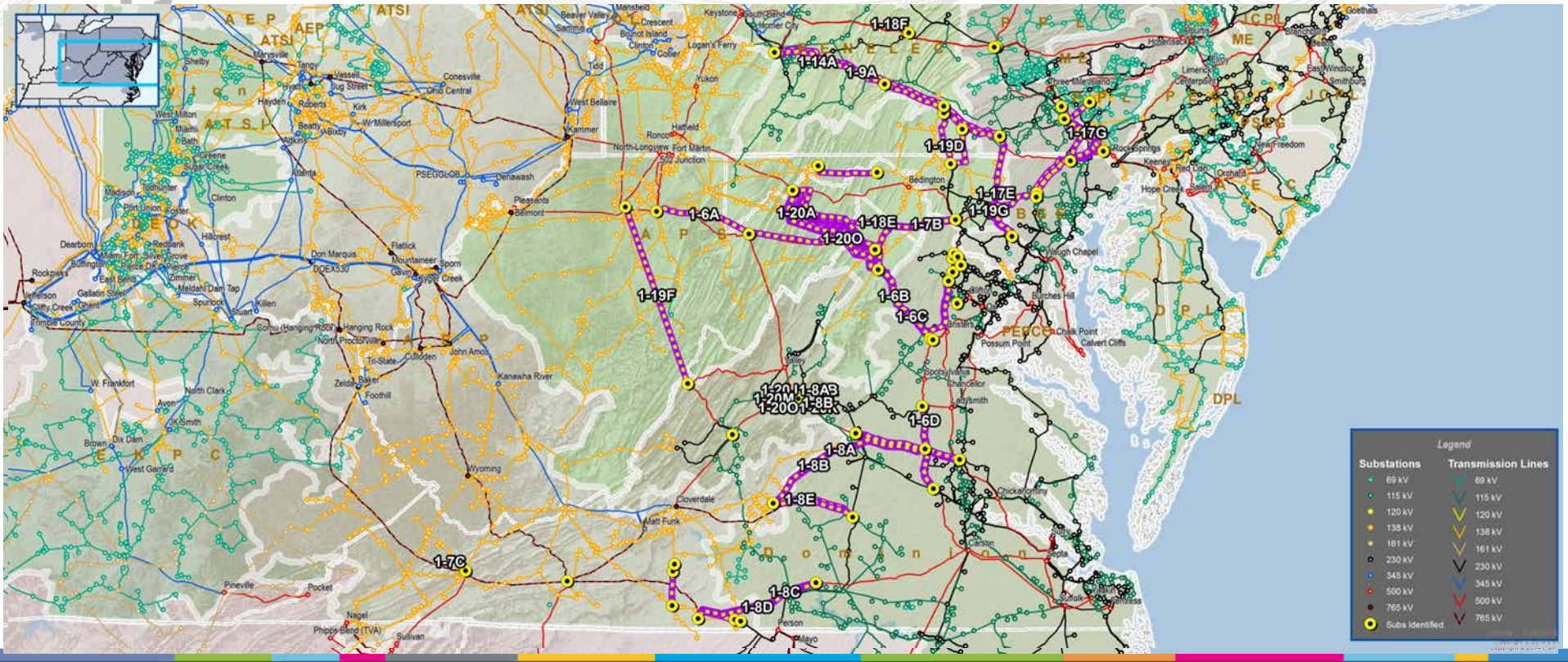
Summary: Projects from groups 2 thru 19

- Simulation conducted to measure impact of all recommended projects from groups 2 thru 19 simultaneously.
  - B/C Ratio = 15.6 with all upgrades included as one project
  - Total 2019 Congestion Reduction was $50 million

- Next Steps
  - Recommendation to PJM Board in October 2015

Project Evaluations
Group 1
(AP-South/AEP-DOM Projects)

Group 1: AP-SOUTH / AEP-DOM



Project Evaluations: Group 1: AP-South/AEP-DOM

Group 1 Tier 1 Finalist Criteria:

- Project B/C>1.25 using 2015 Sensitivity Case

and

- Project B/C>1.25 when base case includes recommended projects from Groups 2-19 using 2015 Sensitivity Case.
  - Projects from groups 2-19 are lower cost upgrades.
  - Projects from Group 1 will not be substitutes for projects from groups 2-19.

and

- Project reduces congestion, production costs, and load payments for combined 2019 and 2022 simulations.*

*Projects still considered if production cost or load payments increased by less than $20 million

Group 1 Tier 1 Project Finalists

Project Name	Company	Cost	In-service Date	B/C 2015 Sensitivity	B/C with Recommended Groups 2-19 projects included	Regional/ Lower Voltage	Project Type	Interface Congestion Delta ($ millions) (2019 + 2022)	RTO Congestion Delta ($ millions) (2019 + 2022)	Production Cost Delta ($ millions) (2019+2022)	Load Payment Delta ($ millions) (2019+2022)
201415_1-6C	Dominion	39.1	2019	4.07	4.5	R	TCSC/SC	-$74.0	-$81.2	-$42	-$45
201415_1-7B	Transource	270.8	2021	1.37	1.58	L	Transmission	-$110.3	-$124.0	-$75	-$11
201415_1-7C	Transource	240.0	2021	1.40	1.42	R	Transmission	-$145.2	-$149.1	-$100	$15
201415_1-9A	DOM High Voltage/Transource	300.7	2020	5.07	5.39	L	Transmission	-$156.2	-$211.2	-$52	-$84
201415_1-17A	Nextera	16.5	2019	3.96	4.37	L	CAP/SVC	-$29.9	-$32.9	-$28	$2
201415_1-17C	Nextera	15.7	2019	4.83	3.24	L	CAP/SVC	-$33.0	-$35.5	-$29	$0
201415_1-17D	Nextera	36.4	2019	2.47	1.71	L	CAP/SVC	-$34.3	-$35.8	-$27	$7
201415_1-17E	Nextera	297.0	2020	2.77	2.76	R	Transmission	-$34.0	-$95.8	$6	-$34
201415_1-18E	FirstEnergy	66.0	2019	2.63	2.87	R	TCSC/SC	-$61.3	-$76.0	-$47	-$19
201415_1-19B	LSPower	38.9	2020	11.34	17.0	L	Transmission	-$4.7	-$32.8	$7	-$57
201415_1-19D	LSPower	104.5	2020	8.19	10.75	L	Transmission	-$34.3	-$76.3	$2	-$62

Tier 1 finalists criteria: Projects with B/C>1.25, Congestion Delta<0, Production costs delta <$20 million, Load Payments delta <$20 million

*Negative represents a reduction as a result of the project

Next Steps

- Reviews Costs and In-service dates
- Sensitivity Runs
  - Fuel prices, Load, Interface Ratings
- Reliability/Constructability Review
- Reduce/Recommend Project(s)

Appendix A
Group 1 Tier 1 Project Finalist
(AP-South/AEP-DOM Projects)

Project ID: 201415_1-6C

Proposed by: Dominion

Proposed Solution: Build one 500kV Thyristor Controlled Series Capacitor (TCSC) at Loudoun substation on the Loudoun - Meadowbrook (535) line and build five (5) 230 kV capacitor banks at five (5) DVP substations to alleviate congestion on AP South and other PJM interfaces

kV Level: 500

Cost ($M): 39.06

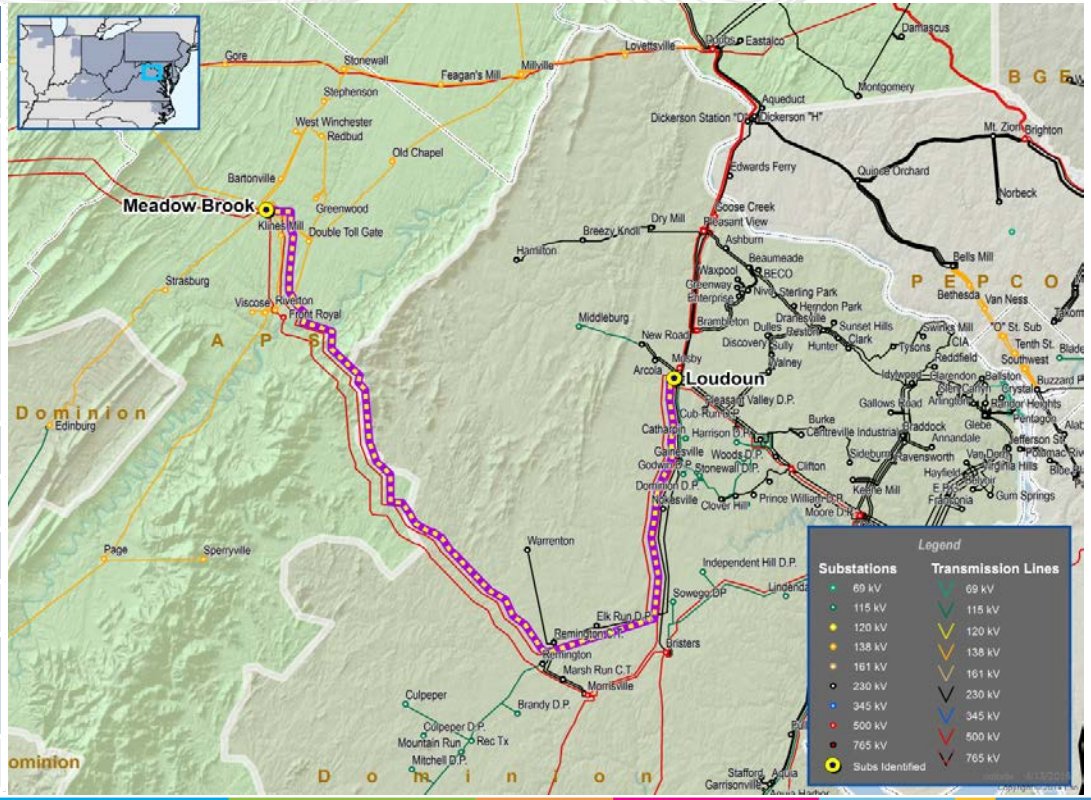
IS Date: 2019

Target Zone: Dominion

ME Constraints: AP SOUTH L/O BED-BLA

Other Interfaces

Notes:



Project ID: 201415_1-7B

Proposed by: Transource

Proposed Solution: Construct a double circuit 230 kV line between Meadow Brook Station and Doubs Station. Additional upgrades in AEP will also be included in this proposal. A total of 1,550 MVARs of new capacitance will also be installed at Brambleton, Ashburn, Lexington, Dooms, Jackson's Ferry and Broadford substations.

kV Level: 230

Cost ($M): 237

IS Date: 2021

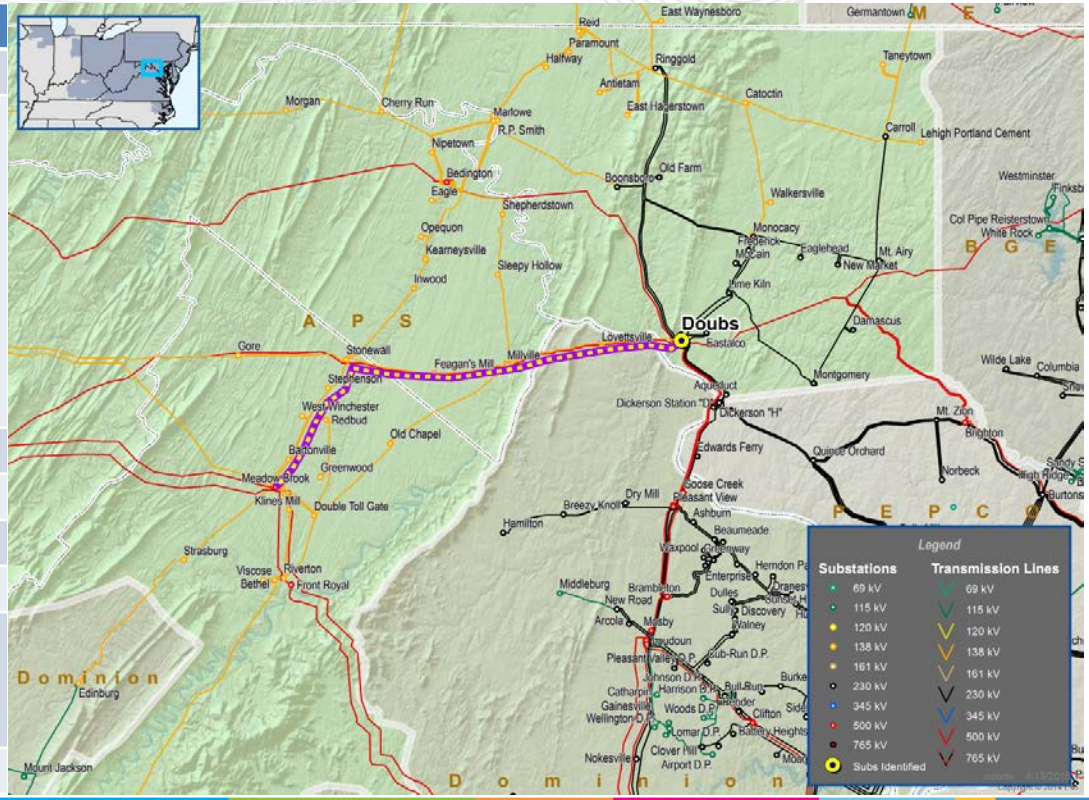
Target Zone: AEP

ME Constraints: AP SOUTH L/O BED-BLA

Other Interfaces

Taneytown to Carroll 138 kV

Notes:



Project ID: 201415_1-7C

Proposed by: Transource

Proposed Solution: Construct a new 500 kV line from Meadow Brook to Doubs. Install a single 500 kV breaker in the existing ring arrangement at Meadow Brook Station. Additional upgrades in AEP will also be included in this proposal. 1,750 MVARs of new capacitance will also be installed with 350 MVAR of capacitor banks each at Brambleton, Loudoun, Lexington, Jackson's Ferry and Broadford substations.

kV Level: 500

Cost ($M): 210

IS Date: 2021

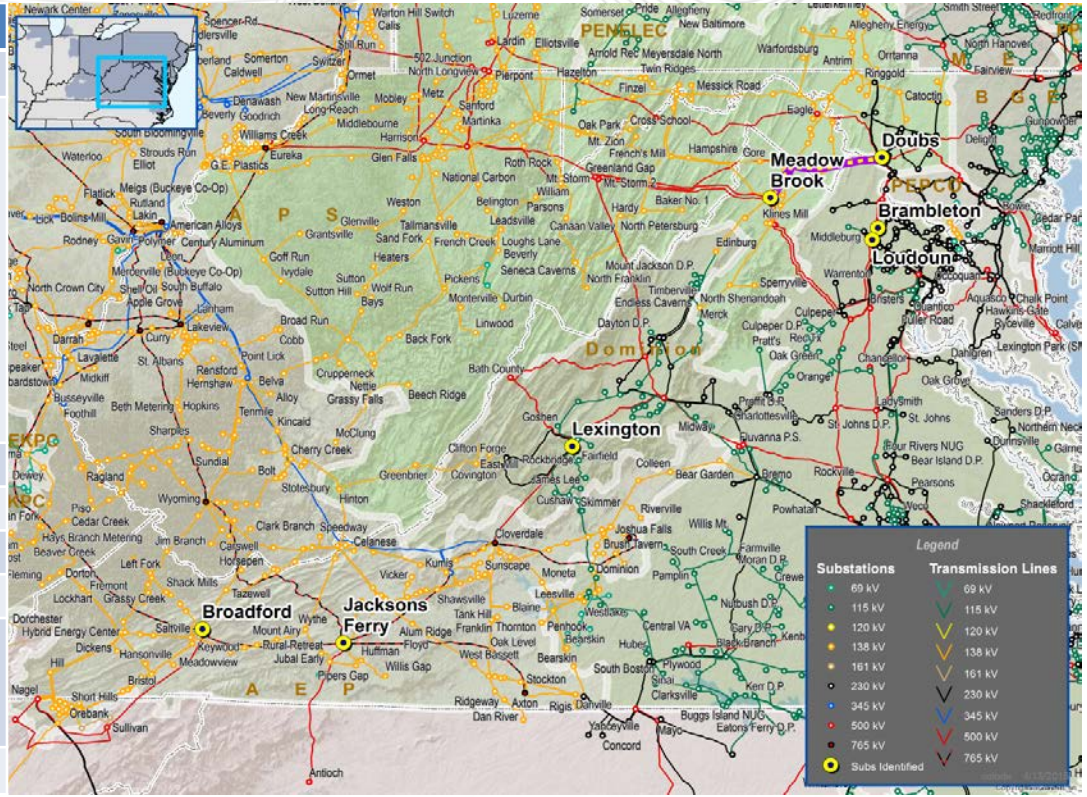
Target Zone: AEP

ME Constraints: AP SOUTH L/O BED-BLA

Other Interfaces

Taneytown to Carroll 138 kV

Notes:



Project ID: 1-9A

Proposed by: Dominion / Transource

Proposed Solution: Tap the Conemaugh - Hunterstown 500 kV line and build new 230 kV double circuit line between Rice and Ringgold. Build new 230 kV double circuit line between Furnace Run and Conastone. Add cap banks to Jackson's Ferry, Broadford, Lexington, Dooms, Ashburn and Brambleton stations. Rebuild the Conastone - Northwest 230 kV line.

kV Level: 230

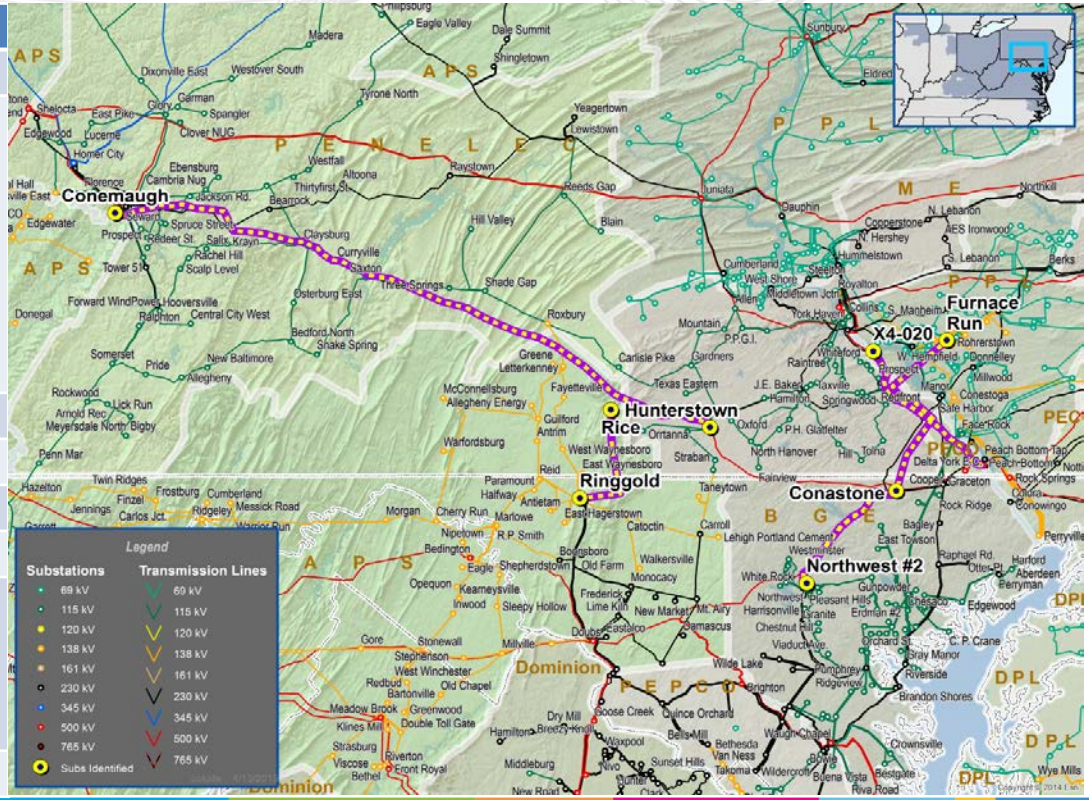
Cost ($M): 269

IS Date: 2020

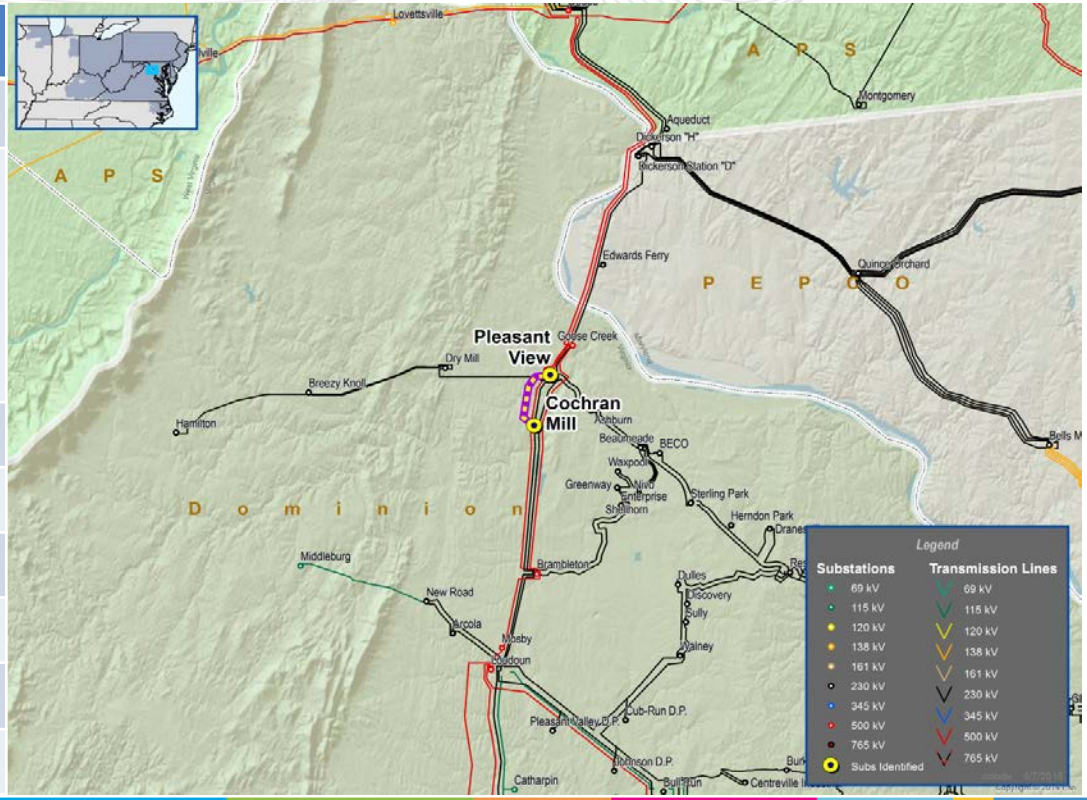
Target Zone: PECO/Dominion/AEP

ME Constraints: AP SOUTH L/O BED-BLA, Brunner Island to Yorkana 230 kV, Taneytown to Carroll 138 kV, Safe Harbor to Graceton 230 kV, Conastone to Northwest 230 kV

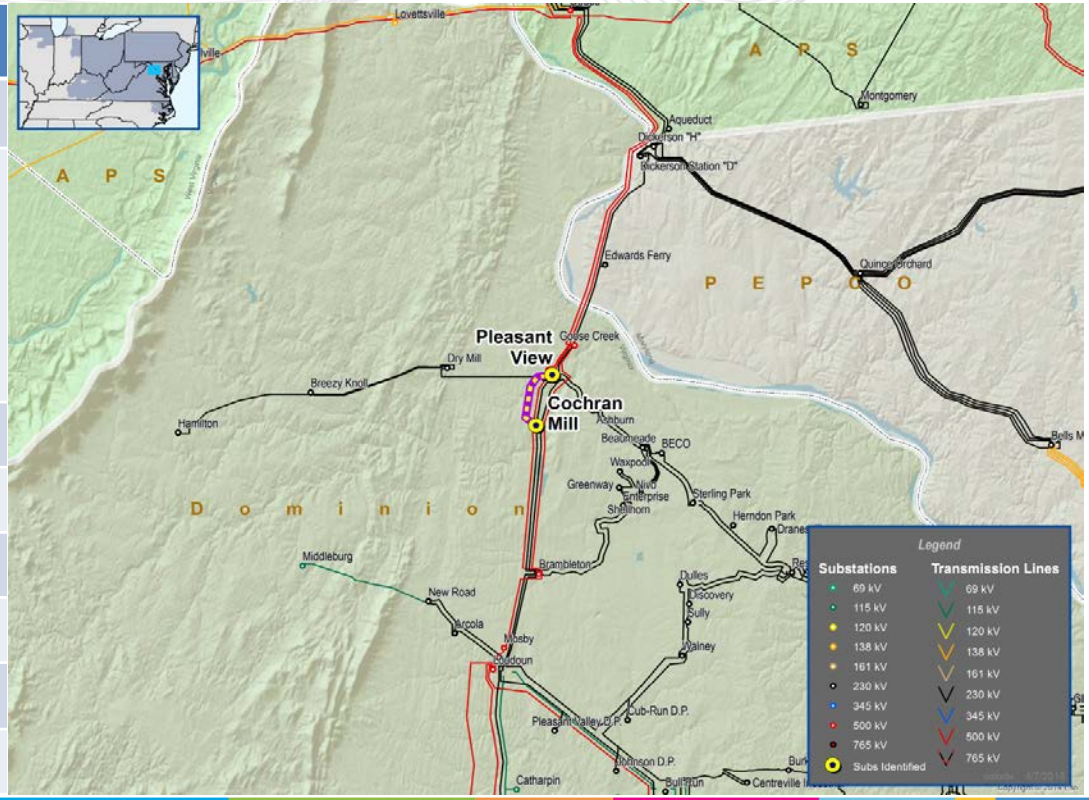
Notes:



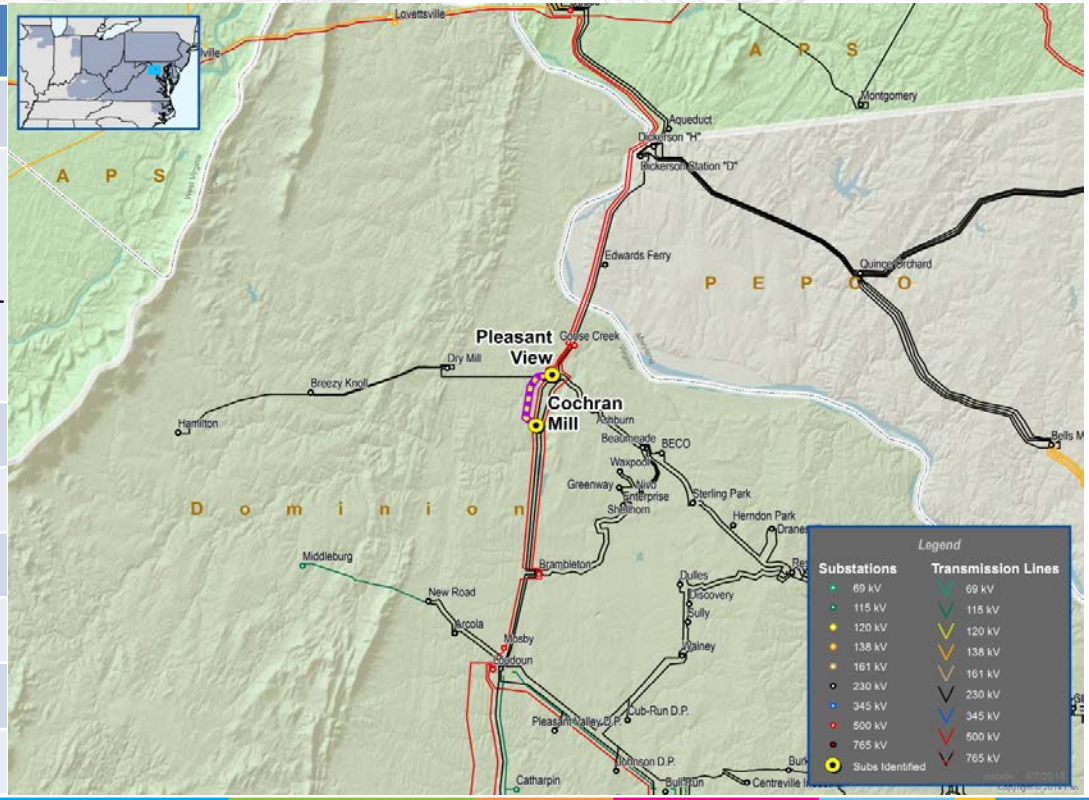
Project ID: 201415_1-17A
Proposed by: Nextera
Proposed Solution: Build new Cochran Mill 230 kV switchyard with 600 MVAR Capacitors, and a new 230 kV line from Cochran Mill - Pleasant View 230 kV
kV Level: 230
Cost ($M): 16.5
IS Date: 2019
Target Zone: Dominion
ME Constraints: AP SOUTH L/O BED-BLA
Notes:



Project ID: 201415_1-17C
Proposed by: Nextera
Proposed Solution: Build new Cochran Mill 230 kV switchyard with 400 MVAR Capacitors, and a new 230 kV line from Cochran Mill - Pleasant View 230 kV
kV Level: 230
Cost ($M): 15.7
IS Date: 2019
Target Zone: Dominion
ME Constraints: AP SOUTH L/O BED-BLA
Notes:

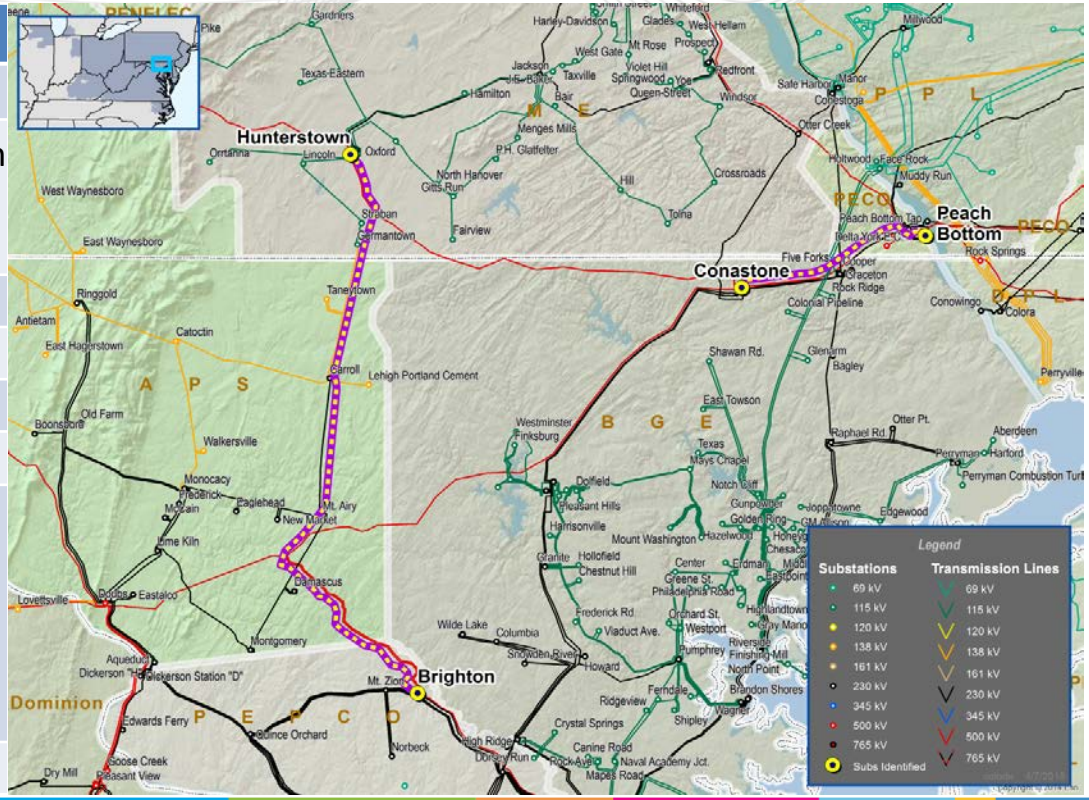


Project ID: 201415_1-17D
Proposed by: Nextera
Proposed Solution: Build new Cochran Mill 230 kV switchyard with 200MVAR SVC, 200 MVAR Capacitors, and a new 230 kV line from Cochran Mill - Pleasant View 230 kV
kV Level: 230
Cost ($M): 36.4
IS Date: 2019
Target Zone: Dominion
ME Constraints: AP SOUTH L/O BED-BLA
Notes:



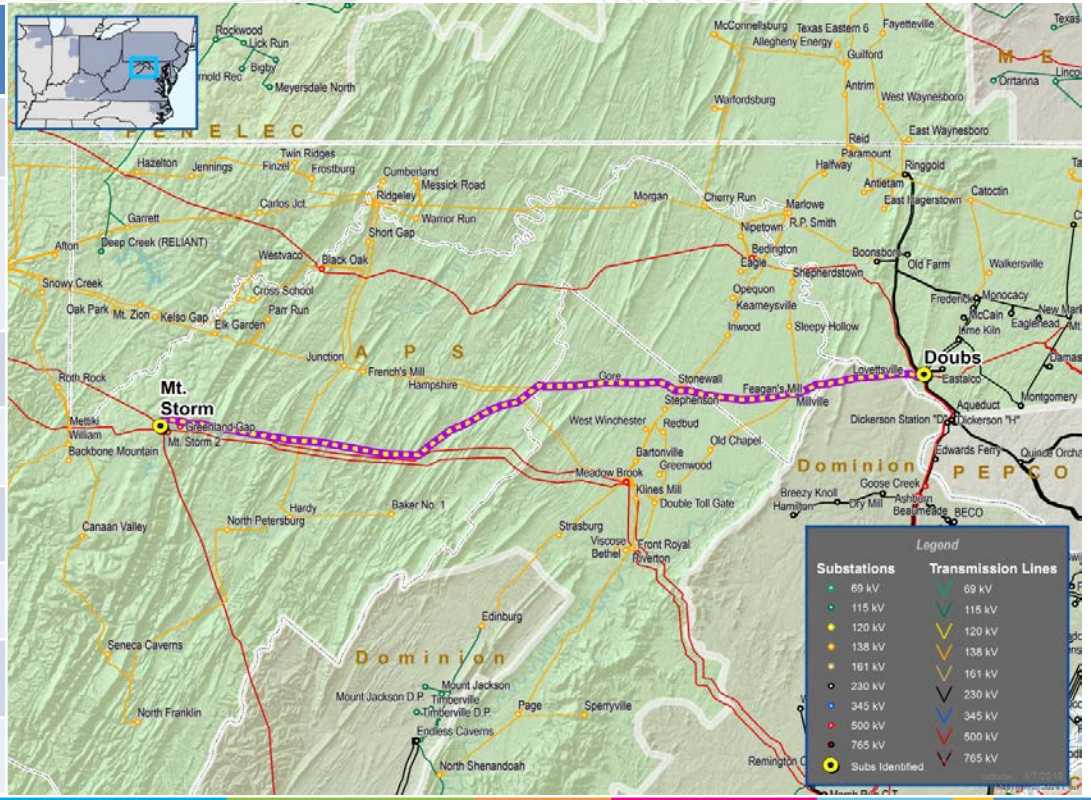
1-17E

Project ID: 201415_1-17E
Proposed by: Nextera
Proposed Solution: Build new Hunterstown - Brighton 500 kV line, Build new Conastone - Peach Bottom 500 kV line
kV Level: 500
Cost ($M): 297
IS Date: 2019
Target Zone: METED/PEPCO/BGE/PECO/APS
ME Constraints: AP SOUTH L/O BED-BLA Brunner Island to Yorkana 230 kV Taneytown to Carroll 138 kV Safe Harbor to Graceton 230 kV
Notes:

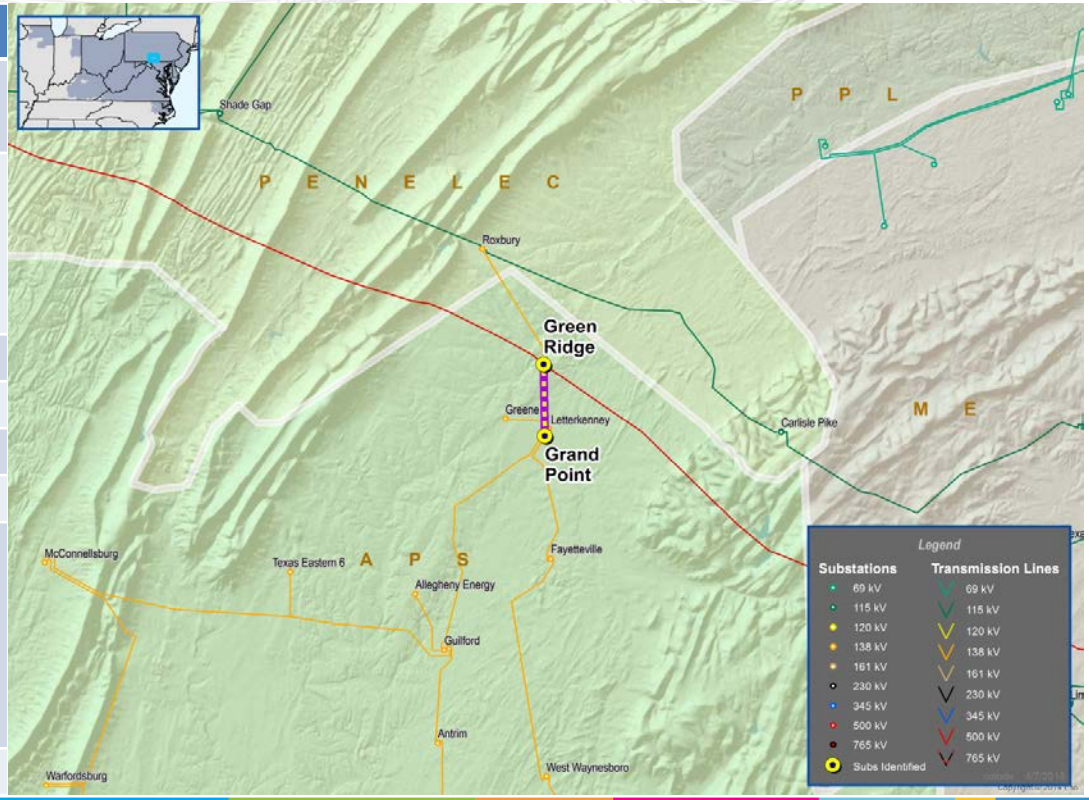


1-18E

Project ID: 201415_1-18E
Proposed by: FirstEnergy
Proposed Solution: Install series capacitors on the Doubs-Mt. Storm 500 kV line
kV Level: 500
Cost ($M): 66
IS Date: 2019
Target Zone: Dominion/APS
ME Constraints: AP SOUTH L/O BED-BLA
Notes:



Project ID: 201415_1-19B
Proposed by: Northeast Transmission Development
Proposed Solution: Approximately 6-mile 138 kV Line from Grand Point to a new 500/138 kV substation on the Conemaugh-Hunterstown 500 kV Line ("Green Ridge")
kV Level: 138
Cost ($M): 38.9
IS Date: 2020
Target Zone: Meted/Penelec
ME Constraints: AP SOUTH L/O BED-BLA BED-BLA L/O MTS-DOU Taneytown to Carroll 138 kV Conastone to Northwest 230 kV Peach Bottom 500 kV
Notes:



Project ID: 201415_1-19D

Proposed by: Northeast Transmission Development

Proposed Solution: Approximately 26-mile 230 kV Line from Ringgold to a new 500/230 kV substation on the Conemaugh-Hunterstown 500 kV Line ("Green Ridge").

kV Level: 230

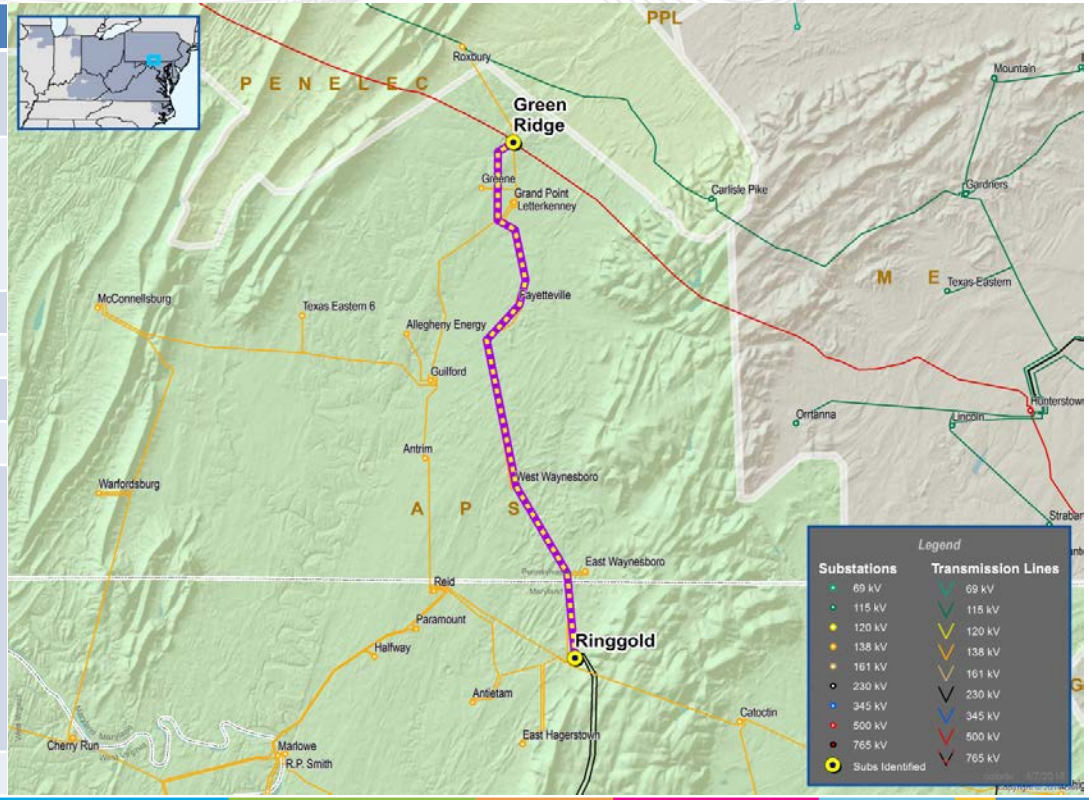
Cost ($M): 104.5

IS Date: 2020

Target Zone: Meted/Penelec

ME Constraints: AP SOUTH L/O BED-BLA
L/O MTS-DOU
50045005 L/O RCKSPG-KEENY
Taneytown to Carroll 138 kV
Conastone to Northwest 230 kV
Peach Bottom 500 kV
Jacksons Ferry to Cloverdale 765 KV 765 kV

Notes:



Appendix B
Detailed Group 1 Results
(AP-South/AEP-DOM Projects)

Group 1 Detailed Results

Project Name	Company	Cost	In-service Date	B/C 2015 Sensitivity	B/C with Recommended Groups 2-19 projects included	Interface Congestion Delta ($ millions) (2019 + 2022)	RTO Congestion Delta ($ millions) (2019 + 2022)	Production Cost Delta ($ millions) (2019+2022)	Load Payment Delta ($ millions) (2019+2022)
201415_1-6C	Dominion	39.1	2019	4.07	4.5	-$74.0	-$81.2	-$42	-$45
201415_1-7B	Transource	270.8	2021	1.37	1.58	-$110.3	-$124.0	-$75	-$11
201415_1-7C	Transource	240.0	2021	1.40	1.42	-$145.2	-$149.1	-$100	$15
201415_1-9A	DOM High Voltage/Transource	300.7	2020	5.07	5.39	-$156.2	-$211.2	-$52	-$84
201415_1-17A	Nextera	16.5	2019	3.96	4.37	-$29.9	-$32.9	-$28	$2
201415_1-17C	Nextera	15.7	2019	4.83	3.24	-$33.0	-$35.5	-$29	$0
201415_1-17D	Nextera	36.4	2019	2.47	1.71	-$34.3	-$35.8	-$27	$7
201415_1-17E	Nextera	297.0	2020	2.77	2.76	-$34.0	-$95.8	$6	-$34
201415_1-18E	FirstEnergy	66.0	2019	2.63	2.87	-$61.3	-$76.0	-$47	-$19
201415_1-19B	LSPower	38.9	2020	11.34	17.0	-$4.7	-$32.8	$7	-$57
201415_1-19D	LSPower	104.5	2020	8.19	10.75	-$34.3	-$76.3	$2	-$62
201415_1-2C	PPL	33.95	2018	0.65	N/A	N/A	N/A	N/A	N/A
201415_1-6A	Dominion	25.00	2019	3.48	5.09	$20.1	$29.8	$36	-$32
201415_1-6B	Dominion	25.00	2019	2.37	2.26	-$17.9	-$23.6	-$20	$28
201415_1-6D	Dominion	42.70	2019	2.93	2.55	-$61.0	-$64.0	-$51	$27
201415_1-7A	Transource	155.36	2020	1.44	1.37	-$81.1	-$83.4	-$69	$39
201415_1-8A	Dominion/Transource	384.00	2020	0.56	N/A	N/A	N/A	N/A	N/A
201415_1-8B	Dominion/Transource	293.00	2020	0.99	N/A	N/A	N/A	N/A	N/A
201415_1-8C	Dominion/Transource	317.00	2020	0.41	N/A	N/A	N/A	N/A	N/A
201415_1-8D	Dominion/Transource	222.00	2020	0.78	N/A	N/A	N/A	N/A	N/A
201415_1-8E	Dominion/Transource	181.00	2019	0.88	N/A	N/A	N/A	N/A	N/A
201415_1-8F	Dominion/Transource	193.00	2021	1.21	N/A	N/A	N/A	N/A	N/A
201415_1-14A	DATC	51.53	2020/2019	3.73	1.9	-$39.9	-$31.6	-$40	$154
201415_1-17B	Nextera	41.00	2019	1.55	1.43	-$41.7	-$42.4	-$37	$23
201415_1-17F	Nextera	76.20	2019	0.90	N/A	N/A	N/A	N/A	N/A
201415_1-17G	Nextera	86.30	2019	1.11	N/A	N/A	N/A	N/A	N/A
201415_1-18F	FirstEnergy	68.00	0	2.62	1.61	-$99.0	-$43.6	-$50	$69
201415_1-19C	LSPower	41.90	2020	13.45	19.24	$35.2	$5.0	$47	-$33
201415_1-19E	LSPower	53.70	2020	0.79	N/A	N/A	N/A	N/A	N/A
201415_1-19F	LSPower	432.50	2023	1.29	1.22	N/A	N/A	N/A	N/A
201415_1-19G	LSPower	48.60	2020	2.09	1.74	-$15.2	-$13.9	-$24	$26
201415_1-20A	ITC	209.56	2020	0.25	N/A	N/A	N/A	N/A	N/A
201415_1-20G	ITC	174.36	2020	0.21	N/A	N/A	N/A	N/A	N/A
201415_1-20J	ITC	212.58	2020	0.32	N/A	N/A	N/A	N/A	N/A
201415_1-20K	ITC	177.38	2020	0.40	N/A	N/A	N/A	N/A	N/A
201415_1-20L	ITC	226.33	2020	0.17	N/A	N/A	N/A	N/A	N/A
201415_1-20M	ITC	229.35	2020	0.45	N/A	N/A	N/A	N/A	N/A
201415_1-20N	ITC	191.12	2020	0.71	N/A	N/A	N/A	N/A	N/A
201415_1-20O	ITC	194.14	2020	0.66	N/A	N/A	N/A	N/A	N/A
201415_1-22A	Ameren	46.6	2019	0.75	N/A	N/A	N/A	N/A	N/A
201415_1-22B	Ameren	46.6	2019	0.75	N/A	N/A	N/A	N/A	N/A

Tier 1 finalist criteria: Projects with B/C>1.25, Congestion Delta<0, Production costs delta <$20 million, Load Payments delta <$20 million

*Negative represents a reduction as a result of the project

Questions?

Email: RTEP@pjm.com