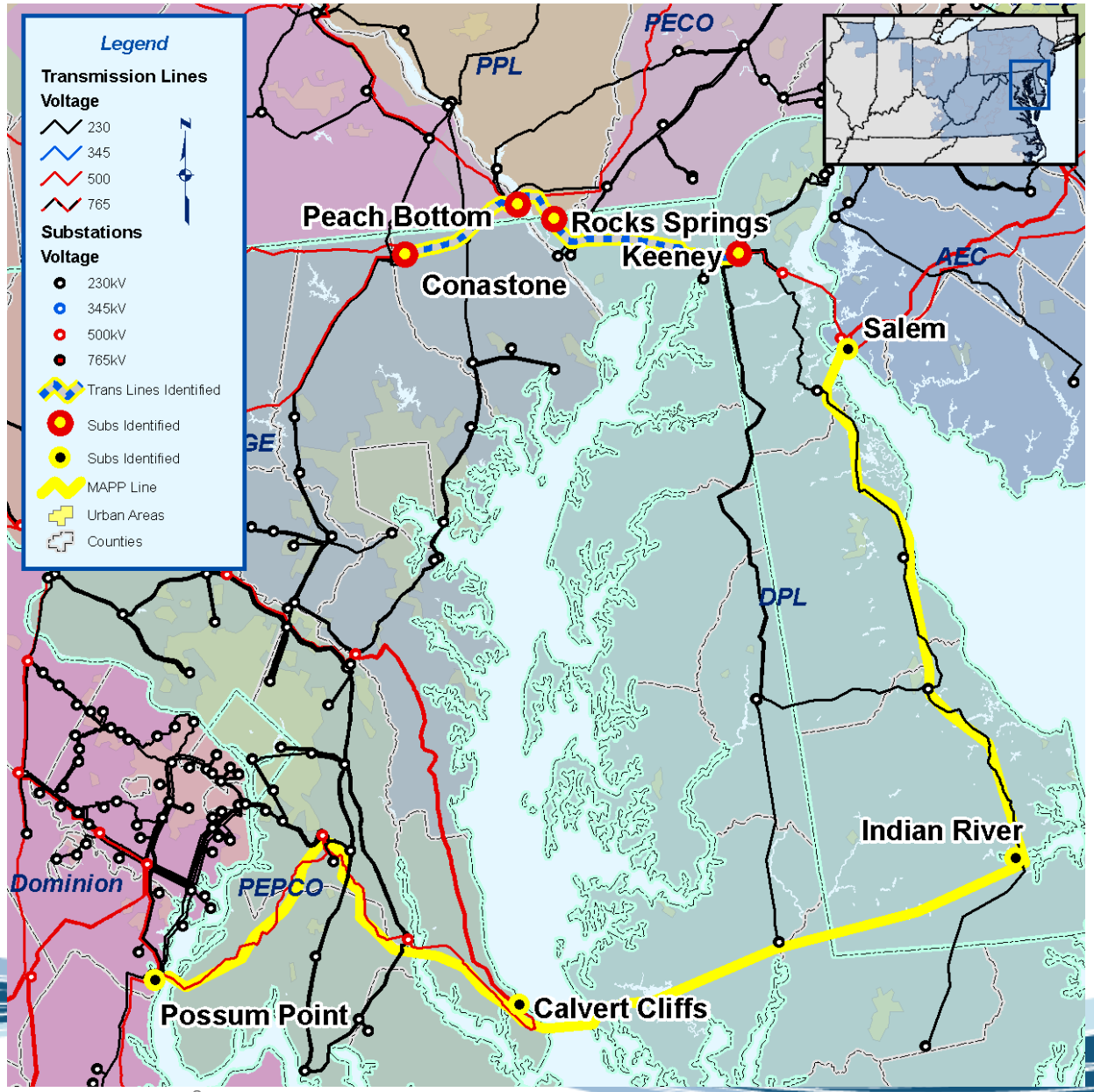
2008 RTEP - Reliability Analysis Update

TEAC Meeting

October 15, 2008

- 15-Year planning analysis identified a thermal overload on the Rock Springs to Keeney 500 kV line
- Severe reactive problems were identified for MAAC and EMAAC load deliverability in 2013.
- Critical contingencies causing voltage collapse include:
  - Loss of Keeney to Rock Springs 500 kV
  - Loss of Peach Bottom to Rock Springs 500 kV
  - Loss of Conastone to Peach Bottom 500 kV
  - Loss of Cedar Creek to Red Lion 230 kV
- PJM evaluated 3 alternatives to address these issues
  - MAPP
  - A new 500 kV line from Conastone to Peach Bottom
  - A new 500 kV line from Peach Bottom to Keeney

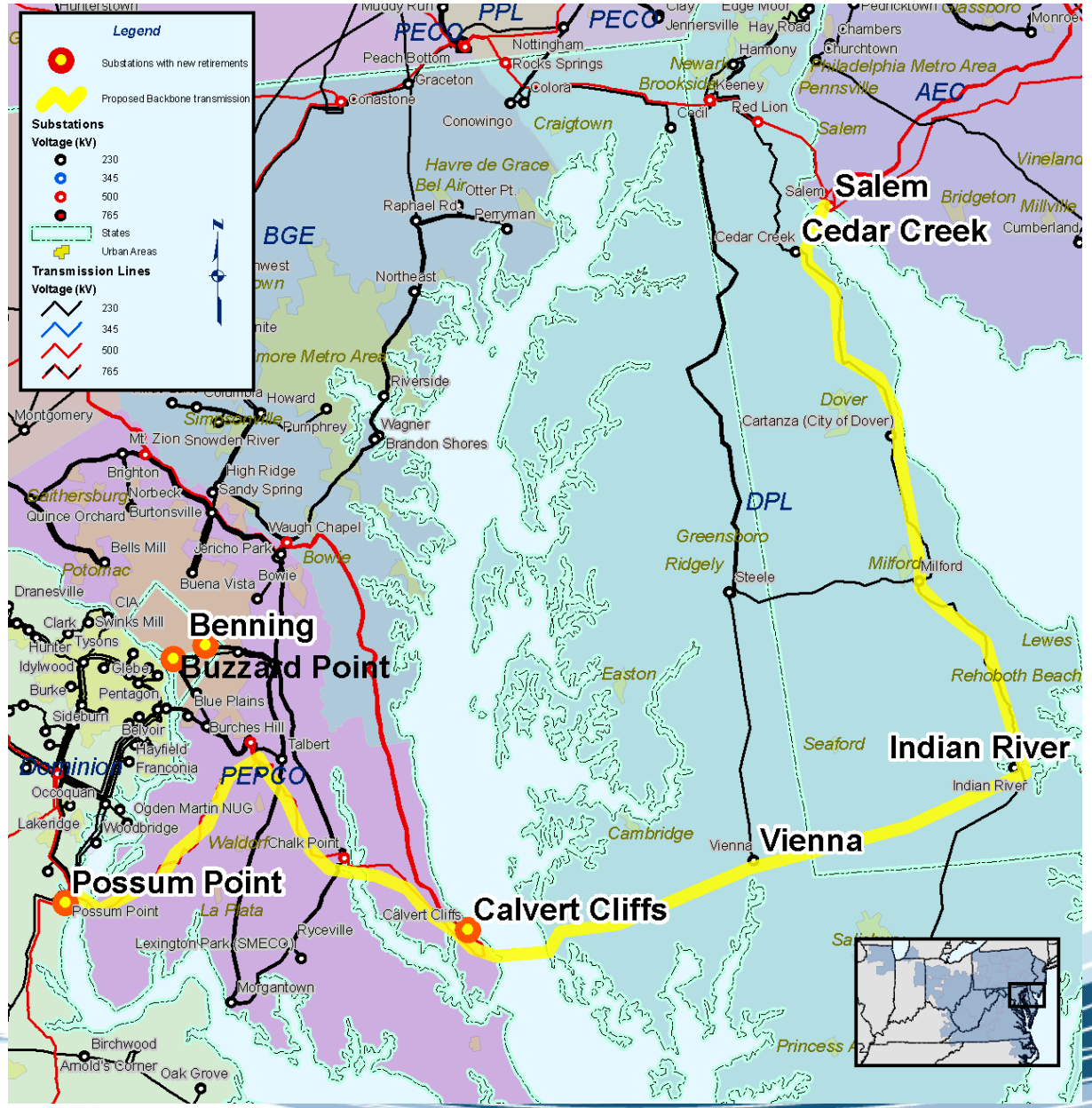
Potential Regional Solutions



MAPP AC vs DC Analysis

Mid-Atlantic Power Pathway (MAPP) Project

- AC versus DC Comparison
  - Two AC designs were evaluated
    - Self contained fluid filled (SCFF)
    - XLPE cables
  - HVDC configuration with a link between Calvert Cliffs and Vienna and a second link between Calvert Cliffs and Indian River



- AC Alternatives – XLPE or Oil filled cables
  - Total of nine cables approximately 12 miles long
  - Largest commercially available cable
  - Only one oil filled 500 kV AC submarine cable in the world (Vancouver)
  - Shunt reactors would be required for voltage control (estimated 1800 MVAR)
  - 500 kV XLPE cable typically installed over shorter distances without splices (typically a few thousand feet)
    - One installation in Japan with splices in a controlled environment (tunnel)
    - No factory splices designed or tested for solid dielectric cable
    - Estimated to take 2 to 5 years to develop, certify and test an XLPE splice
  - Longest 500 kV XLPE cable available without splices is approximately 8 to 9 miles
  - Of these two AC technologies, given the engineering risk and potential for delay associated with a XLPE installation, oil filled cable technology is preferred.

Cost Comparison AC versus DC Bay Crossing

MAPP -- AC Fluid-Filled or Mass Impregnated Cable versus DC Cost Comparison 2008
Cost for a portion of MAPP Project - under consideration for AC versus DC technology

	AC With Fluid Filled Cable	DC	Delta
500kv Switching Station near Calvert Cliffs			
1a. Switching and Shunt Reactor Station	$51.6	$0.0	
1b. Breaker-and-a-half configuration, 830'x500' or 9.5 acres	$0.0	$31.7	
Subtotal	***$51.6***	***$31.7***	***($19.9)***
HVDC Converter Stations near Calvert Cliffs			
2a. 1-1000MW Converter Station plus site preparation	$0.0	$141.3	
2b. 2nd - 1000MW Converter	$0.0	$137.3	
Subtotal - 2-1000MW converter	***$0.0***	***$278.6***	***$278.6***
Underground Cables to Bay (1500ft)			
3. Includes Horizontal Directional Drills (HDDs) for Submarine Cable Landing	***$15.2***	***$9.7***	***($5.5)***
Submarine Cable			
4a. Three parallel 500kV submarine circuits, total of nine (9) cables, original estimate for 8 miles of $263mil updated to 12 miles at $394.5mil	$394.5	$0.0	
4b. Three parallel HVDC 640kV submarine circuits, total of six (6) 3000kcmil cables, twelve miles long	$0.0	$128.0	
Subtotal	***$394.5***	***$128.0***	***($266.5)***
Underground Cables from Bay (1500ft) & Underground to Aerial Transition Station			
5a. Includes Horizontal Directional Drills (HDDs) for Submarine Cable Landing	$15.2	$9.7	
5b. Underground to Aerial Transition Station	$5.0	$1.4	
Subtotal	***$20.2***	***$11.1***	***($9.1)***
Vienna construct 1000MW, 640kV HVDC light converter station to 230kV			
6a. Switching and Shunt Reactor Station	$68.3	$0.0	
6b. (assuming 2 - 1000 MW converters; this will not be needed with only one) -- includes site preparation	$0.0	$139.6	
Subtotal	***$68.3***	***$139.6***	***$71.3***
Indian River construct 1000MW, 640kV HVDC light converter station to 500kV			
7. 1 - 1000 MW converter; includes site preparation	***$0.0***	***$140.4***	***$140.4***
Total	**$549.8**	**$739.1**	**$189.3**

- Improved reactive performance of DC
  - Reactive power of voltage source converter system can be controlled independently
- HVDC control will improve system stability, AC system damping
- Improved reliability – two independent 1,000 MW DC circuits
  - Comparable functionality of independent AC lines is estimated at $350 million and would require additional ROW width.
- Improved control of real power flow with DC system

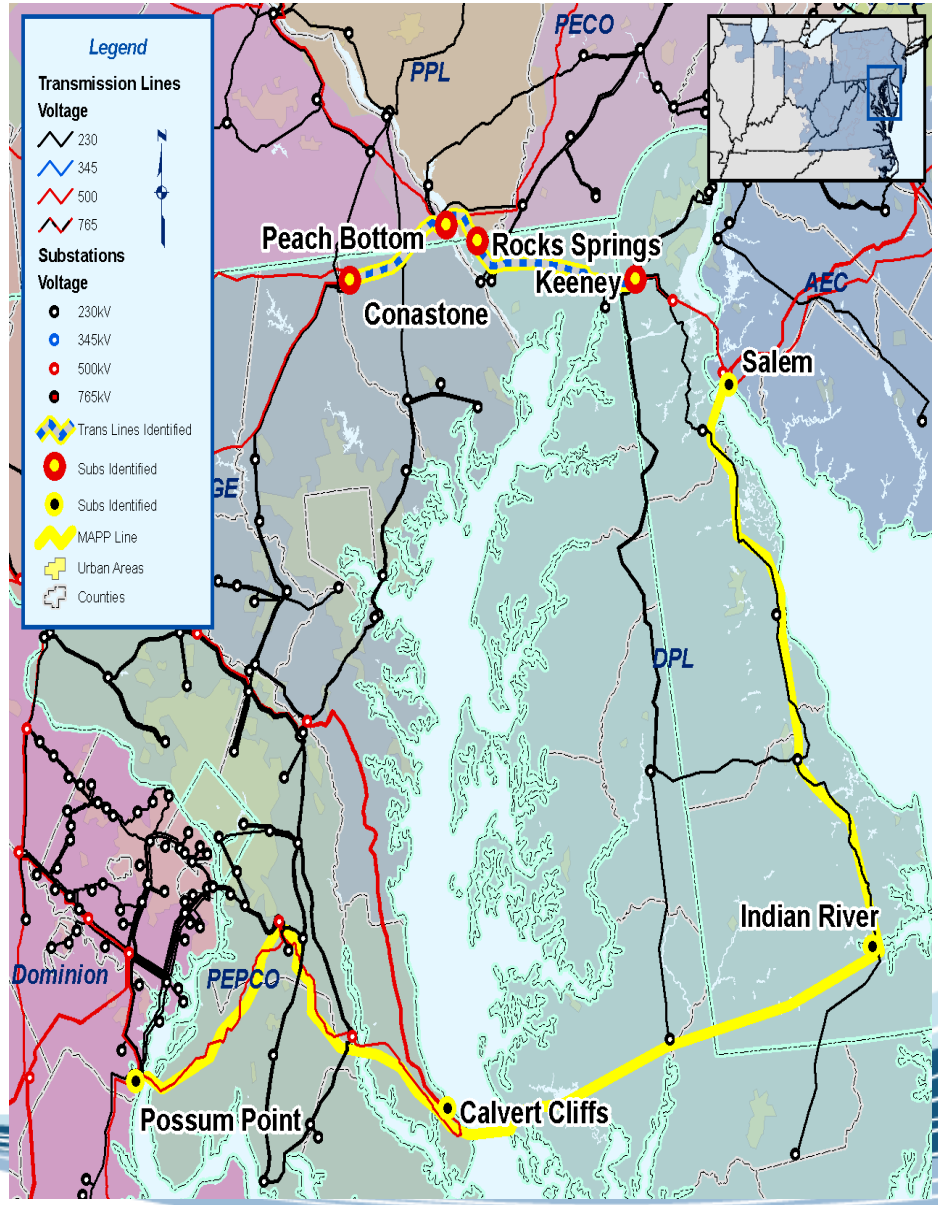
- An AC crossing of the Chesapeake Bay poses significant environmental risks in the event of an oil leak or spill
- Few cables crossing the bay with the DC alternative compared to AC
  - AC crossing would require 9 cables (800’ in width)
  - DC crossing would require 6 cables (500’ in width)
  - Disturbed area in the bay is 40% less with DC

- Considering the difference in cost, the regulatory risk associated with each alternative and the operational benefits the preferred technology is HVDC

- New 500 kV line from Conastone to Peach Bottom to Keeney
- MAPP Project
- Sensitivity Analysis – Indian River generation
  - Indian River Unit 1 and Unit 2 out of the case as PJM has been notified of their intention to retire
  - Indian River Unit 3 and Unit 4 will need to be shut down by 2011 unless they resolve some environmental issues

Indian River 3 & 4 On-line

- Scenario Tested
  - 500 kV AC Line from Possum Point to Burches Hill to Chalk Point to Calvert Cliffs with a DC link from Calvert Cliffs to Vienna
  - 500 kV AC line from Conastone to Peach Bottom to Keeney



500 kV Overloads

				100% Year		
Fr Name	**To Name**	**CKT**	**KV**	**Base**	**DC + P-C**	**C-P-K**
ROCKSPGS	KEENEY	1	500	2018	2023	
PEACHBTM	KEENEY	1	500			2021
AIRDAL2	JUNIATA	1	500	2020	2023	2020
KEYSTONE	AIRDAL3	1	500	2022		2021
8MT STM	01DOUBS	1	500	2023	2023	2018
AIRDAL3	JUNIATA	1	500	2020	2023	2019
KEENEY	REDLION	1	500			2023

				100% Year		
Fr Name	**To Name**	**CKT**	**KVs**	**Base**	**DC + P-C**	**C-P-K**
KEENEY	KEEN_230	1	500/230	2016	2023	2013
KEENEY	KEEN_230	2	500/230	2016	2023	2013
REDLION	RL_230	2	500/230			2013
W CHAPEL	W.CHAPEL	2	500/230	2020		2020
W CHAPEL	W.CHAPEL	1	500/230	2020		2020

230 kV Line Overloads

				100% Year		
Fr Name	**To Name**	**CKT**	**KV**	**Base**	**DC + P-C**	**C-P-K**
PALM093	ALA 089	1	230	2022	2019	2022
BRANDN.S	HWKPT 44	1	230	2020		2020
PALM090	ALA 088	1	230		2022	
H.RDGE16	HOWARD32	1	230	2023		2023
RL_230	CEDAR CK	1	230	2018		2019
SANDY14T	H.RDGE16	1	230	2021		2022
SOLPT 45	RIV2317	1	230	2023		
SANDY34T	H.RDGE16	1	230	2021		2022
GRACETON	MANOR	1	230	2023		
BRANDN.S	HWKPT 45	1	230	2023		
GRACETON	PCHBTMTP	1	230	2023		
PCHBTMTP	NOTTREAC	1	230	2021		
SOLPT 44	RIV2339	1	230	2020		2020

138 kV Line Overloads

				100% Year		
Fr Name	**To Name**	**CKT**	**KV**	**Base**	**DC + P-C**	**C-P-K**
Vienna8	NELSON	1	138		2013	
Steele	Hillsboro	1	138	2021	2023	2021
Reybold	Lums	1	138	2022		2022
Townsend	Church	1	138	2019		2022
Keeney	Glasgow	1	138	2019		2016

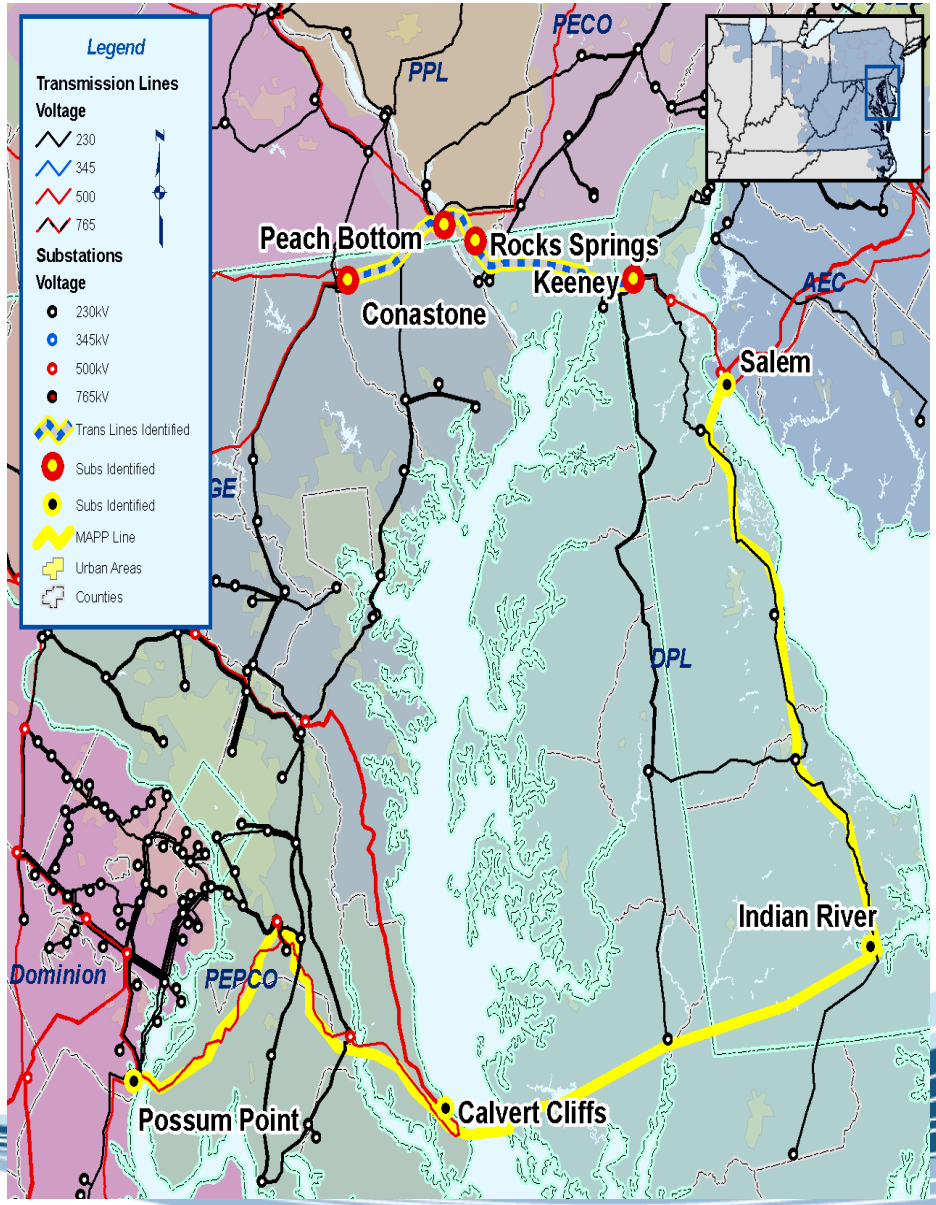
Tower Outages

				100% Year		
Fr Name	To Name	CKT	KV	Base	DC + P-C	C-P-K
Townsend	Church	1	138	2018		2019
				2023 Loading(%)		
Fr Name	To Name	CKT	KV	Base	DC + P-C	C-K-P
Townsend	Church	1	138	114.59		113.48

- Both the DC option as well as the 500 kV line from Conastone to Peach Bottom to Keeney resolve the Mid-Atlantic and Eastern Mid-Atlantic voltage collapse issue noted previously.

Indian River 3 & 4 Off-line

- Scenario Tested
  - 500 kV AC Line from Possum Point to Burches Hill to Chalk Point to Calvert Cliffs with a DC link from Calvert Cliffs to Vienna and a DC link from Calvert Cliffs to Indian River
  - 500 kV AC line from Conastone to Peach Bottom to Keeney



500 kV Overloads

				100% Year		
Fr Name	**To Name**	**CKT**	**KV**	**Base**	**Two DC+P-C**	**C-P-K**
ROCKSPGS	KEENEY	1	500	2013		
CONEM-GH	AIRDAL2	1	500	2023		
PEACHBTM	LIMERICK	1	500	2022		
AIRDAL2	JUNIATA	1	500	2014		2019
KEYSTONE	AIRDAL3	1	500	2014		2020
CNASTONE	PEACHBTM	2	500			2021
KEYSTONE	CONEM-GH	1	500	2018		2023
KEENEY	REDLION	1	500			2020
PEACHBTM	ROCKSPGS	1	500	2017		
8MT STM	01DOUBS	1	500	2018	2021	2019
01KEMPTN	CNASTONE	1	500	2021		2016
PEACHBTM	KEENEY	1	500			2015

Transformers

				100% Year		
Fr Name	**To Name**	**CKT**	**KVs**	**Base**	**Two DC+P-C**	**C-P-K**
KEENEY	KEEN_230	1	500/230	2013		2013
KEENEY	KEEN_230	2	500/230	2013		2013
CNASTONE	CONASTON	1	500/230		2022	
CNASTONE	CONASTON	2	500/230		2022	
W CHAPEL	W.CHAPEL	2	500/230	2019		2020
W CHAPEL	W.CHAPEL	1	500/230	2019		2020
REDLION	RL_230	2	500/230	2013		2016
01BEDING	01BEDNGT	1	765/500	2017	2021	2019
01BEDING	01BEDNGT	2	765/500	2017	2021	2019

230 kV Overloads

				100% Year		
Fr Name	**To Name**	**CKT**	**KV**	**Base**	**Two DC+P-C**	**C-P-K**
PALM093	ALA 089	1	230	2021	2020	2021
NOTTREAC	NOTTNGHM	1	230	2013		
01DOUBS	01LIMEKN	2	230	2014	2018	2014
01DOUBS	01LIMEKN	1	230	2014	2018	2014
KEEN_230	RL_230	1	230			2022
BRANDN.S	HWKPT 44	1	230	2018		2019
MILF_230	INDRIV 4	1	230			2022
H.RDGE16	HOWARD32	1	230	2020		2019
KEEN_230	STEELE	1	230	2020		2018
RL_230	CEDAR CK	1	230	2013		2013
SANDY14T	H.RDGE16	1	230	2014	2023	2017
SANDY34T	H.RDGE16	1	230	2015	2022	2016
HWKPT 44	SOLPT 44	2	230	2022		2022
PARRISH8	MASTER	1	230		2018	
GRACETON	MANOR	1	230	2021		
SOLPT 44	RIV2339	1	230	2018		2019
GRACETON	PCHBTMTP	1	230	2015		
PCHBTMTP	NOTTREAC	1	230	2013		
HWKPT 44	SOLPT 44	1	230	2022		2022

138 kV Overloads

				100% Year		
Fr Name	**To Name**	**CKT**	**KV**	**Base**	**Two DC+P-C**	**C-P-K**
VIENNA 8	NELSON	1	138		2013	
STEEL138	HILLSBRO	1	138	2020		2020
REYBOLD	LUMS	1	138	2020		2019
TOWNSEND	CHURCH	1	138	2015		2013
MILF_138	SHARNGTN	1	138	2022		2022
CEDAR138	CLAYTN_D	1	138	2021		2019
KEEN_138	GLASGOW	1	138	2017		2014

Tower Outages

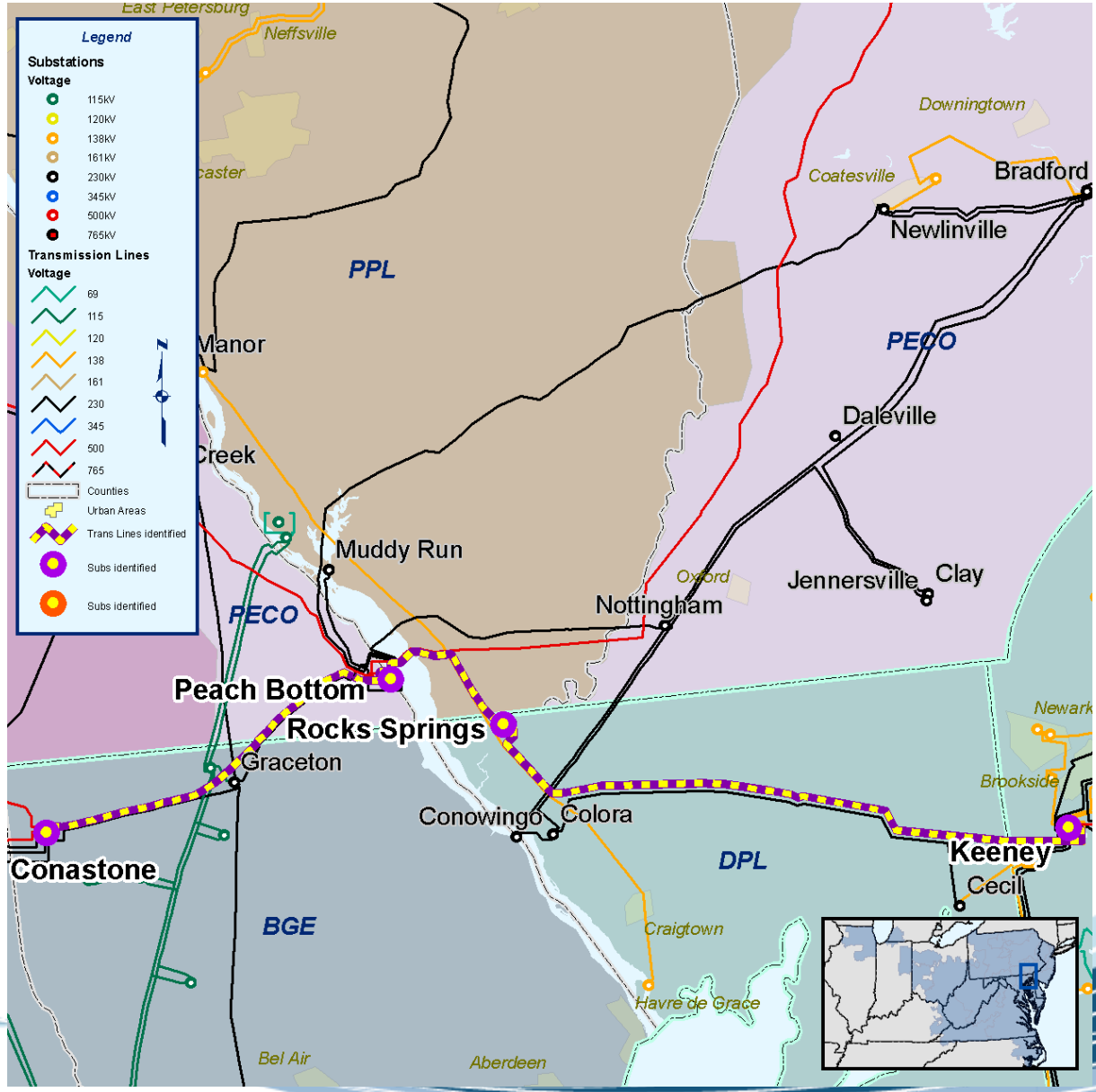
				100% Year		
Fr Name	**To Name**	**CKT**	**KVs**	**Base**	**Two DC+P-C**	**C-P-K**
01DOUBS	01LIMEKN	2	230/230	2014	2018	2014
TOWNSEND	CHURCH	1	138/138	2013		2013
REYBOLD	LUMS	1	138/138	2021		2021
KEEN_230	STEELE	1	230/230	2013		2013
RL_230	CEDAR CK	1	230/230	2013		2013
8PL VIEW	6PL VIEW	1	500/230	2017	2015	2017
MIDLTNTP	TOWNSEND	1	138/138	2016		2017
MT PLSNT	MIDLTNTP	1	138/138	2016		2016
STEELE	MILF_230	1	230/230	2013		2013

Load Deliverability – Voltage Analysis with Indian River Retired

- Mid-Atlantic Load Deliverability
  - DC alternative resolves all issues
  - Conastone to Peach Bottom to Keeney
    - Not converged for the following contingencies:
      - Loss of Red Lion – Hope Creek
      - 8 additional contingencies not converged
- Eastern Mid-Atlantic Load Deliverability
  - DC alternative resolves all issues
  - Conastone to Peach Bottom to Keeney
    - Not converged for the following contingencies:
      - Loss of Red Lion – Hope Creek 500 kV
      - Loss of Peach Bottom – Keeney 500 kV
      - Loss of Oyster Creek (619 MW)
      - 32 additional contingencies not converged

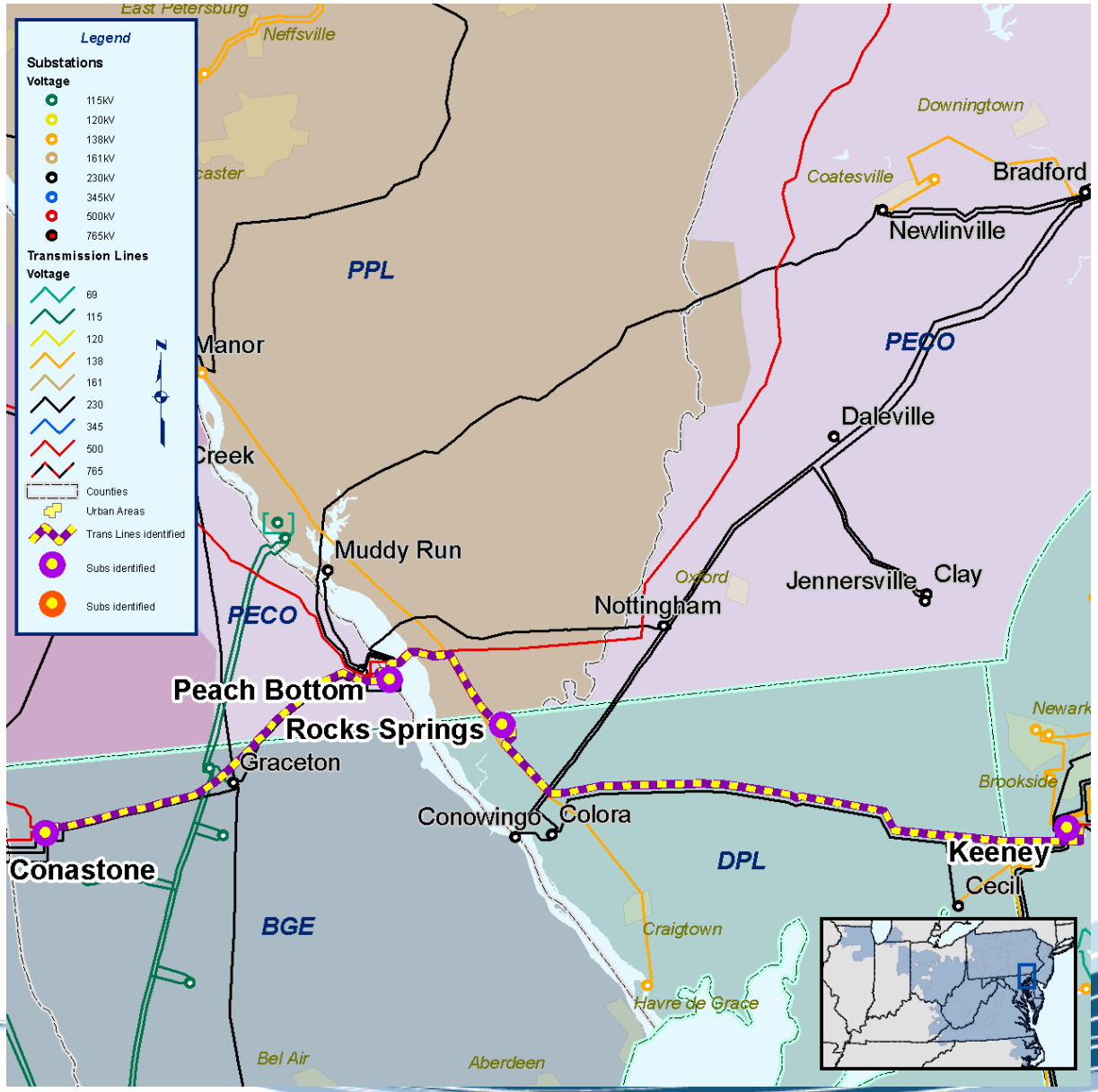
Conastone to Peach Bottom Alternative

- Scope – Build a new 500 kV line from Conastone to Peach Bottom
- Approximately 10.3 miles in BG&E and 6.2 miles in PE
- Estimated cost: $102.5 M
- Estimated time to complete: 8 years



Peach Bottom to Keeney Alternative

- Scope – Build a new 500 kV line from Peach Bottom to Keeney
- Approximately 7.3 miles in PE and 4 miles in Delmarva
- Estimated cost: $193 M
- Risks: Construction of the line will require extended outages of the Rock Springs to Keeney 500 kV line as well as on several 138 kV and 230 KV lines out of Keeney

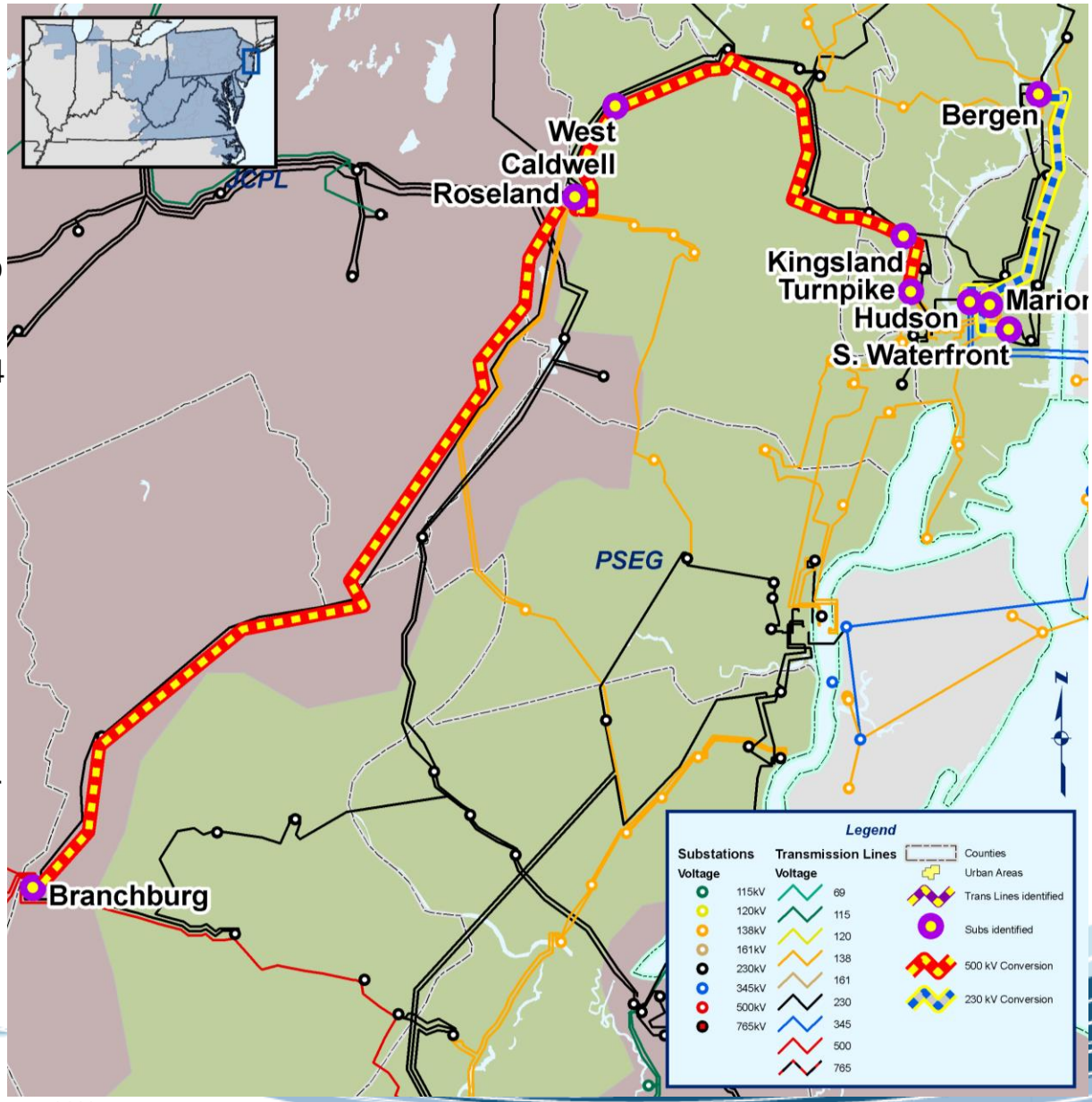


- Proceed with the engineering and construction of the portion of the MAPP project from Possum Point to Burches Hill to Chalk Point to Calvert Cliffs with a DC link from Calvert Cliffs to Vienna and a DC link from Calvert Cliffs to Indian River.
- Expected in-service date: June 1, 2013
- PJM will continue to follow the disposition of the Indian River consent decree to determine if additional interim solutions are required.

PS Thermal and Reactive Issues

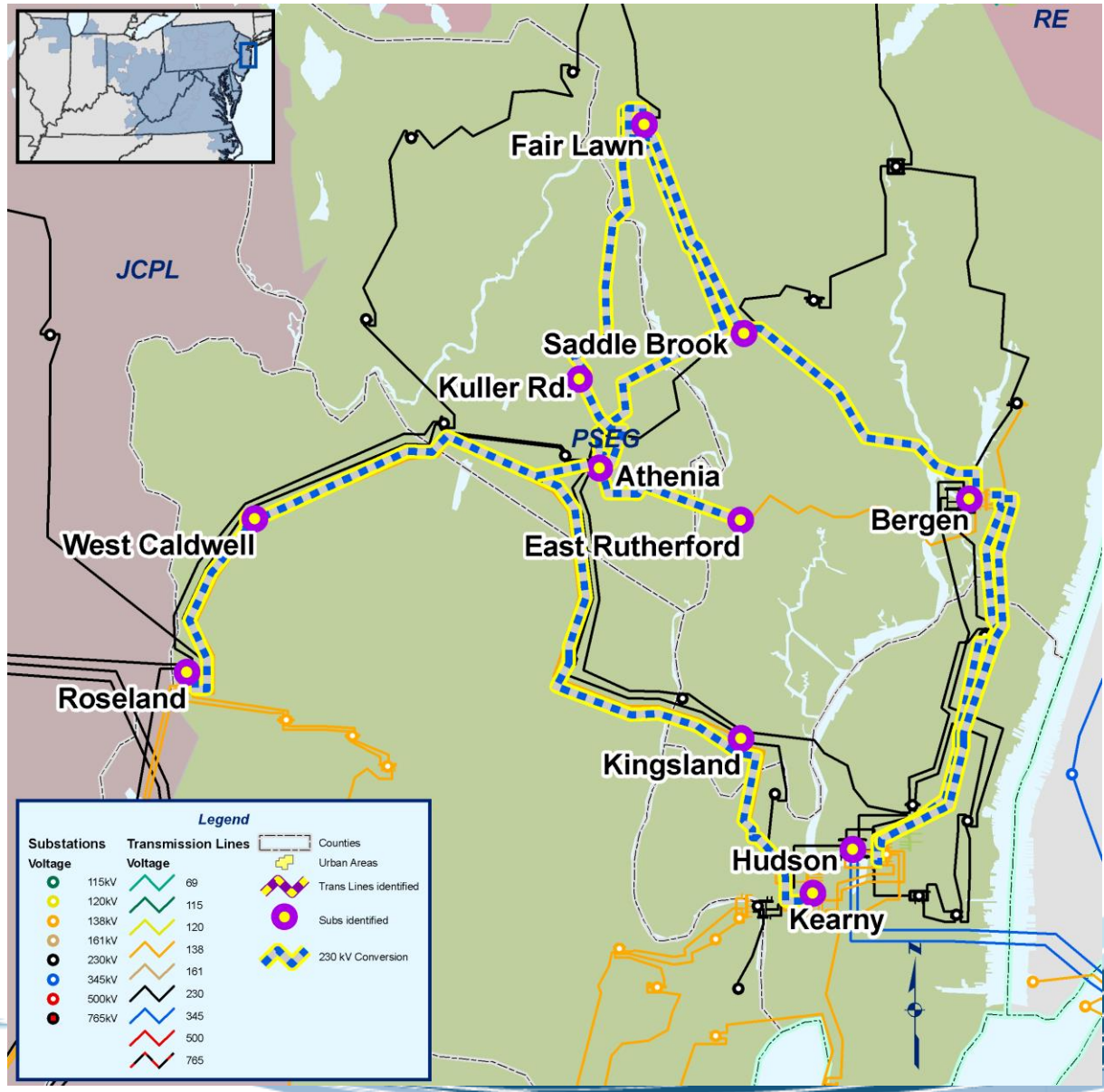
500 kV Alternative Scope

- Convert Roseland – Turnpike (G-1307) 138 kV line to a 500kV line from Roseland to Hudson.
- Move two West Caldwell transformers T-2 and T-4 to the existing Roseland – Cedar Grove 230 kV circuit.
- Move Kingsland transformer #1 to the other bus, and operate in 230 kV
- Remove both G-1307 and D-1304 at Turnpike
- Add a 500kV circuit from Branchburg to Roseland
- Remove one of the proposed 500/230 autotransformers at Roseland
- Convert F-1306 into a 230kV circuit from Hudson to Bergen, but keep E-1305 between Marion – Bergen 138 kV line
- Use 1200N/1500E MVA for the Roseland 500/230 kV transformer
- Re-conductor the Hudson - South Waterfront 230 kV circuit to have 514N/790E MVA ratings.
- Estimated Cost: $1,088 Million



230 kV Alternative Scope

- Convert Roseland – Kearney D-1304 to 230 kV line and loop-in at Athenia 230 kV station
- Convert the 138 kV cable system in Athenia/Fair Lawn/Kuller Road/East Rutherford/Saddle Brook/Bergen to 230 kV operation with 400N/600E line ratings.
- Convert Hudson – Bergen DCTL 138 kV lines E-1305/F-1306 to a single 230 kV circuit
- Convert the Roseland – Kearny CKT G1307 138 kV to 230 kV.
- Change rate A of Roseland – West Caldwell Generation to 800 MVA
- Change rate A of Kingsland – Hudson to 800 MVA
- Estimated Cost: $875 Million



15-Year Planning Results for Single Contingencies

Fr Bus	Fr Name	To Bus	To Name	CKT	KVs	Areas	Base	230kV	500kV
4954	ATHENIA	5020	SADDLBRK	1	230/230	31/31	2013		
5042	CLIFTN K	5187	ATHENIA1	1	230/230	31/31	2013		
5017	ROSELAND	4974	CDR GV B	1	230/230	31/31	2013		
2555	READ-GTN	5017	ROSELAND	1	230/230	28/31	2022		
4092	DALEVLLE	4374	BRADFRD1	1	230/230	30/30		2023	2023
4975	CDR GV F	5042	CLIFTN K	1	230/230	31/31	2013		
5018	ROSLD2-4	5088	W.CALD D	1	138/138	31/31	2013		
4951	ALDENE	5023	SPRINGRD	1	138/138	31/31	2015		
94	ROSELD	5017	ROSELAND	2	500/230	25/31	2013	2013	
94	ROSELD	5017	ROSELAND	1	500/230	25/31	2013	2013	2017
4954	ATHENIA	5037	BERGEN	1	230/230	31/31	2013		
5019	ROSLD5-7	5089	W.CALD G	1	138/138	31/31	2013		
2550	WHIPPANY	5017	ROSELAND	1	230/230	28/31	2013		
5041	CLIFTN B	4954	ATHENIA	1	230/230	31/31	2013		
4962	BRANCHBG	2555	READ-GTN	1	230/230	31/28	2018		
2534	GRYSTN Q	2550	WHIPPANY	1	230/230	28/28	2018	2022	
5017	ROSELAND	4975	CDR GV F	1	230/230	31/31	2013		
5494	FLAGTWN2	5035	SOMRVLLE	1	230/230	31/31	2016		
4974	CDR GV B	5041	CLIFTN B	1	230/230	31/31	2013		
5020	SADDLBRK	5036	MAYWOOD	1	230/230	31/31	2022		
4962	BRANCHBG	5494	FLAGTWN2	1	230/230	31/31	2016		

15-Year Planning Results for Tower Contingencies

Fr Bus	Fr Name	To Bus	To Name	CKT	KVs	Areas	230kV	500kV
3076	MTN CRK	1162	PORTLAND	1	230/230	29/27	2023	
3076	MTN CRK	2556	MO PARK	1	230/230	29/28	2022	
2534	GRYSTN Q	2550	WHIPPANY	1	230/230	28/28	2020	
5088	W.CALD D	4953	ATHENIA3	1	230/230	31/31	2017	
2528	GILBERT	2524	G GARDNR	1	230/230	28/28	2021	
5017	ROSELAND	5088	W.CALD D	1	230/230	31/31	2023	
2535	KITATINY	2540	POHATCNG	1	230/230	28/28	2021	
3085	SUSQHNA	3672	JENK TR2	1	230/230	29/29	2016	2018
4964	BRIDGWTR	4963	MIDDLSEX	1	230/230	31/31	2015*	
2876	SMITHBRG	2878	MANALAPN	1	230/230	28/28	2015*	
2878	MANALAPN	2871	ENGLISH	1	230/230	28/28	2015*	
5035	SOMRVLLE	4964	BRIDGWTR	1	230/230	31/31	2013*	
4963	MIDDLSEX	5106	L.NELSNI	1	230/230	31/31	2013*	

*: Losses of Atlantic - Smithburg 230 kV line and Atlantic - Larrabee 230 kV line in the PSEG 230 kV option create reactive issues (large difference between DC and AC loadings).

Reactive Performance Comparison

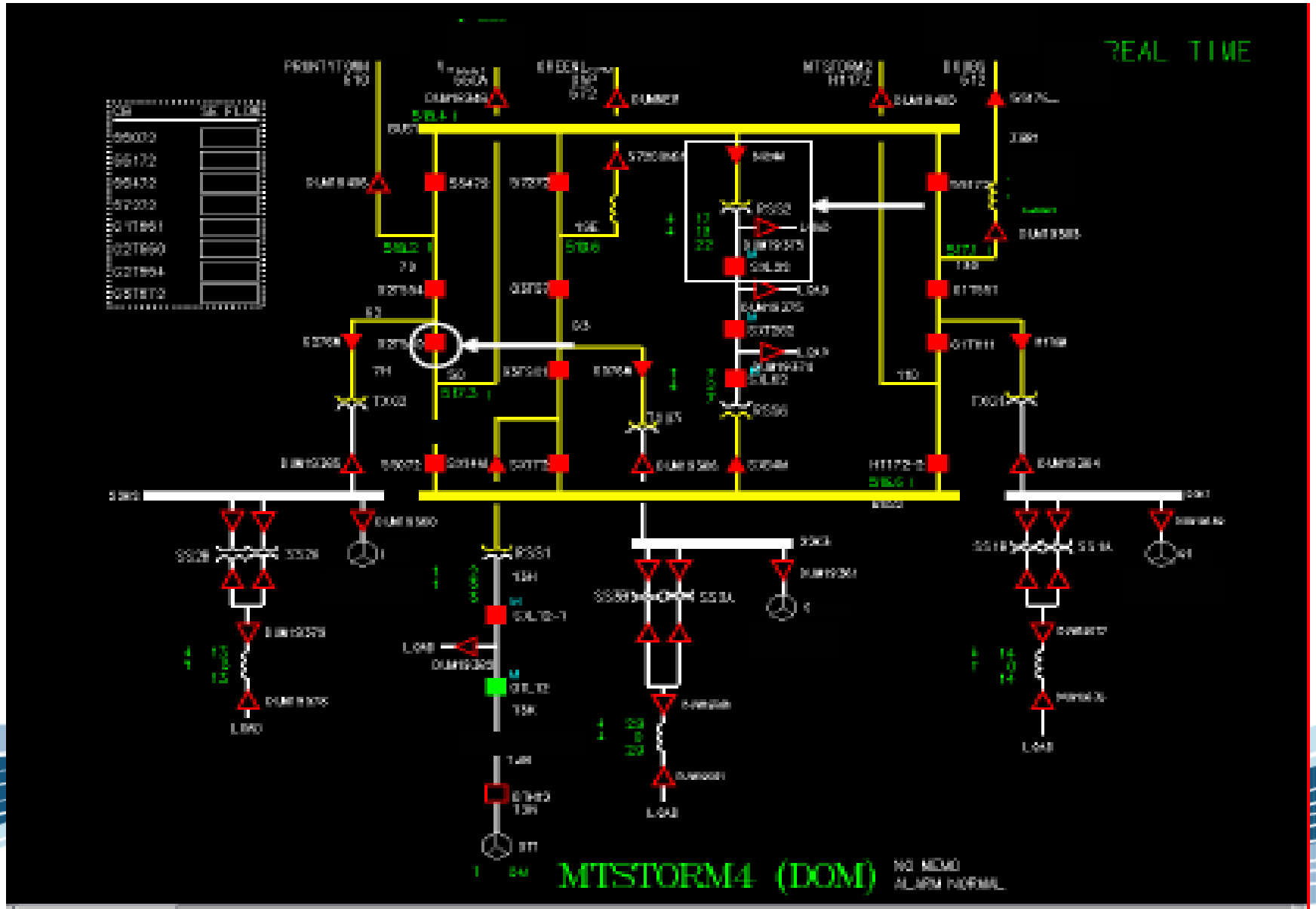
- The two alternatives resolve many of the reactive issues identified
- Both the 500 kV and 230 kV alternatives resolve reactive issues for PS and PS North load deliverability conditions.
- For EMAAC load deliverability conditions, reactive performance is similar for each alternative with significant voltage issues for the loss of the Greystone to Whippany 230 kV line.
- For MAAC load deliverability conditions, reactive losses are approximately 1000 MVAR higher for the 230 kV alternative.
- Common mode contingency performance is better with the 500 kV alternative.

- Work by the independent engineering firm that has been contracted by PJM to evaluate the constructability of each alternative is in-progress.
- The 500 kV alternative is more robust resolving all near term thermal violations.
- A more robust 230 kV alternative would be required as the proposed alternative does not resolve all of the near term violations.
- PJM staff will be recommending the 500 kV alternative to the PJM Board of Managers provided the 500 kV alternative does not identify any fatal flaws with the alternative.

Miscellaneous Upgrades

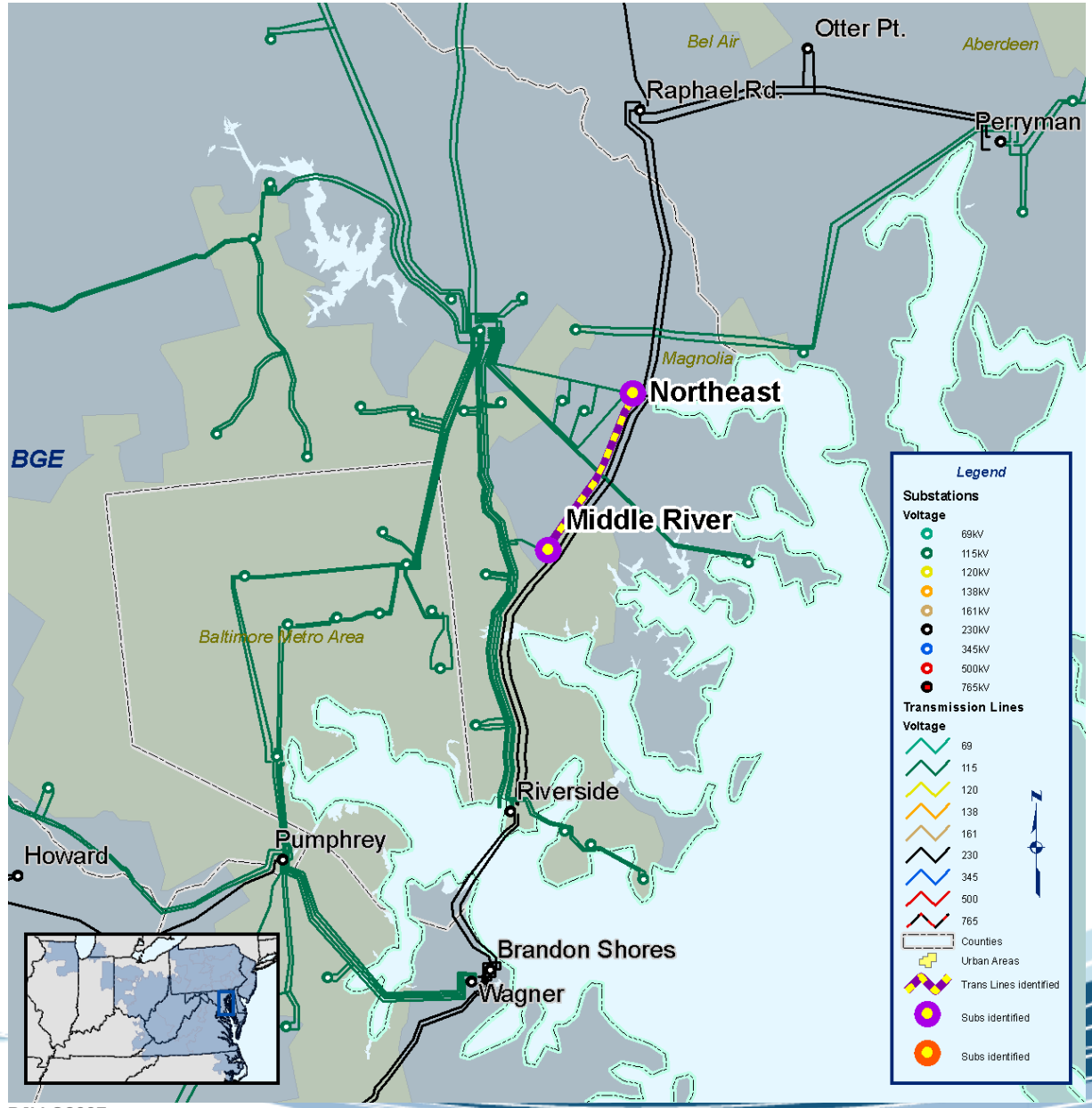
- The breaker configuration at Mt Storm is such that the loss of a transformer trips a 500 kV bus
- There is no circuit breaker on the transformer
- Operating to this contingency has caused significant congestion over the past year
- Since July there has been over $35 million in congestion to operate to this contingency
- PJM recommendation: replace the existing MOD on the 500 kV side of the transformer with a circuit breaker
- Estimated cost: $1.5 million
- Installation could be completed as early as next year

Mt Storm Transformer Breaker Upgrade



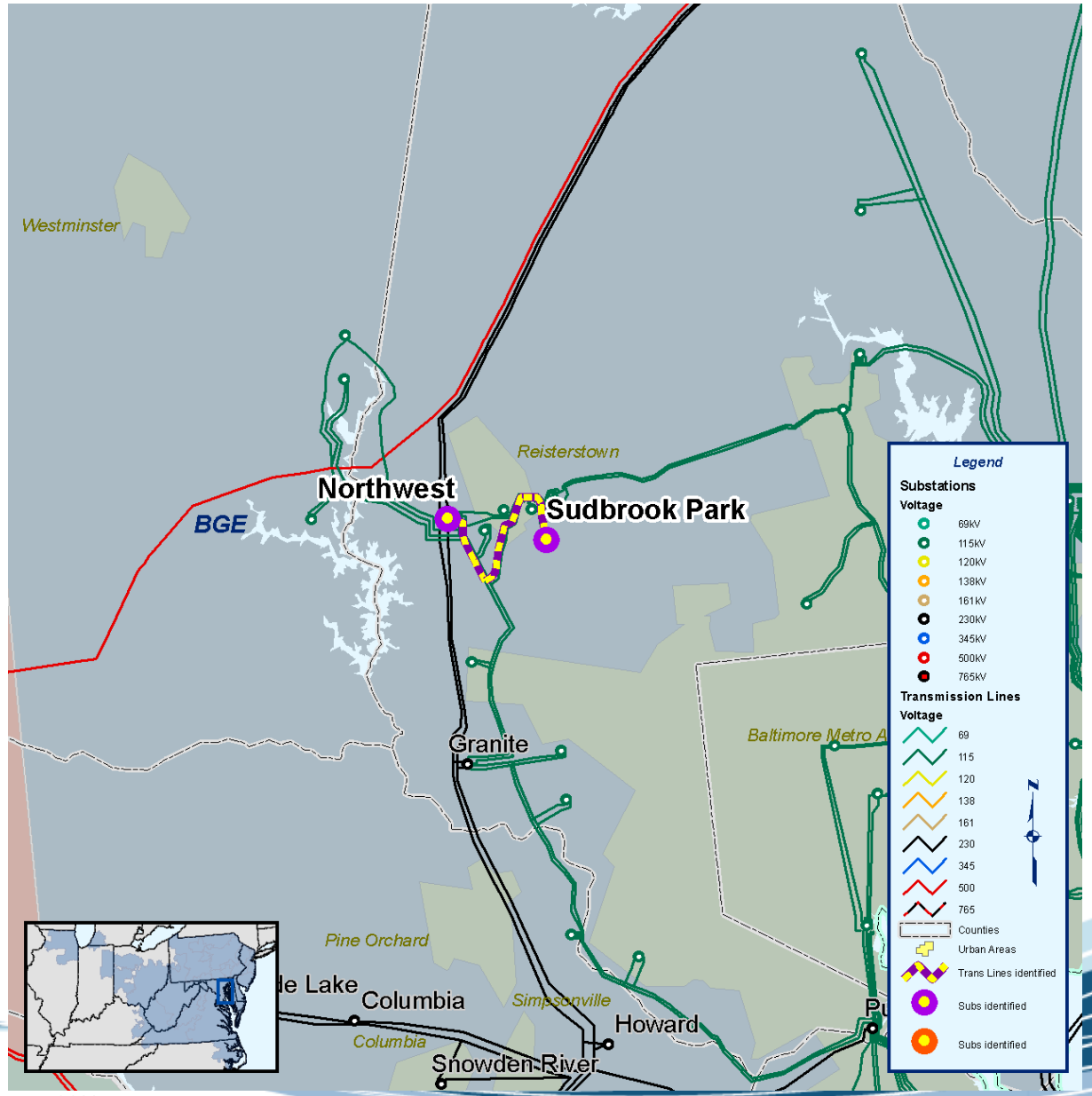
BGE N-2 Baseline Upgrades

- Middle River – Chesaco Park 115 kV line / loss of Middle River - Northeast 115 kV line + Basecase
- Install a 115 kV breaker at Chesaco Park
- Cost Estimate: $1.4M
- Expected IS Date: 6/01/2013



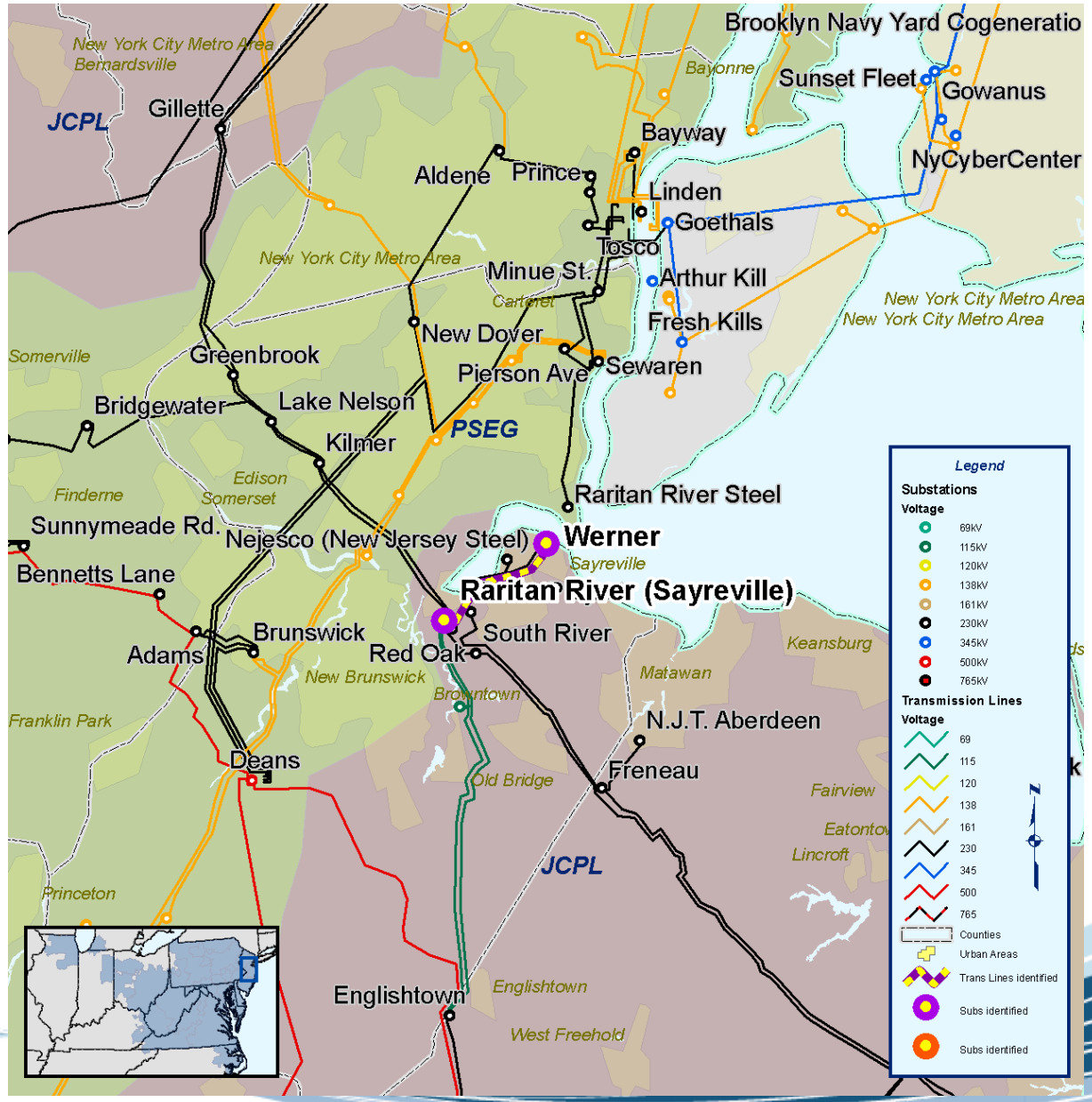
BGE N-2 Baseline Upgrades

- Gwynnbrook - Sudbrook 110579-E 115 kV line / loss of Northwest – Sudbrook 110578 115 kV line + Basecase
- Install 2, 115 kV breakers at Gwynnbrook
- Cost Estimate: $1.8M
- Expected IS Date: 6/01/2013



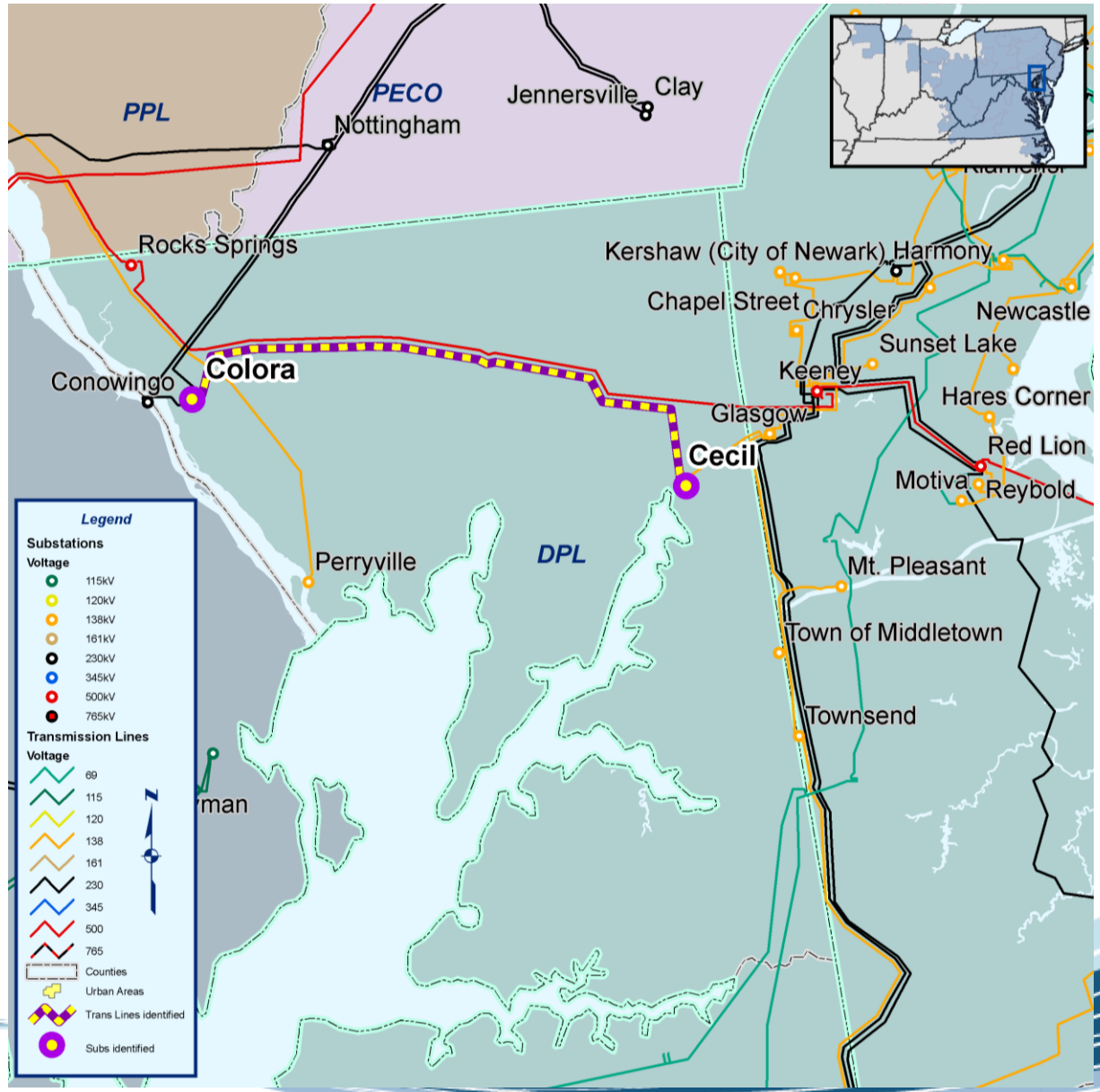
JCPL N-2 Baseline Upgrades

- Werner – Raritan River 115 kV line / loss of Smithburg-Englishtown 230 kV line + loss of Raritan River 230/115 kV transformer
- Werner 230/115 kV transformer / loss of Smithburg-Englishtown 230 kV line + loss of Raritan River 230/115 kV transformer
- Add a 2nd Raritan River 230/115 kV transformer
- Estimated Project Cost: $7.1 M
- Expected IS Date: 6/01/2013



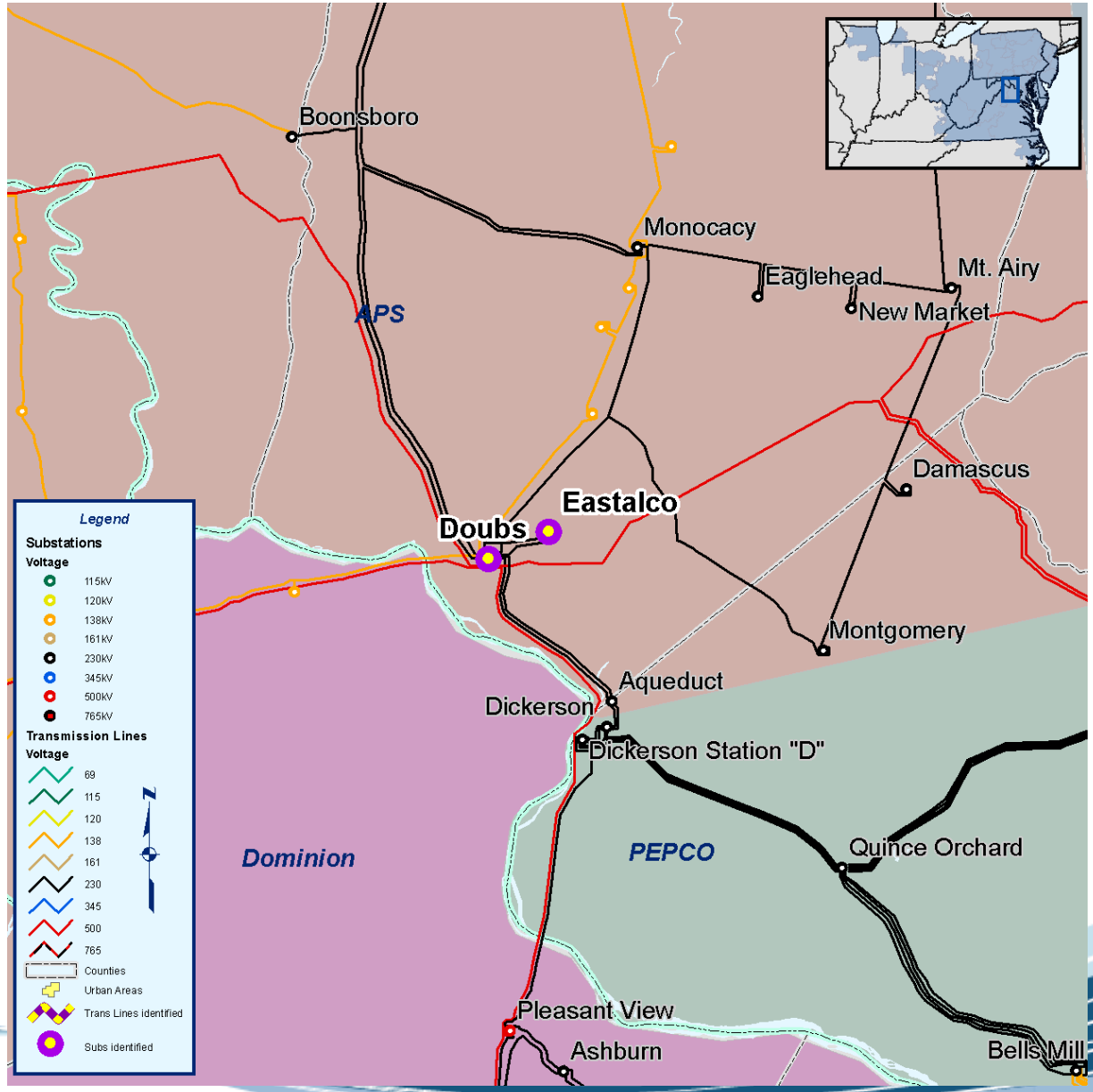
DPL N-2 Baseline Upgrades

- Cecil – Colora 230 kV line / loss of Lums – Reybold 138 kV line + loss of Glasgow – Keeney 138 kV line
- Reconfigure Cecil substation into 230 kV and 138 kV ring buses, add a 230/138 kV transformer, and operate the 34 kV bus normally open
- Estimated Project Cost: $6 M
- Expected IS Date: 6/01/2013



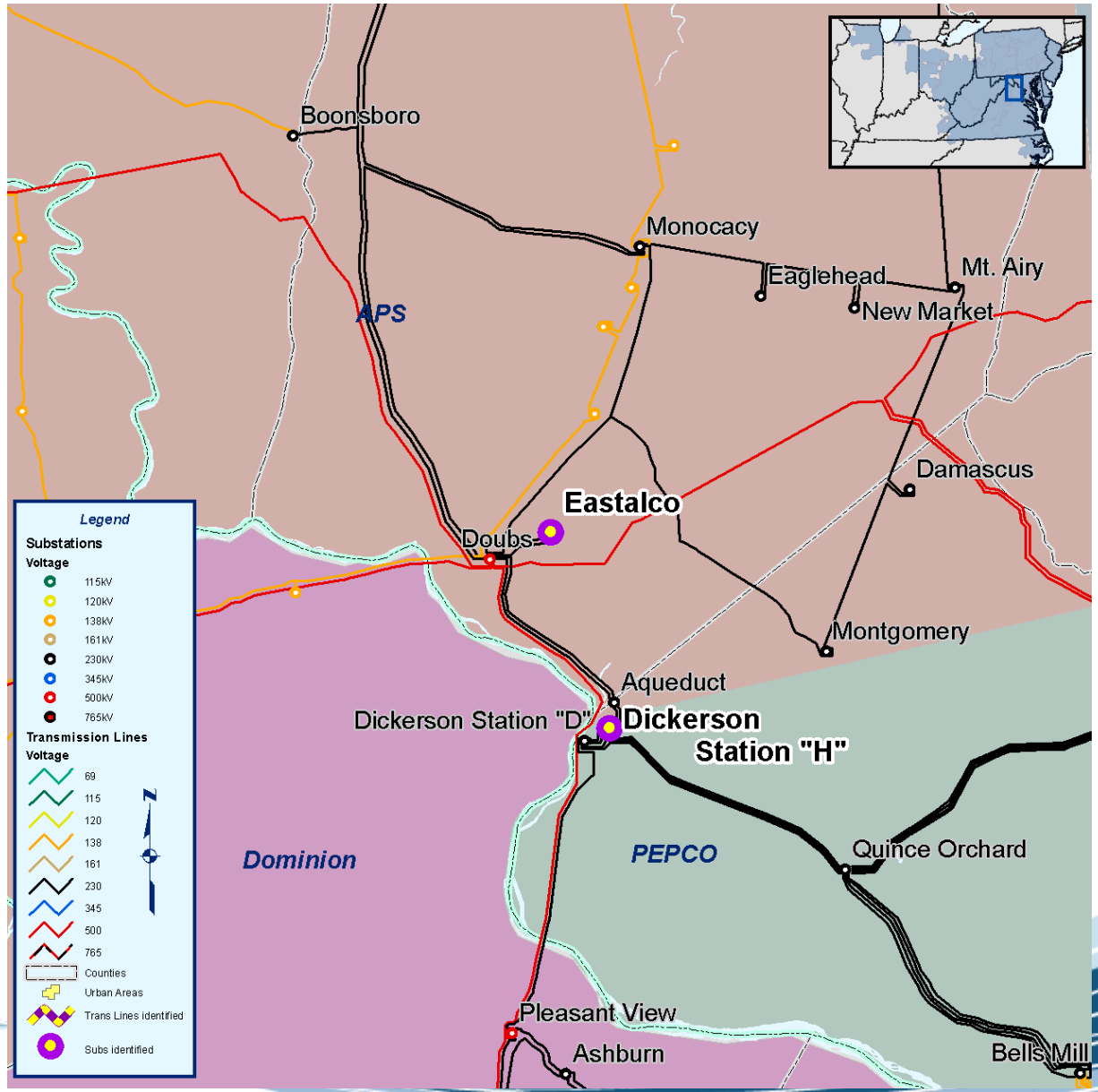
AP Baseline Upgrades

- Accelerate breaker network upgrades associated with the Eastalco generation project
- Acceleration required to meet baseline need despite current suspension status of Eastalco generation project
- Replacement of Doubs 230 kV breakers DJ2, DJ3, DJ6, and DJ16
- Estimated Replacement Cost: $300K per breaker
- Estimated Advancement Cost: $10K per breaker
- Expected IS Date: 6/01/2009



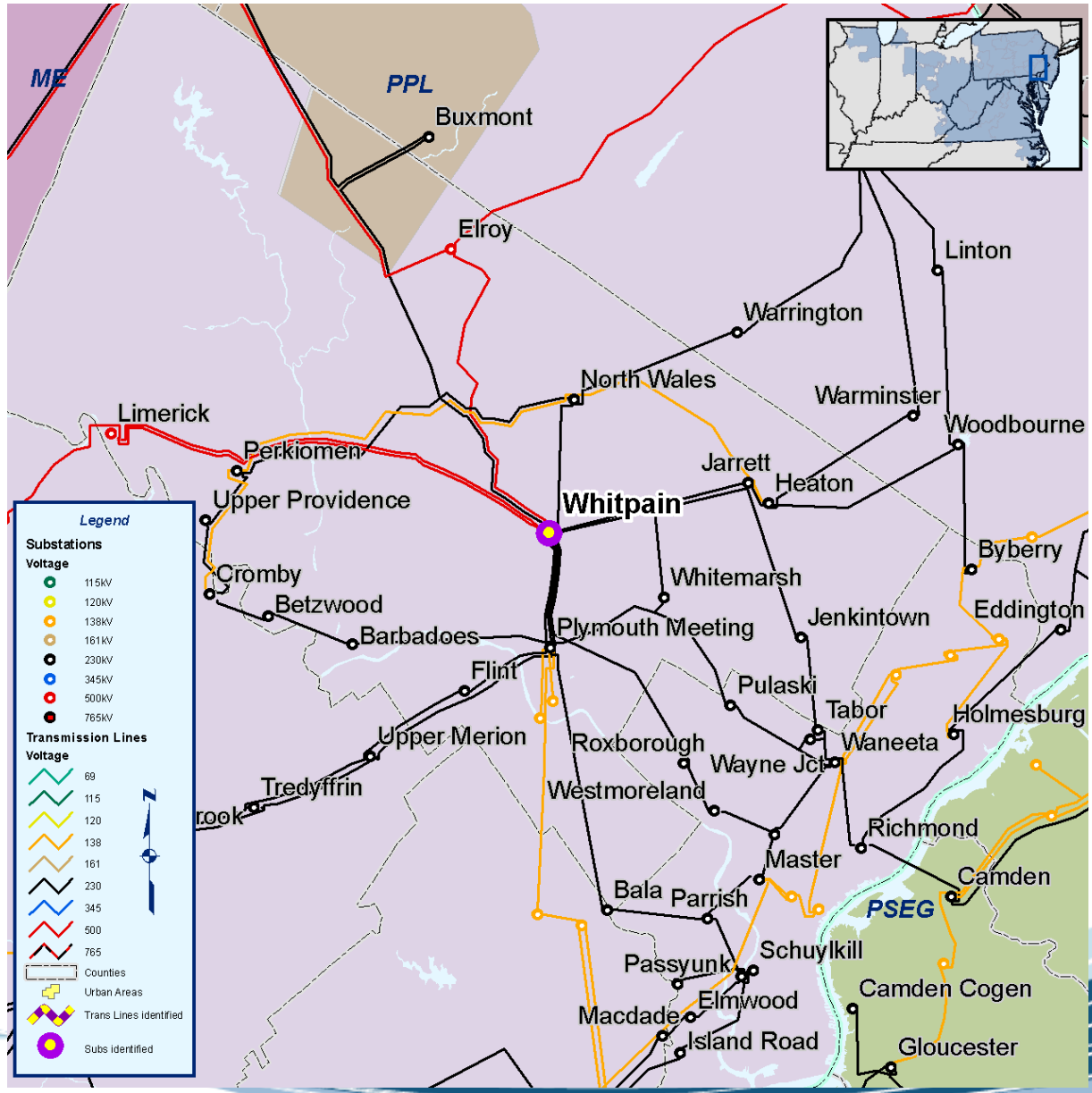
Pepco Baseline Upgrades

- Accelerate breaker network upgrades associated with the Eastalco generation project
- Acceleration required to meet baseline need despite current suspension status of Eastalco generation project
- Upgrading Dickerson H 230 kV breakers, 412A, 42A, 42C, 43A, 44A, 45B, 47A, spare
- Estimated Upgrade Cost: $567K for the 8 breakers
- Estimated Advancement Cost: $10K per breaker
- Expected IS Date: 6/01/2009



PECO Baseline Upgrades

- Replace Whitpain 230 kV breakers 135 and 145
- Estimated Replacement Cost: $350K per breaker
- Expected IS Date: 6/01/2011



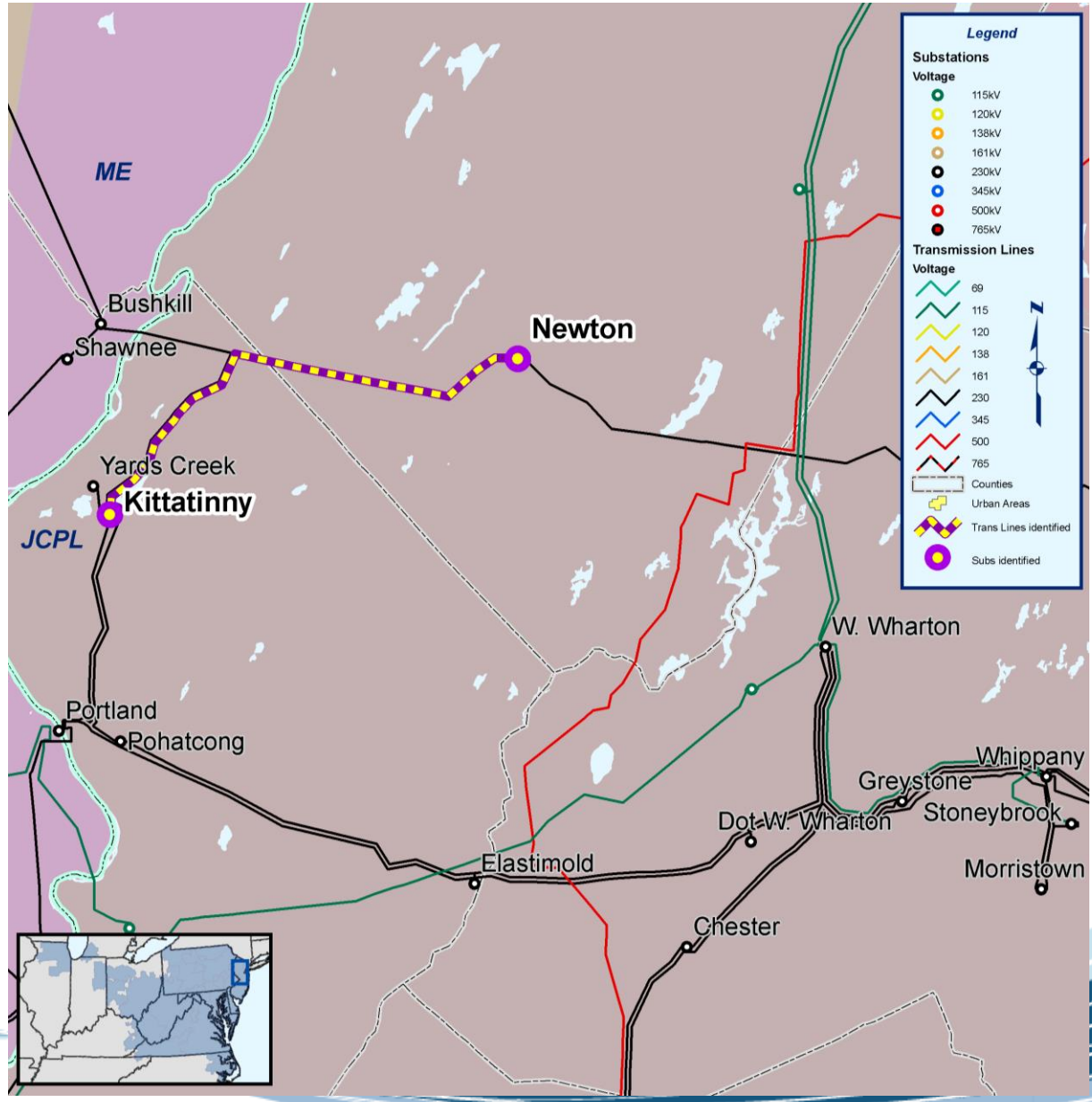
2011 RTEP Retool

Scope of Retool

- 2011 RTEP retool drivers
  - Sewaren 1-4 deactivation request withdrawn
  - Parlin deactivation request withdrawn
  - O66 Merchant Transmission Interconnection FSA
- PJM will request Hudson 1 to be a Reliability Must Run generator for 2011
  - Delays the need to do many reconductor jobs some of which may be delayed even further with the Susquehanna – Roseland 500 kV project and which may interfere with the Susquehanna – Roseland 500 kV construction schedule
    - Kittatinny - Newton 230 kV
    - Newton – Montville 230 kV
    - Greystone – Whippany 230 kV
    - Greystone – West Wharton 230 kV
    - Portland – Martins Creek 230 kV
  - Provides the option to retain the unit through 2012 in case the in service date for the Susquehanna – Roseland 500 kV circuit slips
  - Retool results that follow include the Hudson 1 unit

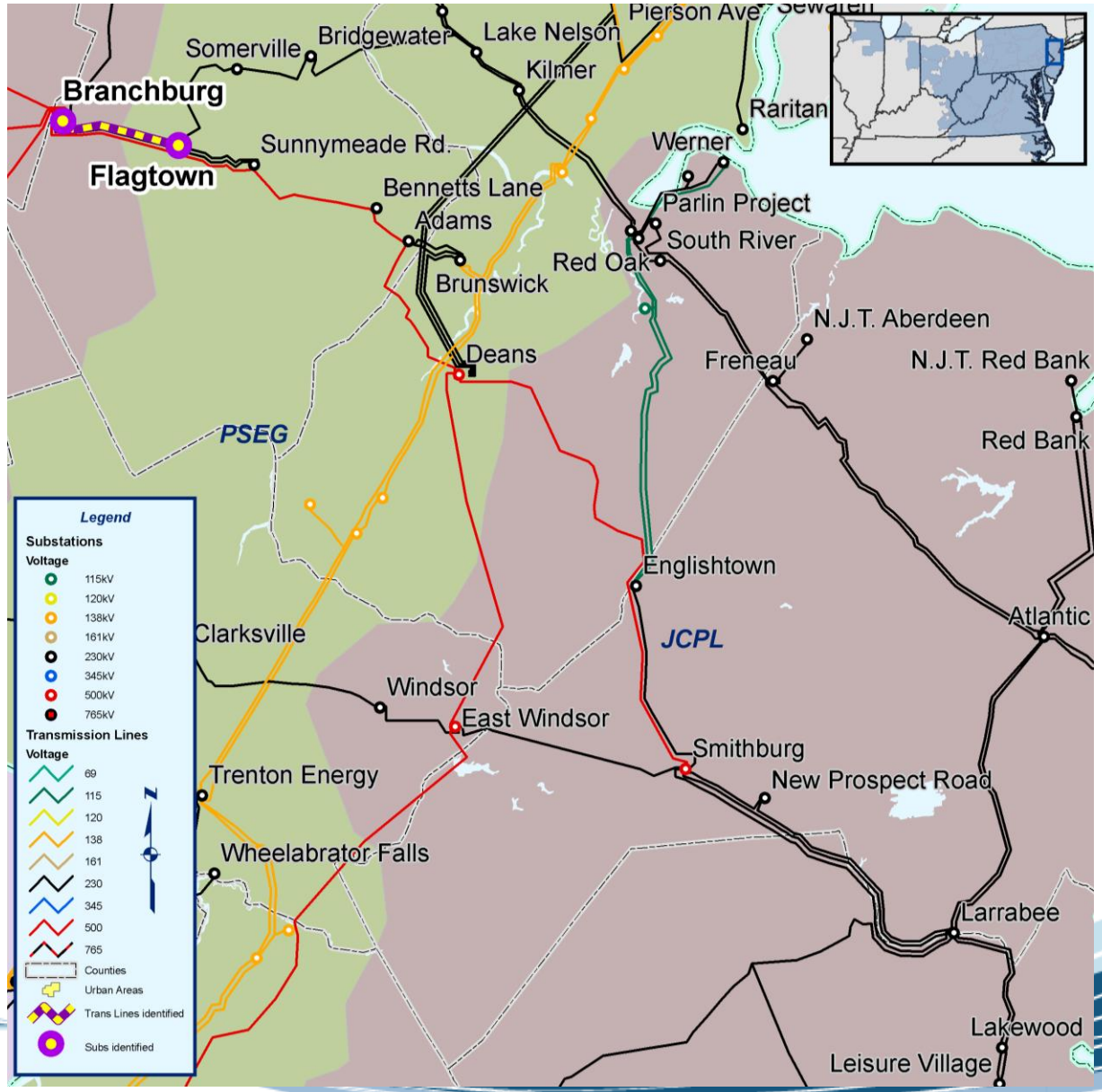
PSEG Baseline Upgrades

- Kittatinny-Newton 230 kV / loss of Portland-Greystone 230 kV + loss of Kittatinny-Pohatcong 230 kV
- Increase operating temperature and delay reconductor work until 2012
- Cost Estimate: $100K
- Expected IS Date: 6/01/2011



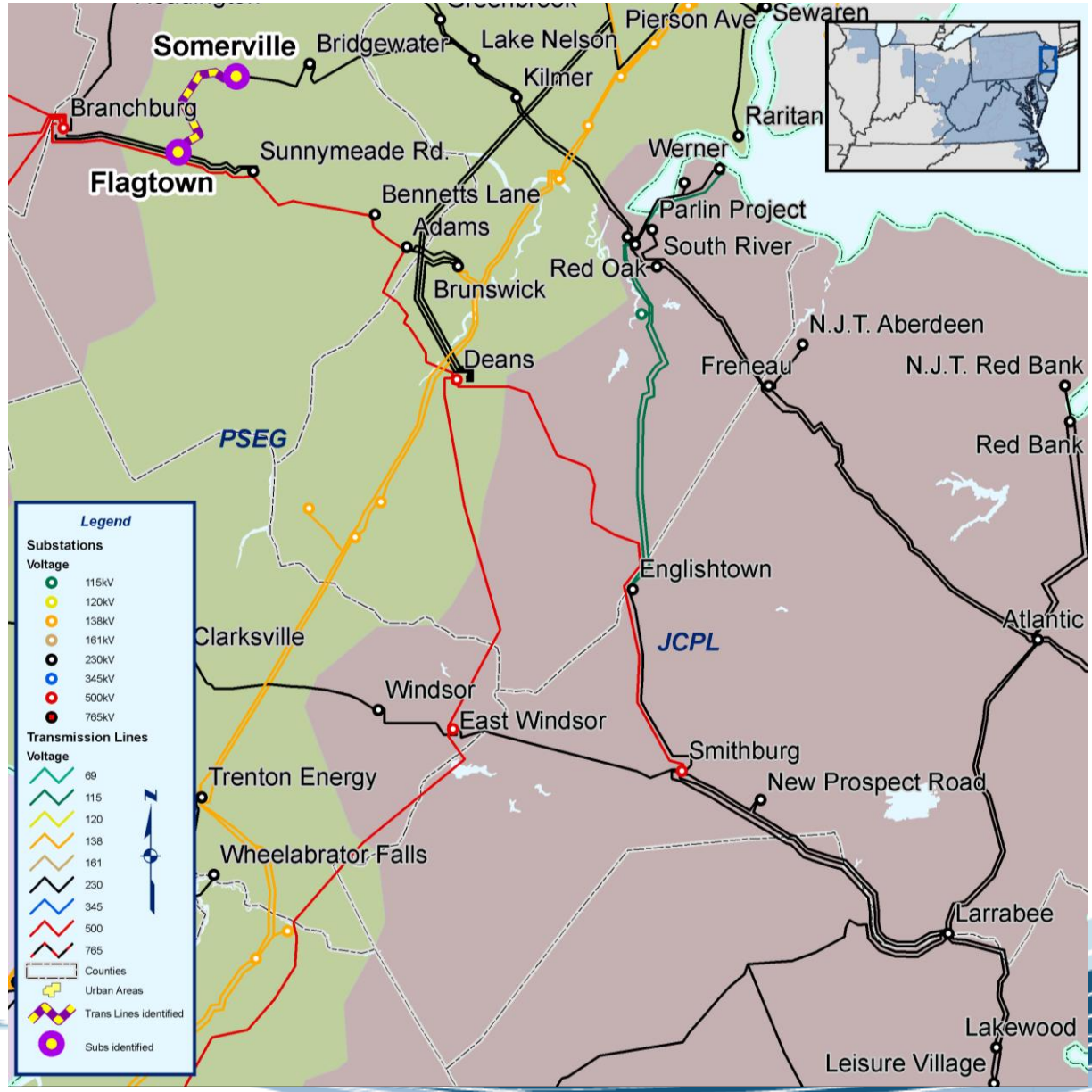
PSEG Baseline Upgrades

- Branchburg-Flagtown 230 kV / loss of Atlantic-Larabee 230 kV + Atlantic-Smithburg 230 kV
- Reconductor with 2x1033 ACSS conductor
- Cost Estimate: $12M
- Expected IS Date: 6/01/2011



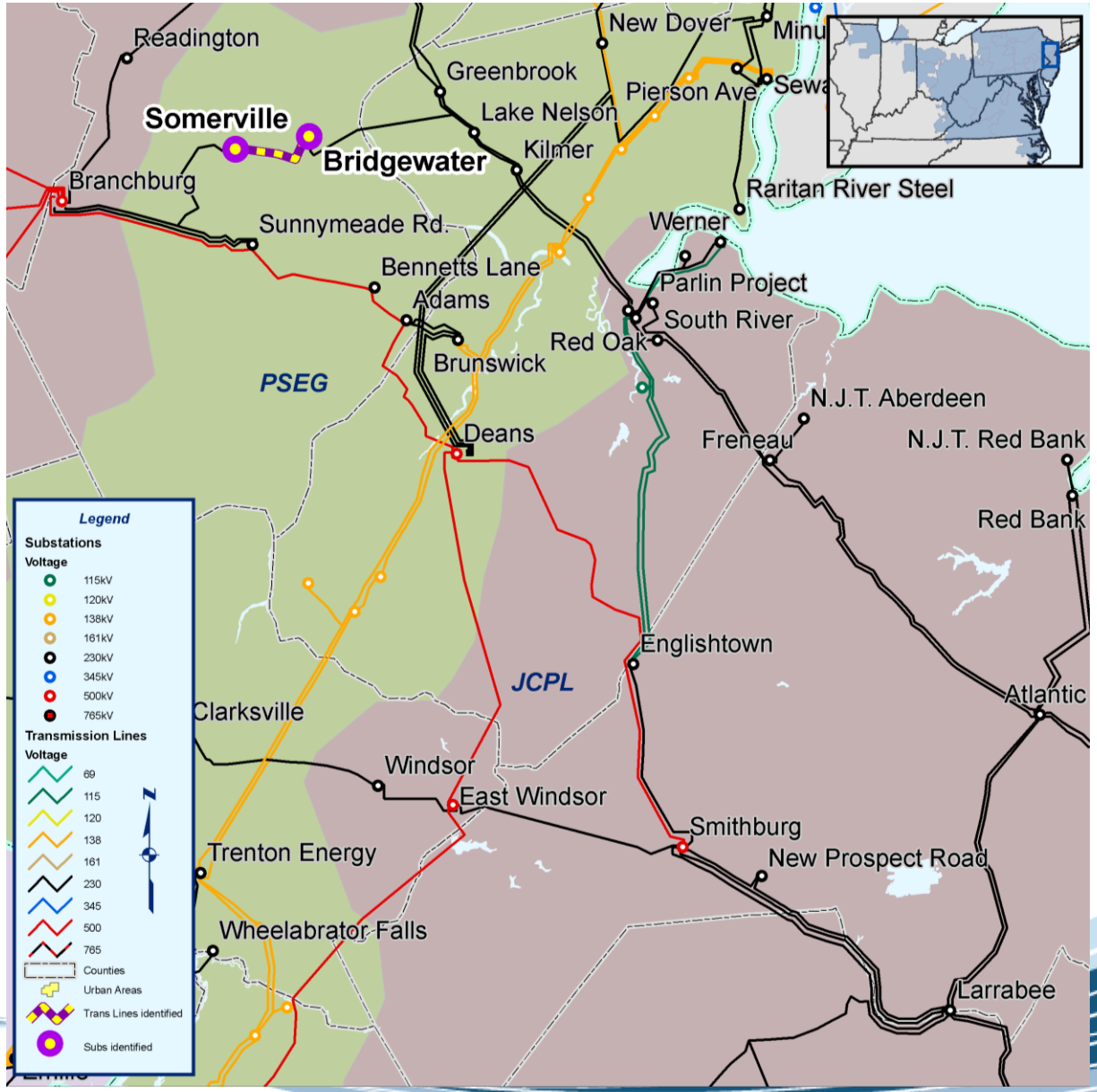
PSEG Baseline Upgrades

- Flagtown-Somerville 230 kV / loss of Atlantic-Larabee 230 kV + Atlantic-Smithburg 230 kV
- Reconductor with 2x1033 ACSS conductor
- Cost Estimate: $15M
- Expected IS Date: 6/01/2011



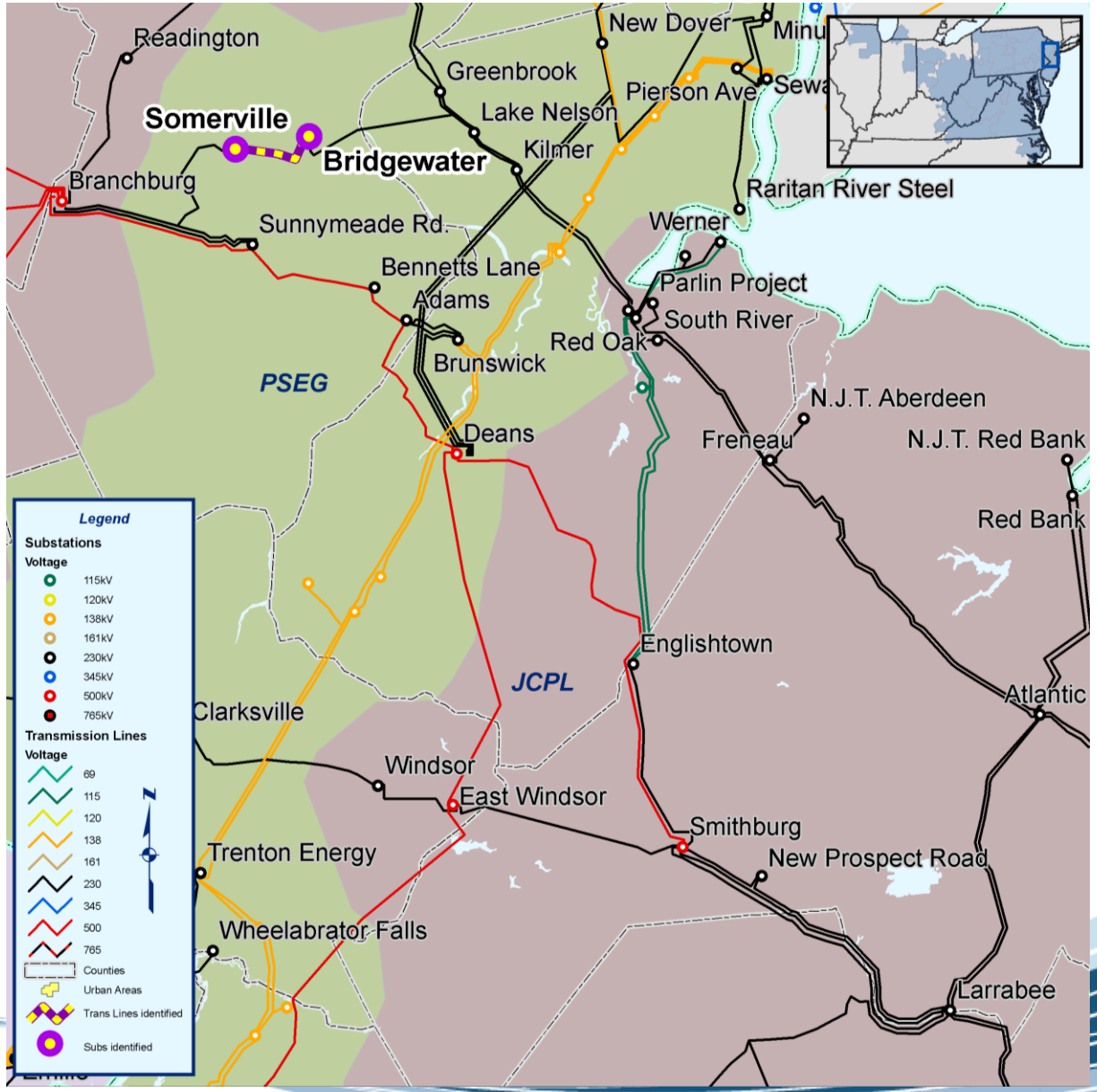
PSEG Baseline Upgrades

- Somerville-Bridgewater 230 kV / loss of Atlantic-Larabee 230 kV + Atlantic-Smithburg 230 kV
- Reconductor with 2x1033 ACSS conductor
- Cost Estimate: $9M
- Expected IS Date: 6/01/2011



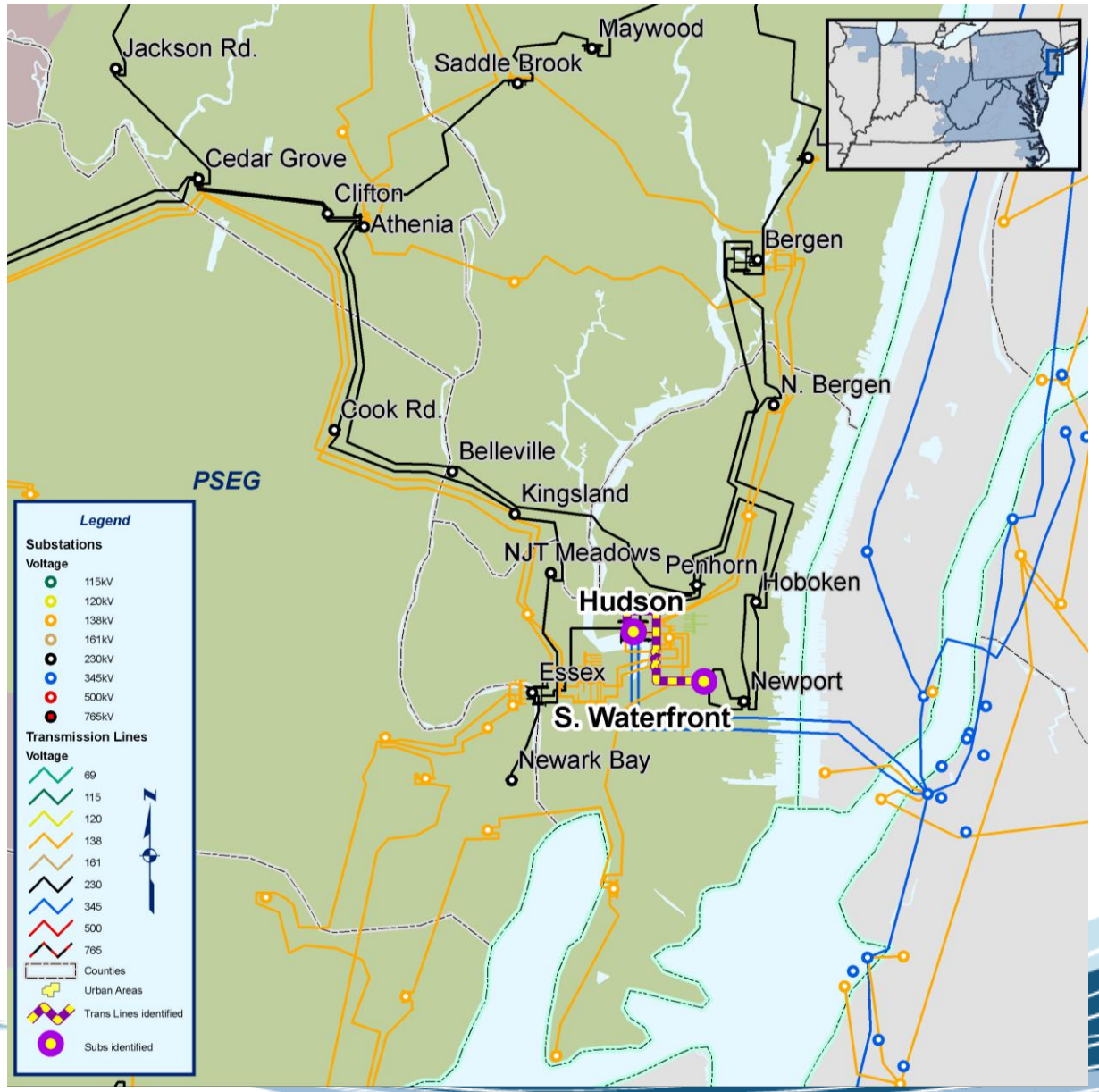
PSEG Baseline Upgrades

- Bridgewater-Middlesex 230 kV / loss of Atlantic-Larabee 230 kV + Atlantic-Smithburg 230 kV
- Replace terminal equipment at both ends of line
- Cost Estimate: $0.25M
- Expected IS Date: 6/01/2011



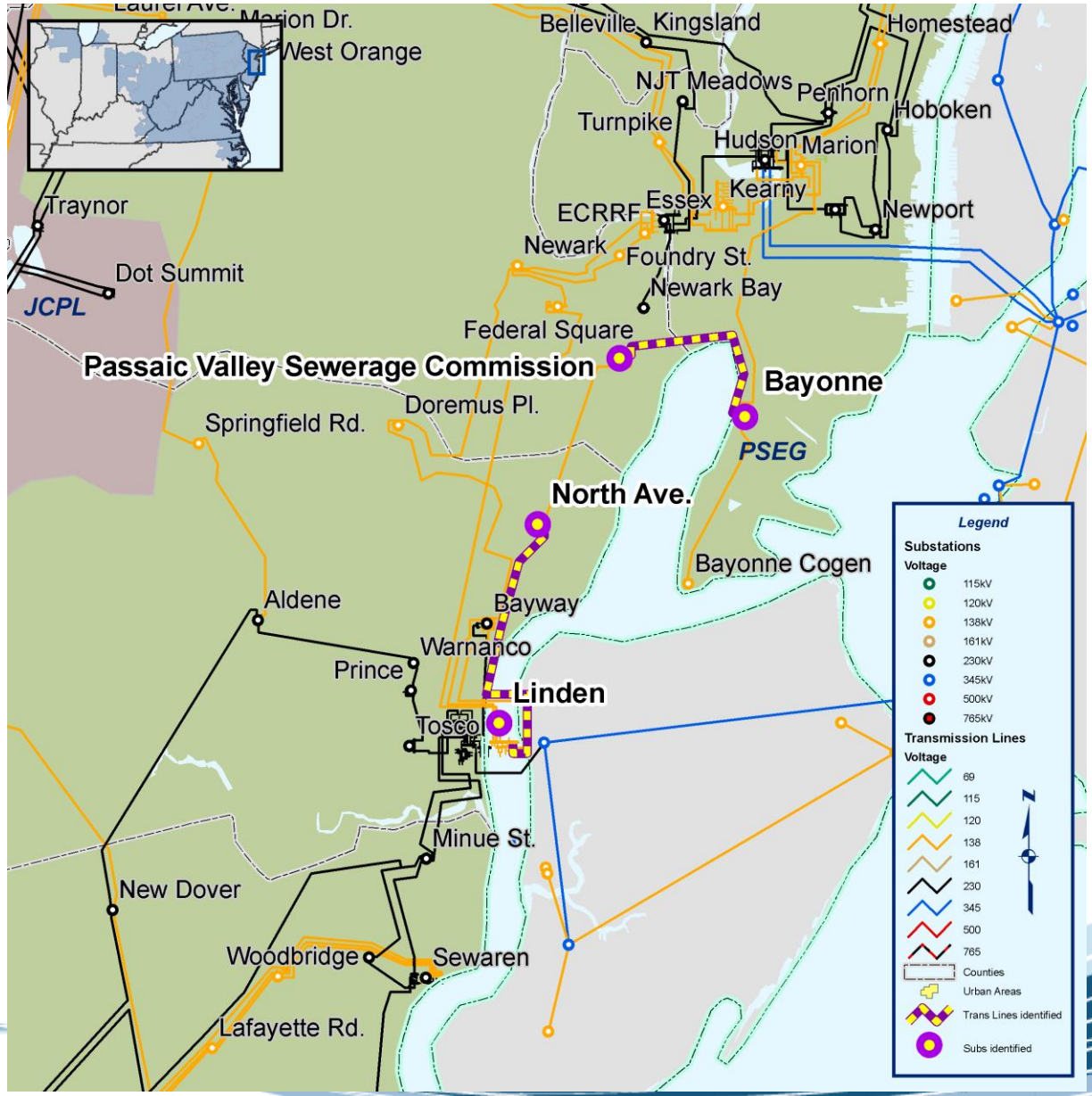
PSEG Baseline Upgrades

- Hudson - South Waterfront 230 kV / loss of Hudson – Penhorn 230 kV
- Reconductor the circuit
- Cost Estimate: $27M
- Expected IS Date: 6/01/2011



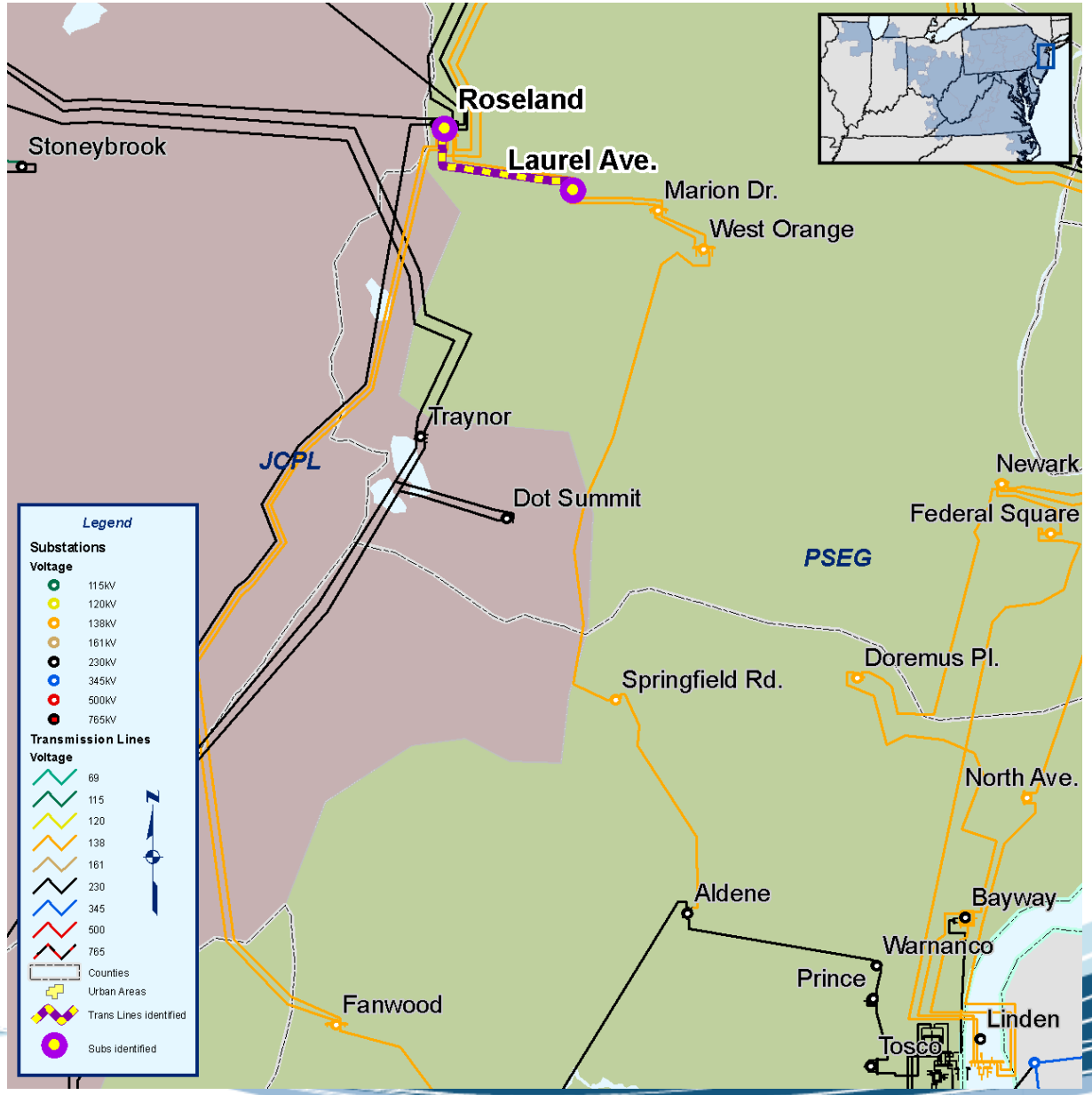
PSEG Baseline Upgrades

- Linden - North Avenue 138 kV / loss of Hudson – Essex 230 kV + NJT Meadows – Athenia 230 kV
- PVSC – Bayonne 138 kV / loss of Hudson – Essex 230 kV + NJT Meadows – Athenia 230 kV
- Construct new 138 kV circuit between Essex and Kearny 138 kV and install a bus tie at Kearny 138 kV
- Cost Estimate: $17M
- Expected IS Date: 6/01/2011



PSEG Baseline Upgrades

- Roseland – Laurel "S" 138 kV / loss of Aldene – Spring Rd. 138 kV and delay of network upgrade b0275 by one year
- Install a Roseland 138 kV tie breaker
- Cost Estimate: $0.5M
- Expected IS Date: 6/01/2009



- Develop upgrades for any remaining common mode failure reactive issues
- 2012 Retool
- Continue to evaluate the remaining elements of backbone projects

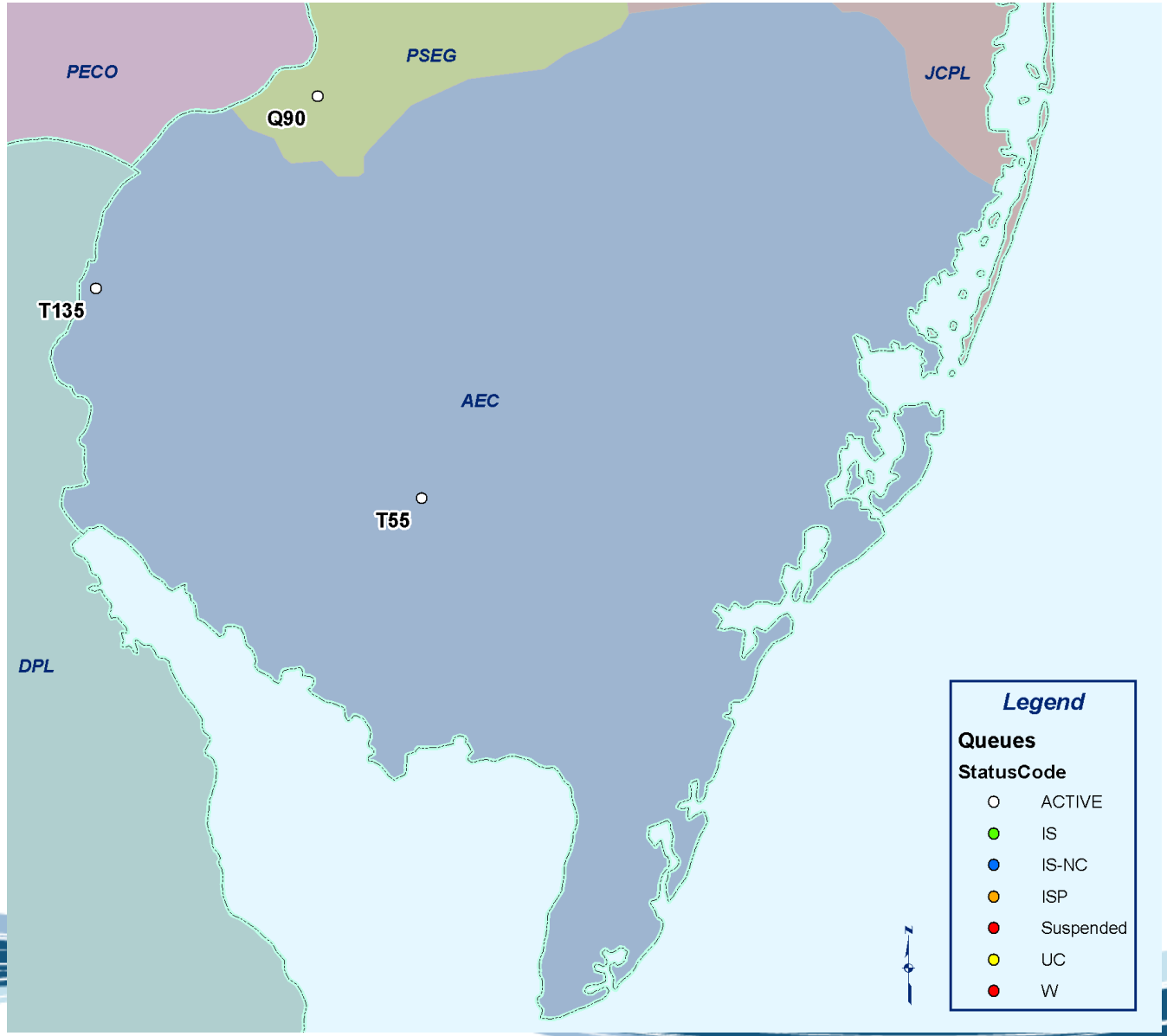
Generation Interconnection

PJM Generation and Merchant Transmission Impact Studies

AEC Impact Studies

Queue	Description	Status	IS Date	Capacity MW	Energy MW	Fuel Type	Study Type
Q90	Mickleton 230kV	Active	6/1/2012	650	650	Natural Gas	Generation
T135	Chambers 230kV	Active	1/7/2008	15	15	Coal	Generation
T55	Sherman Ave	Active	4/1/2009	12.4	12.4	Natural Gas	Generation

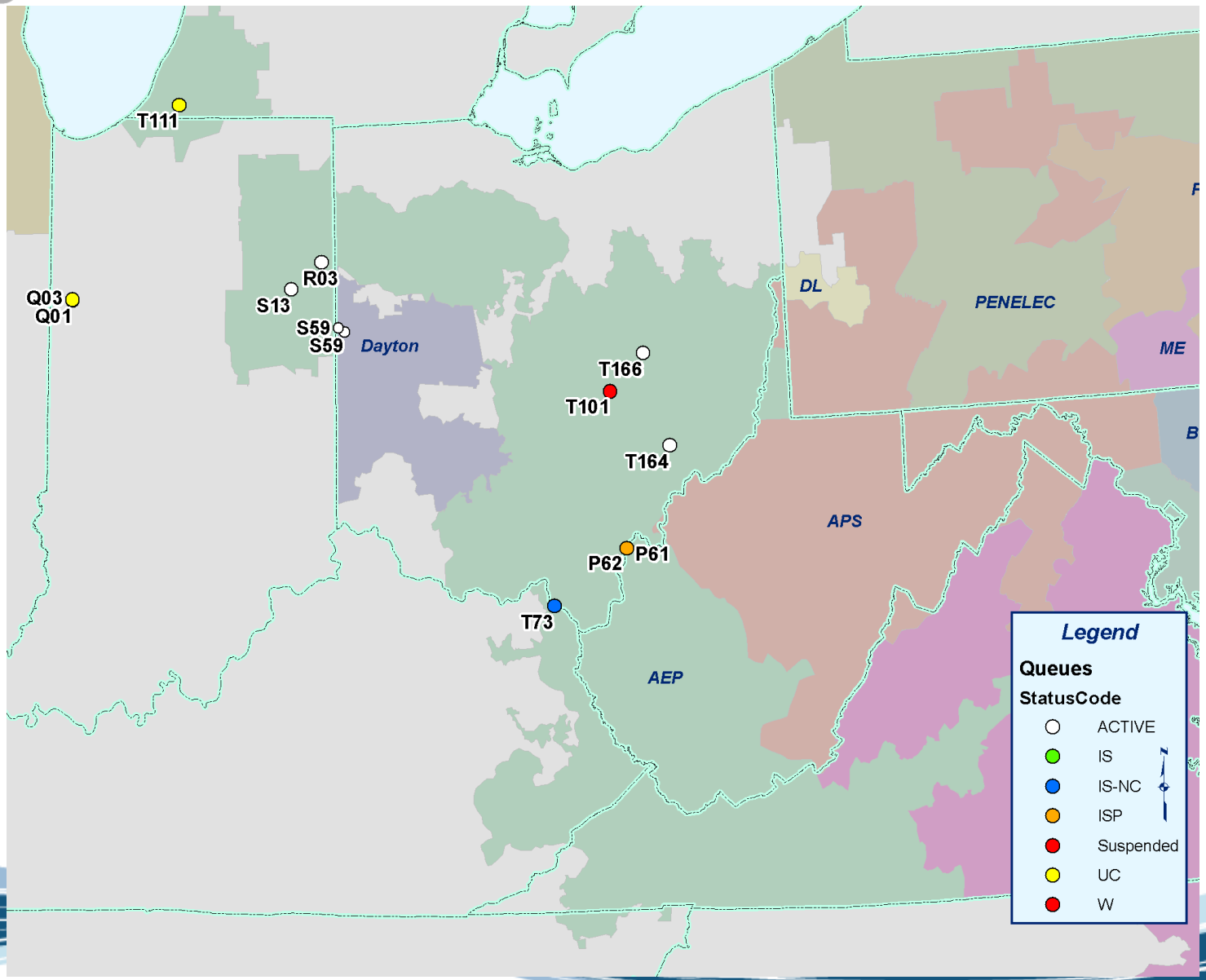
AEC


PECO
PSEG
JCPL
Q90
T135
AEC
T55
DPL
Legend
Queues
StatusCode
ACTIVE
IS
IS-NC
ISP
Suspended
UC
W

AEP Impact Studies

Queue	Description	Status	IS Date	Capacity MW	Energy MW	Fuel Type	Study Type
P42	West Kingsport 138kV	In-Service		50	0	BioMass	Generation
P61	Gavin #1 765kV	Partially In-Service		20	20	Coal	Generation
P62	Gavin #2 765kV	In-Service		20	20	Coal	Generation
Q01	Olive-Dequine 345kv	Under Construction	12/1/2008	100	500	Wind	Generation
Q03	Olive-Duquine 345kV	Under Construction	12/1/2009	50	250	Wind	Generation
Q10	Keystone 345kV	In-Service		27	27	Natural Gas	Generation
Q43	Clinch River 138kV	Active	3/1/2012	534	534	Coal	Generation
R03	Adams - Allen 138kV	Active	12/31/2008	26	130	Wind	Generation
S13	Keystone 345kV	Active	3/15/2007	19	19	Natural Gas	Generation
T111	Buchanan Hydro-Niles 69kV	Under Construction	7/1/2008	8	8	Methane	Generation
T164	Muskingum River	Active	2/1/2008	15	15	Coal	Generation
T165	Conesville #5	Active	2/1/2008	20	20	Coal	Generation
T166	Conesville #6	Active	2/1/2008	20	20	Coal	Generation
T73	Hanging Rock 765kV	In-Service		20	20	Natural Gas	Generation

AEP


T111
Q03
Q01
R03
S13
S59
S59
Dayton
T166
T101
T164
P62
P61
T73
AEP
APS
DL
PENELEC
ME
Legend
Queues
StatusCode
ACTIVE
IS
IS-NC
ISP
Suspended
UC
W

Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0589	Poston Station and Elliot Tap - Rebuild approximately 3 miles of 138kV line between the Poston Station and Elliot Tap	AEP	5/31/2012	Active	3.00	P54	Sporn - Waterford 345kV
n0590	Sporn - Replace risers and switches at Sporn station and rebuild approx. 4 miles of the 34.5kV line between Sporn station and the new P54 Interconnection Station		5/31/2012	Active	13.40		
n0591	Muskingum River - Waterford - Rebuild approximately 4 miles of the 345kV line between Muskingum River and Waterford Station		5/31/2012	Active	10.70		
n0592	Tidd - Carnegie - 138kV line section 1.21 miles of 556 ACSR with 954 ACSR conductor		5/31/2012	Active	0.32		
n0593	French Creek - Heaters Tap - 138kV line section - reconductor 25.11 mile line section with 954 ACSR conductor		5/31/2012	Active	9.50		
n0594	Sporn - Replace the "CC" 345kV circuit breaker		5/31/2012	Active	1.90		

Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0595	Sporn - Replace the "CC1" 345kV circuit breaker	AEP	5/31/2012	Active	1.90	P54	Sporn - Waterford 345kV
n0596	Waterford - Replace the "52-A" 345kV circuit breaker		5/31/2012	Active	2.00		
n0597	Waterford - Replace the "52-B" 345kV circuit breaker		5/31/2012	Active	2.00		
n0598	Waterford - Replace the "52-C" 345kV circuit breaker		5/31/2012	Active	2.00		
n0599	Muskingum River - Replace the "SD" 345kV circuit breaker		5/31/2012	Active	1.70		
n0600	Muskingum River - Replace the "SE" 345kV circuit breaker		5/31/2012	Active	1.70		
n0601	Muskingum River - Replace the "SD" 345kV circuit breaker		5/31/2012	Active	1.70		
n0604	Belmont - Install a third breaker in the Harrison - Belmont line cross bus		5/1/2012	Active	0.39		

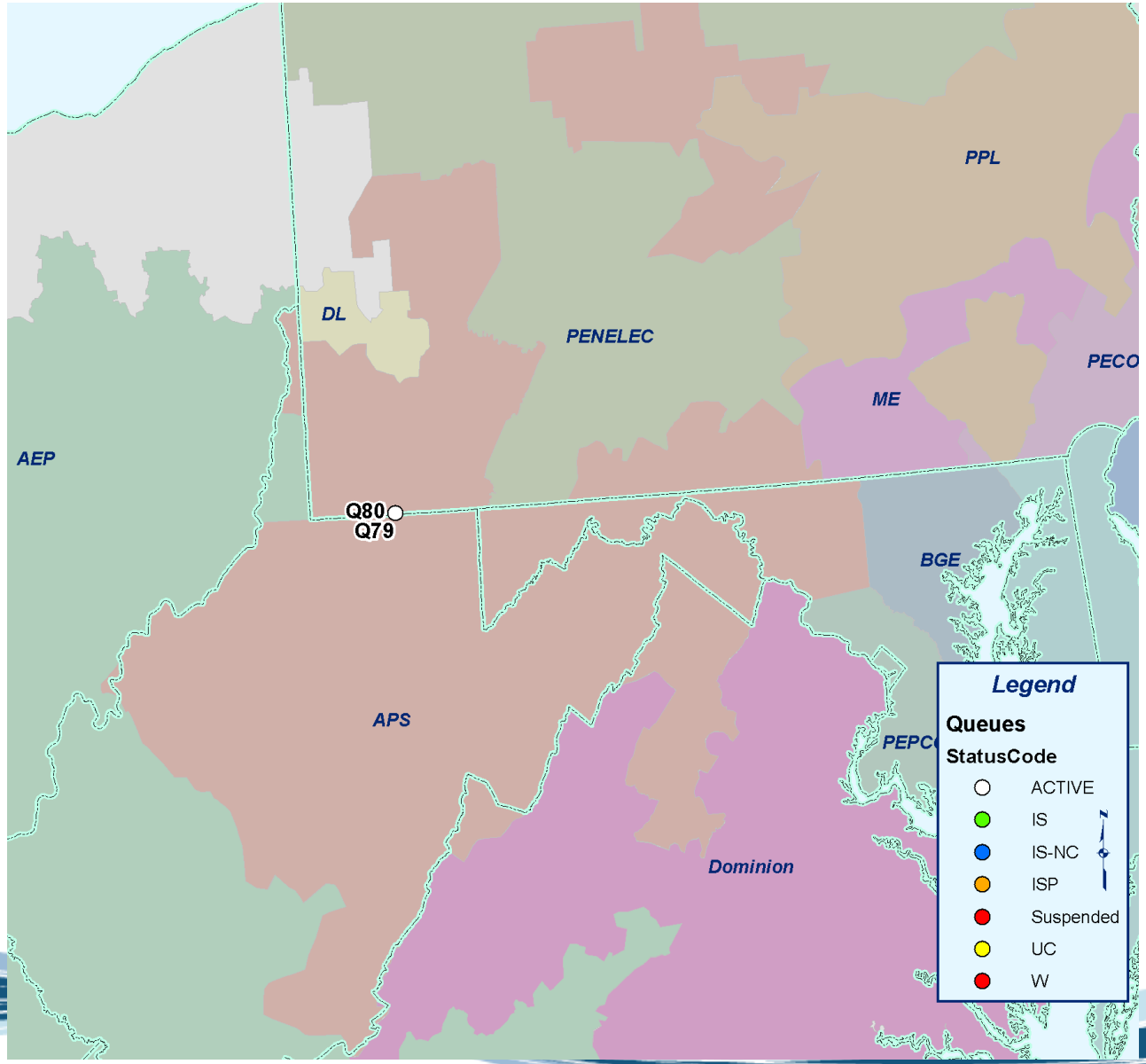
Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0868	Beaver Creek - Replace relays at Beaver Creek on the Beaver Creek - Clinch River 138kV line	AEP	3/1/2012	Pending	0.74	Q43	Clinch River 138kV
n0869	Nagel - Replace relays at Nagel on the Nage-Clinch River 138kV line		3/1/2012	Pending	0.49		
n0870	Saltville - Replace relays at Saltville on the Satlville-Clinch River 138kV line		3/1/2012	Pending	0.63		
n0871	North Briston-Wolf Hills 138kV - Construct a double circuit 138kV steel lattice tower line (5.4 miles)		3/1/2012	Pending	7.29		
n1012	Olive-DeQuine - 3 Breaker, Ring Bus at interconnection substation		12/31/2009	Pending	5.80	S06	Olive-DeQuine 345kV
n1013	Olive - Dequine -Terminate line into interconnection substation		12/31/2009	Pending	0.43		

Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n1014	Dequine - Replace wave trap and line tuner on the Olive-Dequine line	AEP	12/31/2009	Pending	0.07	S06	Olive-DeQuine 345kV
n1015	Olive - Replace line tuner on the Olive-Dequine line		12/31/2009	Pending	0.00		
n1024	Adams - Allen 138kV - Install 3 breaker ring bus at interconnection substation		12/31/2008	Pending	4.50	R03	Adams - Allen 138kV
n1025	Allen 138kV - Replace line relaying and wave trap with AEP standard package		12/31/2008	Pending	0.33		
n1026	Adams 138kV - Replace line relaying and wave trap with AEP standard package		12/31/2008	Pending	0.28		
n1027	Adams - Allen 138kV - Construct .25 miles of double - circuit 138kV line		12/31/2008	Pending	0.33		
n1028	Lincoln 138kV - Replace CB-D 138kV circuit breaker		12/31/2008	Pending	0.23		

APS Impact Studies

Queue	Description	Status	IS Date	Capacity MW	Energy MW	Fuel Type	Study Type
Q79	Ft. Martin - Kammer 500kV	Active	9/1/2010	100	0	Coal	Generation
Q80	Ft. Martin - Kammer 500kV	Active	8/1/2012	750	0	Natural Gas	Generation
U2-088 (MTX)	Meadow Brook 500kV	Active	1/1/2011	MTX	MTX	MTX	Merchant Transmission

APS

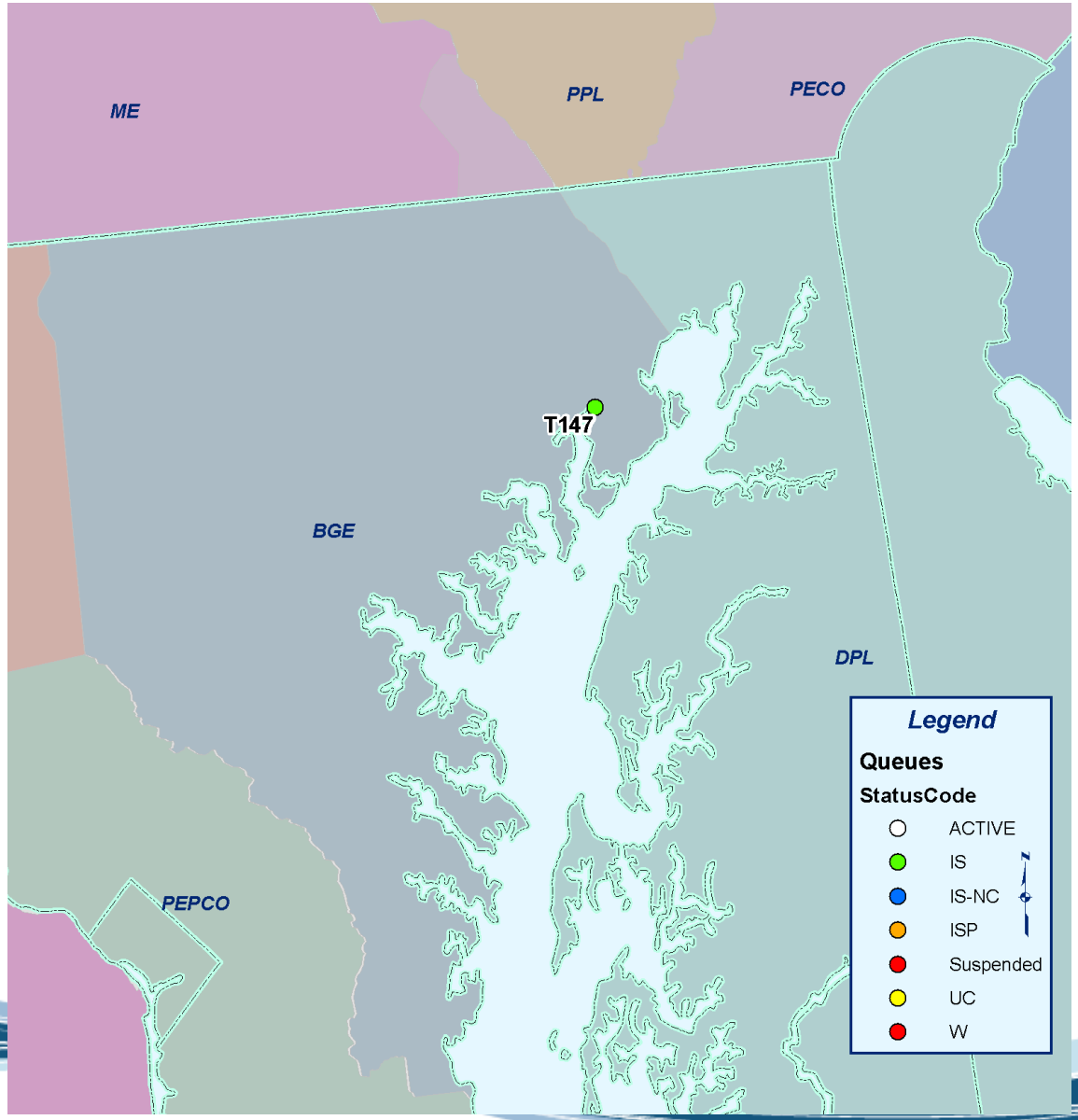

PPL
DL
PENELEC
PECO
ME
AEP
Q80
Q79
BGE
APS
PEPC
Dominion
Legend
Queues
StatusCode
ACTIVE
IS
IS-NC
ISP
Suspended
UC
W

Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0878	Albright - Install 138kV relaying at the Albright Substation for the Afton circuit	APS	12/1/2006	Active	0.19	N33	Afton 138kV
n0879	Garrett - Install 138kV relaying at the Garrett substation fo rthe Afton circuit		12/1/2006	Active	0.20		
n0880	Afton - Loop Albright-Garrett 138kV circuit into new Afton substation. Perform relay setting/adjustment at the new Afton substation		12/1/2006	Active	0.19		
n1031	Black Oak 500kV - Install 200 MVAR SVC		6/1/2007	Pending	44.00	S07	ARR
n1032	Meadowbrook 500kV - Install 350 MVAR switched shunt capacitor		6/1/2007	Pending	11.40		

BGE Impact Studies

Queue	Description	Status	IS Date	Capacity MW	Energy MW	Fuel Type	Study Type
T147	Perryman	In-Service		10	10	Natural Gas	Generation

BGE

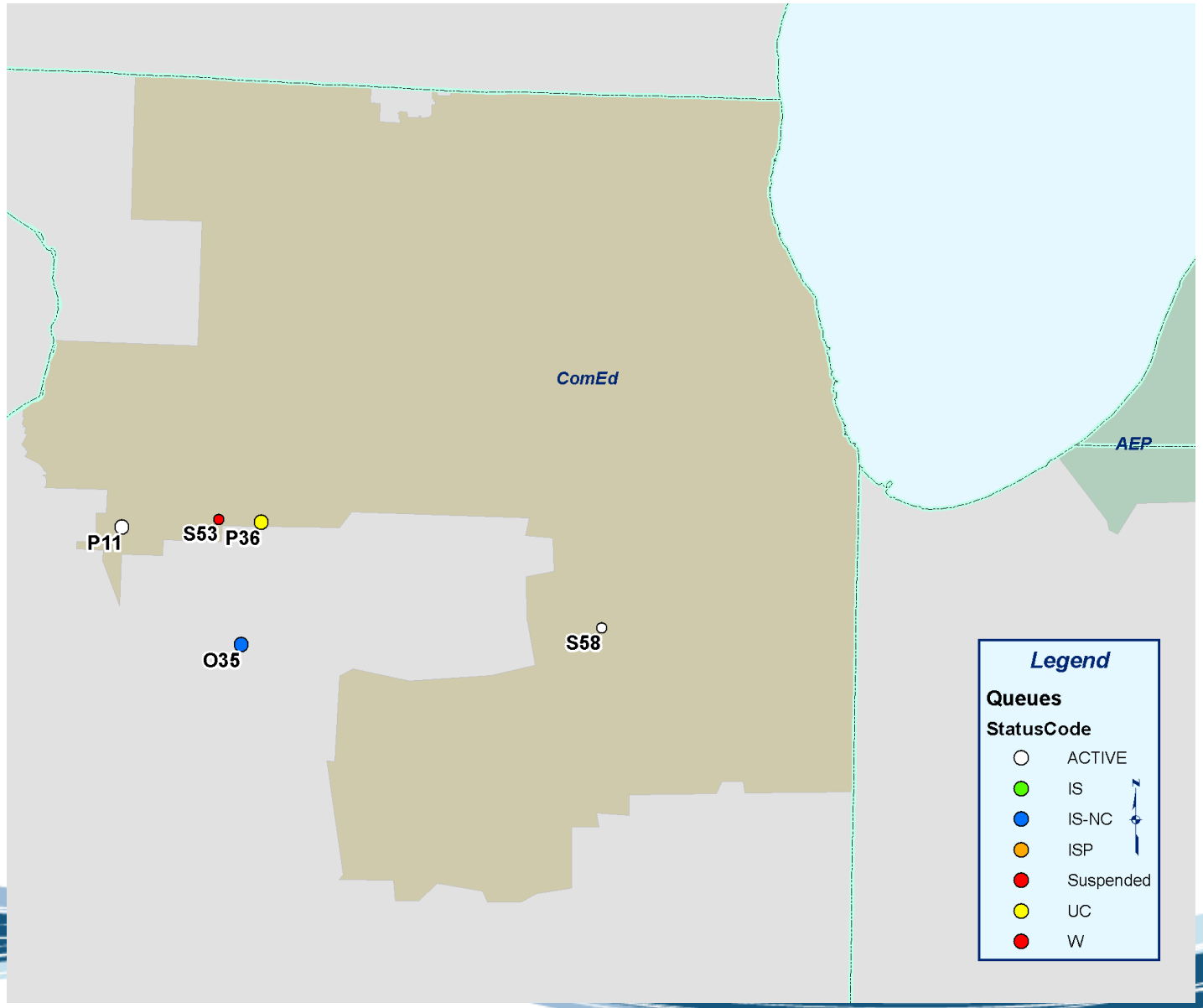

ME
PPL
PECO
T147
BGE
DPL
PEPCO
Legend
Queues
StatusCode
ACTIVE
IS
IS-NC
ISP
Suspended
UC
W

Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0874	Graceton - Bagley - The line needs to be reconductored with 1,272 kcm rated at 125 deg. C. (SE becomes 699 MVA) The cost is approx. 6M and 3 Years to complete	BGE	6/1/2011	Pending	6.16	Q42	Indian River
n0885	Burt-Sandy Springs - Rebuild existing line using double bundle 1033 ACSR. Double circuit 2314/2334 Time dependent on High Ridge to Sany Springs		12/31/2010	Active	0.50	R17	Morgantown - Oak Grove 230kV
n0886	Kemptown - Conastore - Replace 500kV Breaker Disconnects		12/31/2010	Active	0.50		
n0890	Conastone-Peach Bottom - Build 500kV line, Conastone end (BGE portion of line)		6/1/2010	Active	1.50	R75	Mitchell - Shepler Hill 138kV
n0891	Conastone-Peach Bottom - Replace 500kV line metering equip 5012 (Peach Bottom to Conastone - PECO only)		6/1/2010	Active	0.10		
n0892	Conastone-Peach Bottom - Replace 500kV line two circuit breakers, est. time 30 months		12/31/2010	Active	1.30	R17	Morgantown - Oak Grove 230kV
n0896	Conastone - Relocate 500kV 501 line into a new two breaker bay		6/1/2010	Active	7.00	R37	Rehoboth 138kV
n0900	Graceton to Bagles - 230kV Rebuild double circuit and add 2 breakers at Graceton		6/1/2009	Pending	25.70	Q74	Linden 230kV
n0906	Constone - Mt. Carmel - 230kV Line 2322 with 1590 kcmil ACSR (160 C design) to match the ratings of adjacent 230kV circuit 2310		12/15/2011	Active	4.63	R01	Susquehanna
n0921	Constone - Northwest - Reconductor 230kV line 2322 with 1,590kcmil (160 C design) to match the ratings of adjacent 230kV circuit 2310		1/1/2013	Active	5.00		

ComED Impact Studies

Queue	Description	Status	IS Date	Capacity MW	Energy MW	Fuel Type	Study Type
O35	Providence Heights #1 138kV	In-Service		15	74	Wind	Generation
P11	Kewanee 138kV	Active	12/31/2007	40	200	Wind	Generation
P36	Nelson - Lee Co. EC 345kV	Under Construction	9/15/2007	48	240	Wind	Generation

ComEd



Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0845	TSS 155 Nelson - Install 138kV breaker and disconnect switches in existing 15508 Line Breaker	ComEd	12/31/2006	Pending	0.68	P11	Kewanee 138kV
n0875	TSS 113 Waterman - Reconductor 2-3 Bus Tie		9/15/2007	Pending	0.10	P36	Nelson - Lee Co. EC 345kV
n0876	TSS 937 Lee Cty EC - Change Zone 2 timer settings on Line 15501		9/15/2007	Pending	0.01		
n0877	TSS 937 Lee Cty EC - Combine contributions from P36 and Lee County into stabiltiy SPS for Byron Unit 1		9/15/2007	Pending	0.01		
n0938	TSS 119 - Lancaster - Install 138kV breaker and disconnect switch on line 11904		10/1/2007	Pending	0.47	P46	Lena 138kV
n0939	TSS 119 - Lancaster - Install 138kV breaker and disconnect switch on 5-6 Bus Tie		10/1/2007	Pending	0.47		
n0940	TSS-119 - Lancaster - Install 138kV breaker and disconnect switch on 17121		10/1/2007	Pending	0.47		
n0941	TSS 121 - Freeport - Replace 1-5 Bus Tie Breaker		10/1/2007	Pending	0.20		
n0942	TDC 370 - Elroy - Relay modifications associated with P46		10/1/2007	Pending	0.07		
n0943	TSS 180 - Lena - Relay modifications associated with P46		10/1/2007	Pending	0.06		
n0954	TSS 937 Lee County EC - Modify by adding a fourth ring bus breaker to tie in TSS 950 and South Dixon		9/15/2007	Pending	2.26	P36	Nelson - Lee Co. EC 345kV

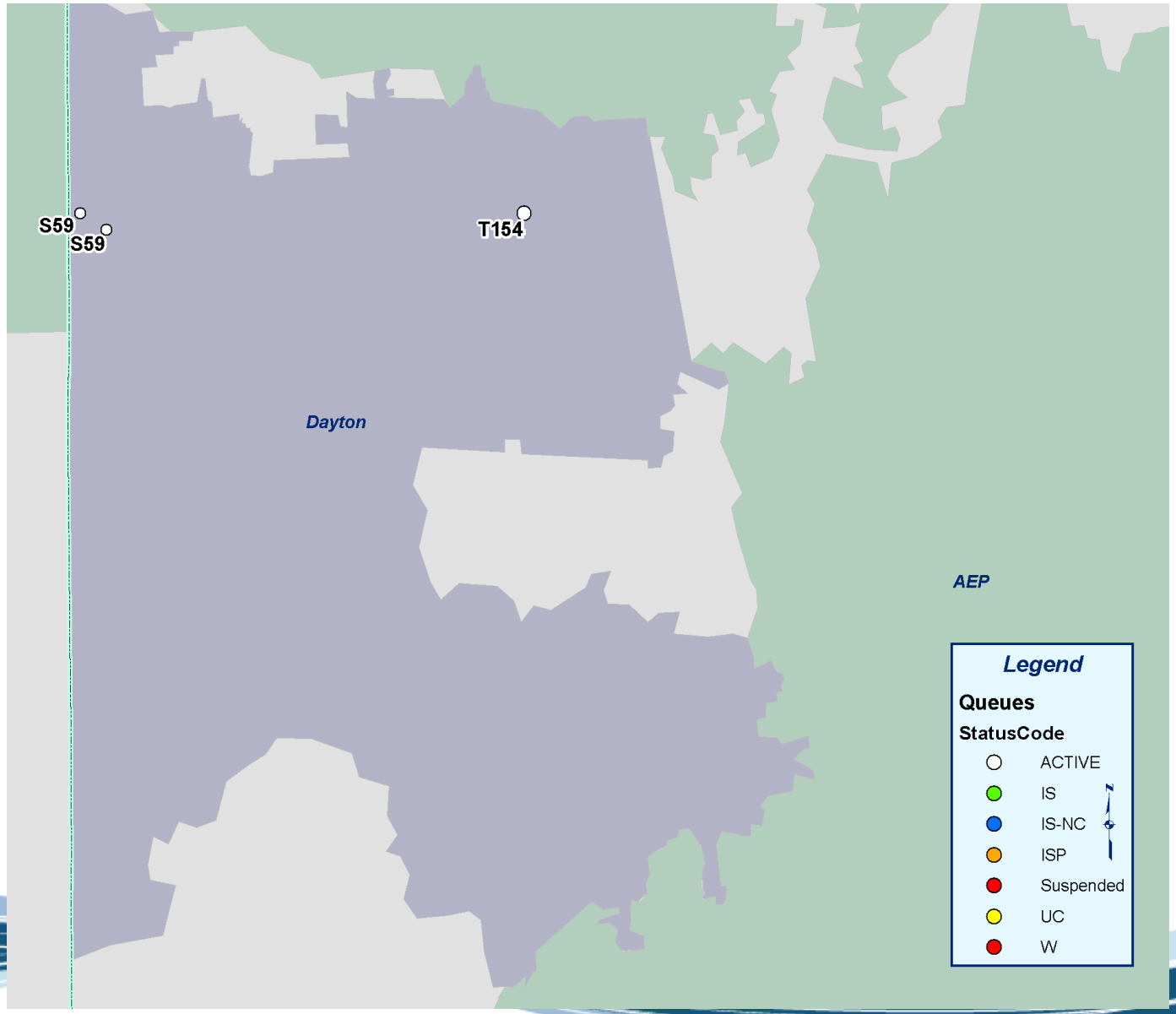
Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0994	TSS 112 Wilton Center - Upgrade existing 8012 line relaying to be compatible with new line 11212 terminal at TSS 976 Cayuga Ridge South	ComEd	12/1/2007	Active	0.28	O51	Pontiac Midpoint-Wilton Center 345kV
n0995	TSS 80 Pontiac Midpoint - Upgrade existing 8012 line relaying to be compatible with new line 8012 terminal at TSS 976 Cayuga Ridge South		12/1/2007	Active	0.12		
n0996	TSS 976 Cayuga Ridge South - Erect new interconnection substation for Queue position O51		12/1/2007	Active	0.47		
n0997	TSS 80 Pontiac Midpoint - TSS 976 Cayuga Ridge South - TSS 112 Wilton Center - Install digital microwave communication for addition of new Livingston 2 ring bus		12/1/2007	Active	1.68		

Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0998	TSS 976 Cayuga Ridge South - TSS 112 Wilton Center - Reconductor 0.187 miles of line 11212 between TSS 976 Cayuga Ridge South and TSS 112 Wilton Center	ComEd	12/1/2007	Active	0.07	O51	Pontiac Midpoint-Wilton Center 345kV
n1023.1	Quad City Sta 4 - Replace BT1-3 Breaker		10/31/2010	Pending	1.50		
n1023.2	Quad City Sta 4 - Replace BT 6-7 Breaker		10/31/2010	Pending	1.50		
n1023.3	Quad City Sta 4 - Replace BT 11-1 Breaker		10/31/2010	Pending	1.50		
n1023.4	Quad City Sta 4 - Replace BT 7-8 Breaker		10/31/2010	Pending	1.50		
n1023.5	Quad City Sta 4 - Replace BT 10-11 Breaker		10/31/2010	Pending	1.50		
n1029	Kickapoo Creek TSS105 - Install relay scheme to prevent islanding wind generation into Ameren load at Marseilles		12/31/2006	Pending	0.20	P10	LaSalle 138kV
n1030	Kickapoo Creek TSS105 - Modify Settings changes to accommodate P10		12/31/2006	Pending	0.02		

Dayton Impact Studies

Queue	Description	Status	IS Date	Capacity MW	Energy MW	Fuel Type	Study Type
T154	Bellefontaine 69kV	Active	12/1/2008	10	10	Methane	Generation

Dayton

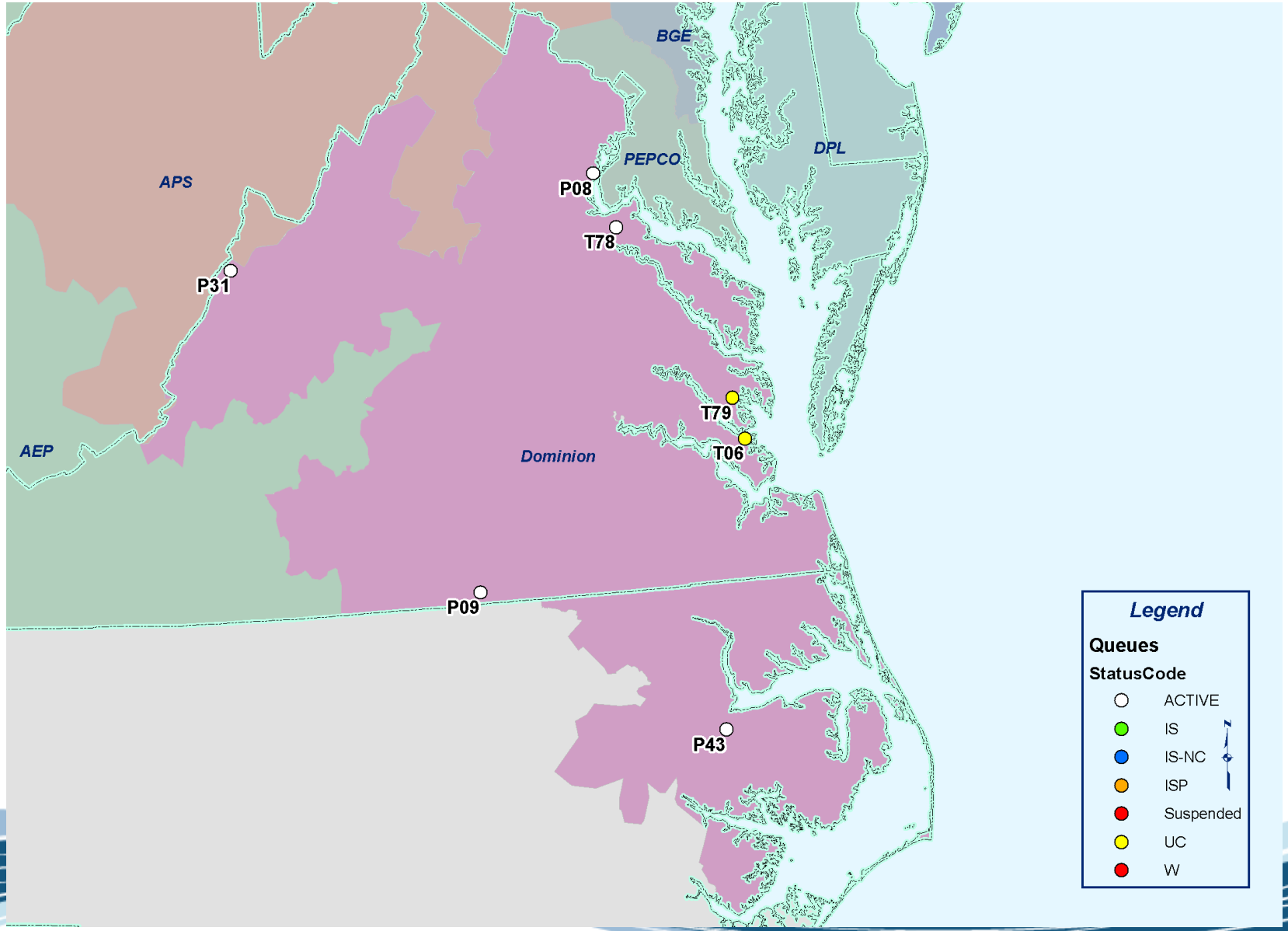


Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0674	Monroe - Construct new Interconnection Switching Station T Bus and set remote relays	Dayton	7/31/2007	Active	1.60	O21	Liberty 69kV

Dominion Impact Studies

Queue	Description	Status	IS Date	Capacity MW	Energy MW	Fuel Type	Study Type
P08	Possum Point	Active	5/1/2009	600	0	Natural Gas	Generation
P09	Kerr Dam 115kV	Active	9/30/2008	91	0	Hydro	Generation
P31 (MTX)	Bath County	Active	6/1/2006	MTX	MTX	MTX	Merchant Transmission
P43	Weyerhaeuser 115kV	Active	7/1/2006	78.4	0	Wood	Generation
T06	Yorktown 230kV	Under Construction	5/1/2014	20	20	Oil	Generation
T78	Arnolds Corner 34.5kV	Active	10/1/2008	9.9	9.9	Methane	Generation
T79	Shacklefords 34.5kv	Under Construction	10/1/2008	6.4	6.4	Methane	Generation

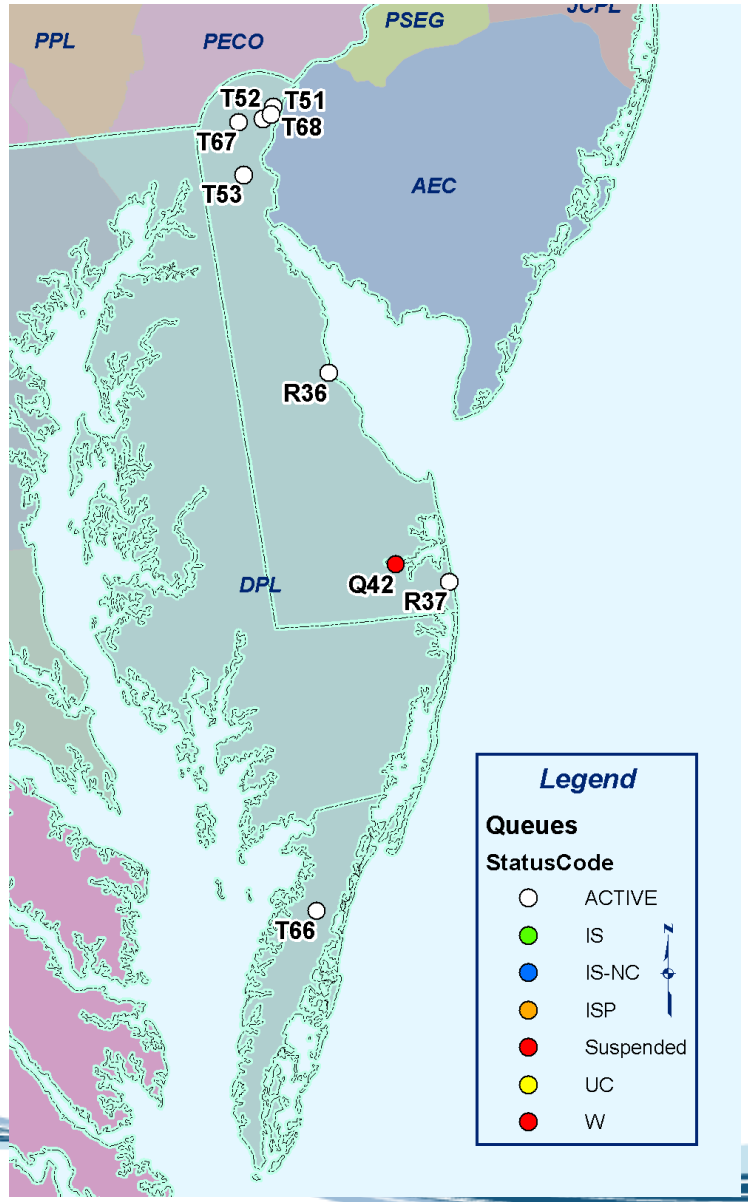
Dominion



Delmarva Impact Studies

Queue	Description	Status	IS Date	Capacity MW	Energy MW	Fuel Type	Study Type
R36	Bethany 138kV	Active	6/1/2014	90	450	Wind	Generation
R37	Rehoboth 138kV	Active	6/1/2014	90	450	Wind	Generation
T51	Hay Road	Active	5/1/2008	13	13	Natural Gas	Generation
T52	Red Lion 500kV	Active	5/1/2008	20	20	Natural Gas	Generation
T53	Delaware City	Active	6/1/2008	7.3	7.3	Oil	Generation
T56	Christiana	Active	4/1/2009	8.4	8.4	Oil	Generation
T66	Tasley	Active	4/1/2009	6.7	6.7	Oil	Generation
T67	West	Active	4/1/2009	5.3	5.3	Oil	Generation
T68	Edgemoor	Active	4/1/2009	5.2	5.2	Oil	Generation

DPL

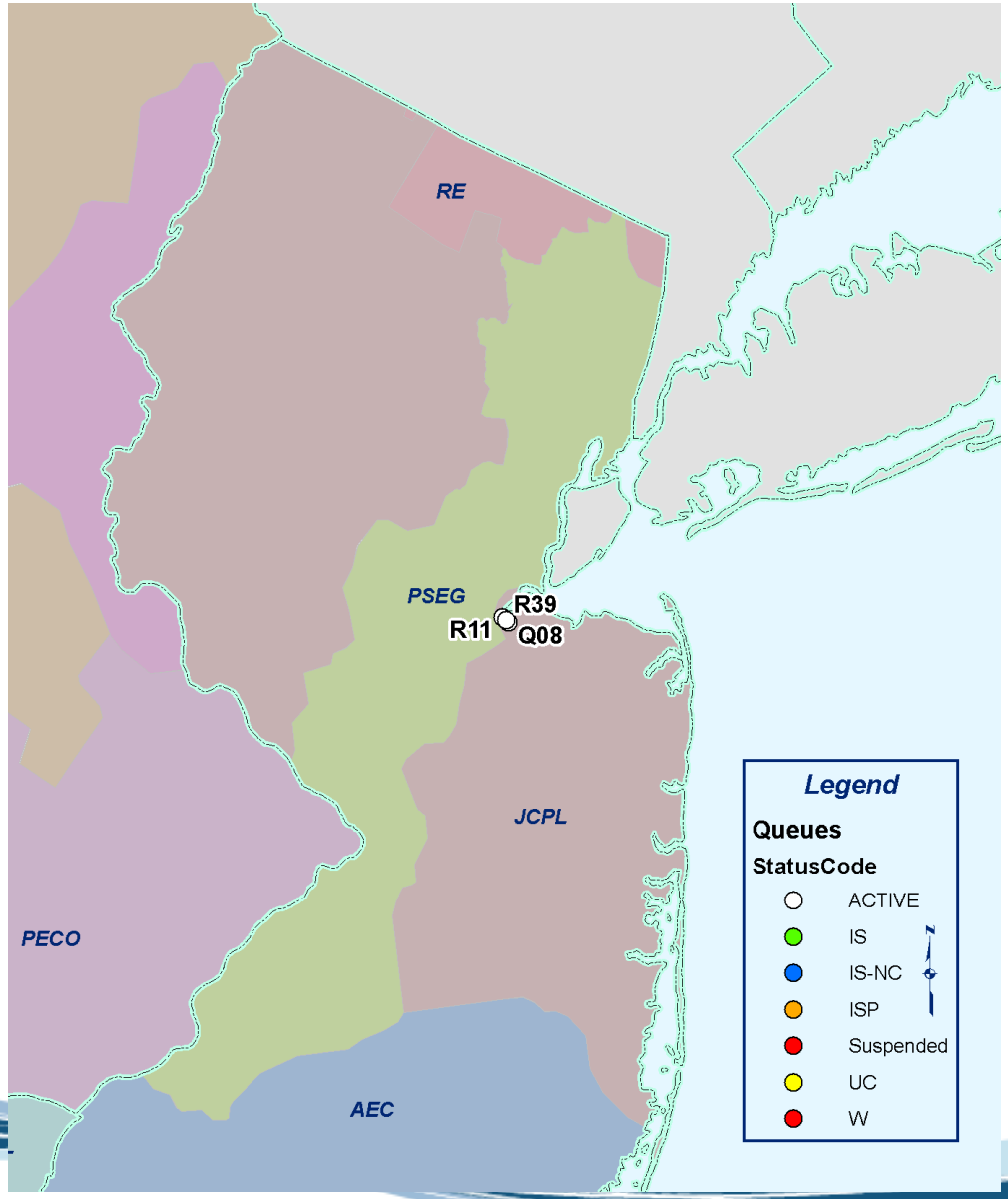

PPL
PECO
PSEG
JCPL
AEC
DPL
T52
T51
T68
T67
T53
R36
Q42
R37
T66
Legend
Queues
StatusCode
ACTIVE
IS
IS-NC
ISP
Suspended
UC
W

Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0916	Eddystone 3 - Island Road 6 - Replace metering equipment	DPL	6/1/2014	Active	0.20	R37	Rehoboth 138kV
n0917	Milford - Steele - Reconductor 230kV line		6/1/2014	Active	10.23		
n0918	Steele - Oil City - Upgrade the temperature rating on the 138kV line		6/1/2014	Active	0.25		
n0922	Bridgeville - Taylor - 69kV upgrade 3.63 miles of 336.4 ACSR at 80 degrees C to 125 degrees C		6/1/2011	Pending	1.50	Q42	Indian River
n0923	Steele - 230/138kV replace the 220 MVA unit with a 300 MVA unit		6/1/2011	Active	4.30		
n0924	Loretto - Piney Grove - Upgrade 9.51 miles of 477ACSR at 80 degrees C to 125 degrees C		6/1/2011	Active	0.50		

JCPL Impact Studies

Queue	Description	Status	IS Date	Capacity MW	Energy MW	Fuel Type	Study Type
Q08	Red Oak 230kV	Active	6/1/2008	50	50	Natural Gas	Generation
R11	South River	Active	6/30/2009	440	440	Natural Gas	Generation
R39	Red Oak 230kV	Active	8/1/2009	300	300	Natural Gas	Generation

JCPL



Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0907	Raritan River - Red Oak A Mitigation Upgrade, Drop Loop/Bus Conductor (Bundled)	JCPL	6/30/2009	Active	8.33	R11	South River
n0908	Williams - Freneau Mitigation Upgrade, Drop Loop/Bus Conductor (Bundled)		6/30/2009	Active	4.85	R11	South River
n0909	Parlin - Williams Mitigation Upgrade, Drop Loop/Bus Conductor (Bundled)		6/30/2009	Active	1.94		
n0910	South River - Atlantic 230kV line, Mitigation Upgrade, Drop Loop/Bus Conductor (Bundled)		6/30/2009	Active	11.06		
n0911	South River - Atlantic 230kV line (G1047), Mitigation Upgrade, Drop Loop/Bus Conductor (Bundled)		6/30/2009	Active	0.88		
n0913	Red OakA - (T1034) 230kV line - Mitigation upgrade, Drop Loop/Bus Conductor (Bundled)		8/1/2009	Active	0.14	R39	Red Oak 230kV

Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0914	Red OakB - (G1047) 230kV line - Mitigation upgrade, Drop Loop/Bus Conductor (Bundled)	JCPL	8/1/2009	Active	0.14	R39	Red Oak 230kV
n0915	Manor - Graceton - 230kV line upgrade terminal equipment		8/1/2009	Active	37.00		
n0991	Red Oak - Modify 230kV substation to connect a 5 breaker ring bus to Raritan River - Parlin and Raritan River - South River 230kV lines		6/1/2008	Active	7.90	Q08	Red Oak 230kV
n0992	Raritan River - Install 230kV breaker, two 230kV switches and reroute existing control cabling at the 230kV substation		6/1/2008	Active	1.12		
n0993	Red Oak - Install 230kV breaker, two 230kV switches and control work at substation		6/1/2008	Active	1.00		
n1011	Atlantic - 230kV Disconnect Switch replacement		8/1/2009	Active	0.09	R39	Red Oak 230kV
n1033.2	Gilbert 230kV - Install one (1) switched shunt capaictor		6/1/2007	Pending	2.75	S07	ARR

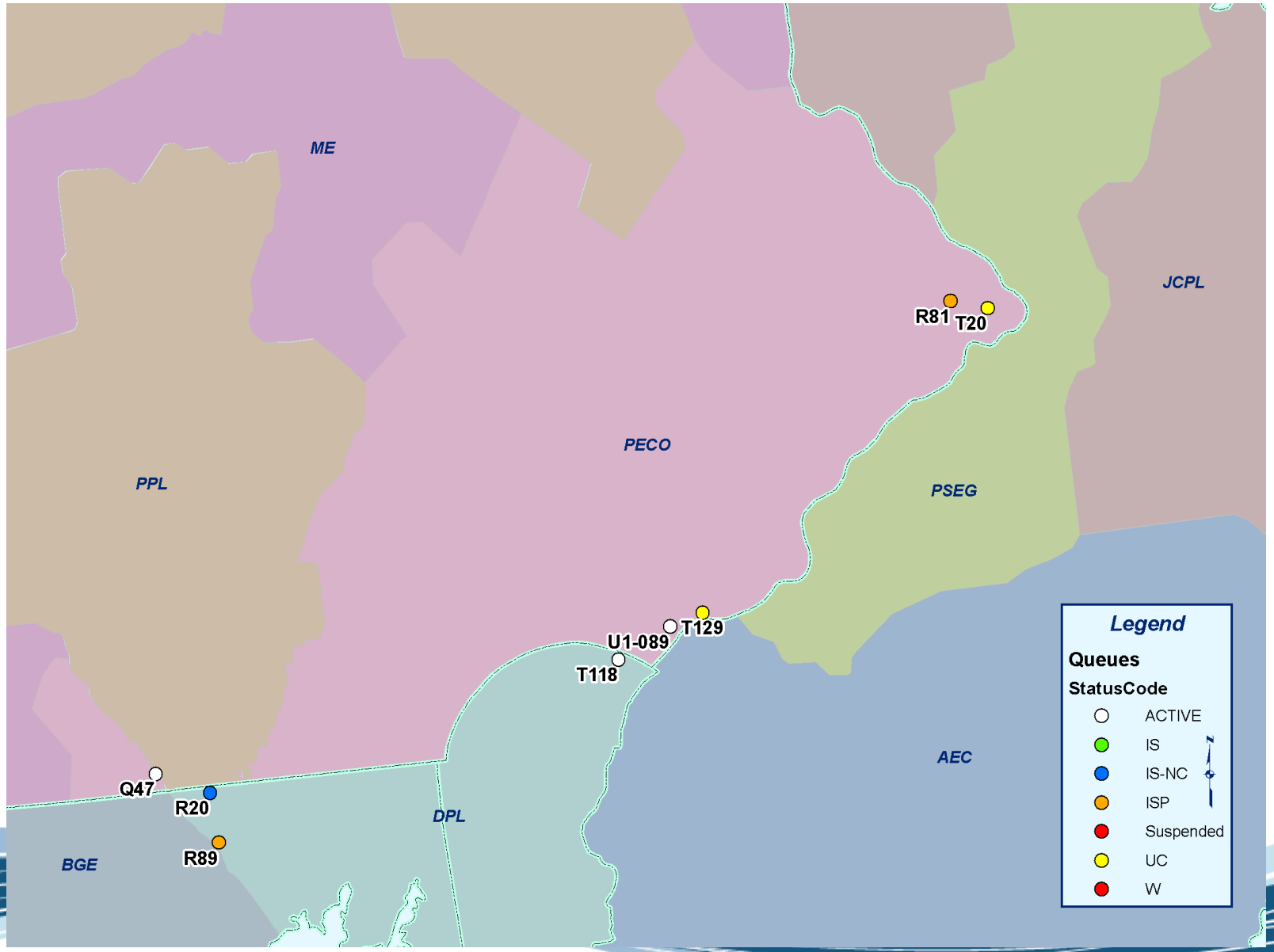
ME Network Upgrades

Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n1033.1	Portland 230kV - Install two (2) 100 MVAR switched shunt capacitors	ME	6/1/2007	Pending	2.75	S07	ARR

PECO Impact Studies

Queue	Description	Status	IS Date	Capacity MW	Energy MW	Fuel Type	Study Type
Q47	Peach Bottom	Active	10/31/2012	140	140	Nuclear	Generation
R20	Rock Springs	In-Service		20	20	Natural Gas	Generation
R81	Emilie 230kV	Partially In-Service		101	101	Natural Gas	Generation
R89	Conowingo	Partially In-Service		24	24	Hydro	Generation
T118	Linwood 230kV	Active	12/12/2007	10	10	Natural Gas	Generation
T129	Printz 230kV	Under Construction	5/1/2008	20	20	Natural Gas	Generation
T20	Falls	Under Construction	4/28/2008	3	3	Solar	Generation
U1-089	Paper Tap 69kV	Active	1/1/1986	20	0	Other	Generation

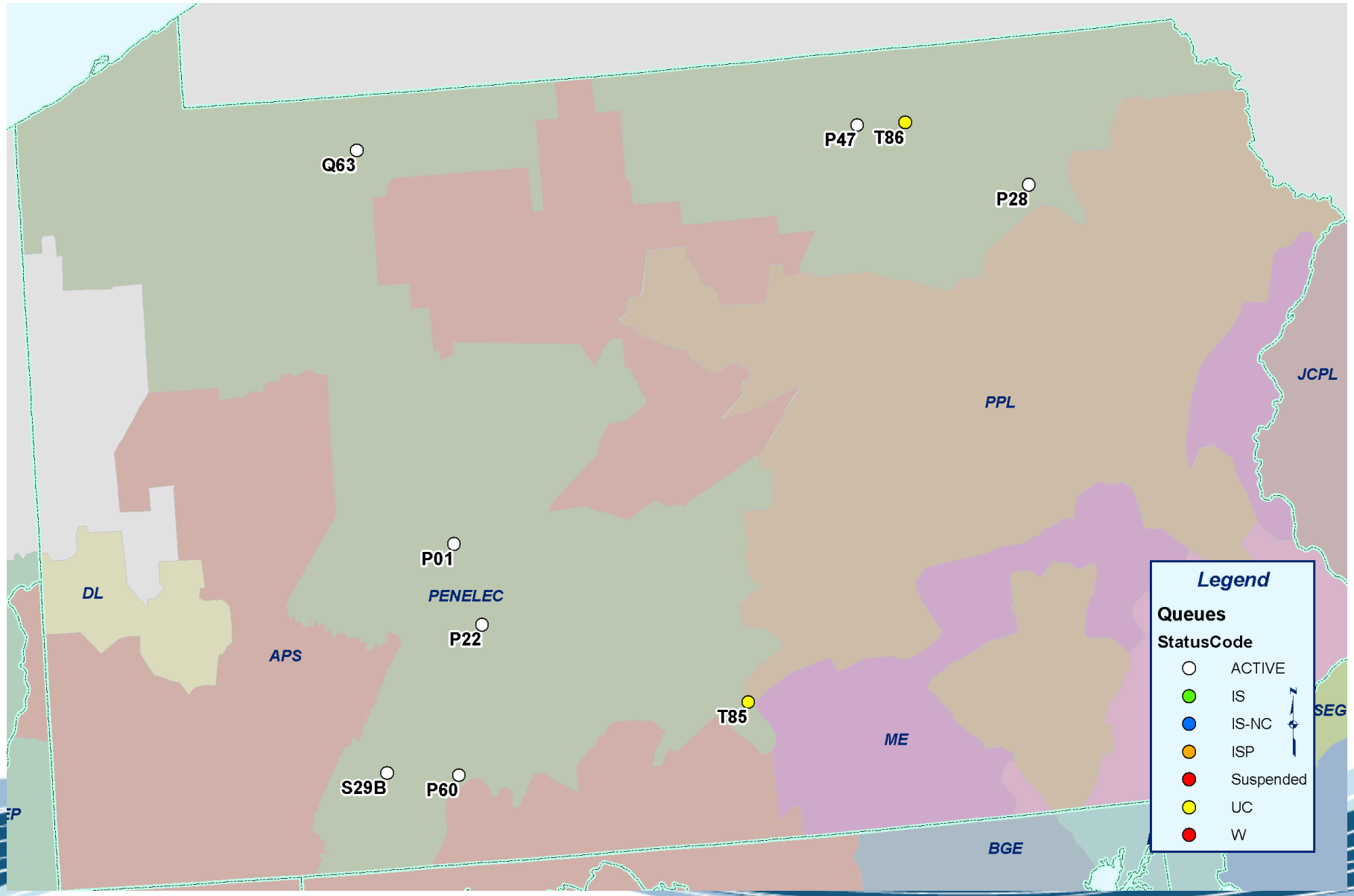
PECO



Penelec Impact Studies

Queue	Description	Status	IS Date	Capacity MW	Energy MW	Fuel Type	Study Type
P01	Westover-Madera 115kV	Active	10/31/2007	13	65	Wind	Generation
P22	Johnstown Altoona 230kV	Active	7/1/2007	4	20	Wind	Generation
P28	Mehoopany 115kV	Active	11/1/2007	30	150	Wind	Generation
P45A	Thompson 115kV	Active	12/1/2009	24	120	Wind	Generation
P47	Mansfield-S. Troy 115kV	Active	12/31/2007	20	100	Wind	Generation
P60	New Baltimore 115kV (Stony Creek)	Active	9/1/2007	10.5	52.5	Wind	Generation
Q63	Seneca 230kV	Active	11/1/2006	16	16	Hydro	Generation
S29B	Somerset 23kV	Active	7/1/2008	5.7	5.7	Methane	Generation
T104	Arnold 115kV	In-Service		0	0	Wind	Generation
T85	Roxbury-Blain 23kV	Under Construction	10/1/2008	6	6.4	Methane	Generation
T86	Bradford 34.5kV	Under Construction	7/1/2008	1.5	1.6	Methane	Generation

PECO



Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0872	Linwood - Chichester (Circuit 1) - Reconductor line and upgrade substation equipment Linwood to Chichester 220-39 line.	PECO	6/1/2011	Active	8.00	Q42	Indian River
n0873	Linwood - Chichester (Circuit 2) - Reconductor line and upgrade substation equipment Linwood to Chichester 220-43 line.		6/1/2011	Active	8.00		
n0887	Richmond - Richmond - Replace line reactors est. time 18 months		6/1/2008	Active	0.20	R81	Emilie 230kV
n0888	Homesburg-Richmond - Replace terminal equip 230 kV line est time 30 months, est new rating 457/574 MVA		6/1/2008	Active	4.00		
n0889	Emilie-Neshaminy - Replace terminal equip 230kV line		6/1/2008	Active	0.50		
n0893	Nottingham-Nottreac - 230kV line replace line reactor 220-01Reac		8/1/2009	Active	0.20	R39	Red Oak 230kV
n0894	Nottreach-Peach Bottom - Reconductor 230kV line 220-08-p, estm new rating 724 MVAe		8/1/2009	Active	29.00		
n0895	Peach Bottom - Graceton - Reconductor 230kV line 22008		8/1/2009	Active	5.09		
n0982	Printz - Replace 2 circuit breakers 230kV line		6/1/2012	Active	0.60	Q90	Mickleton 230kV
n1010	Nottingham - Cochransville - 161 MVAR Cap at Nottingham and 80 MVAR Cap at Cochransville		10/31/2012	Pending	9.20	Q47	Peach Bottom

Penelec Network Upgrades

Penelec

Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0897	E. Towanda - E. Sayreville - upgrade/replace CT 115kV circuit at East Sayreville	PENELEC	1/1/2013	Active	0.13	R01	Susquehanna
n0898	N. Meshhoppen - 230/115kV addition of two 230kV breakers, reconfigure ring bus		1/1/2013	Active	1.50	Q90	Mickleton 230kV
n0899	Constone - Mt Carmel - 230kV install 2 500/230kV xfmrs, 4-500kV bkrs., 7-230kV bkrs.		1/1/2013	Active	70.00	R01	Susquehanna
n0901	Lackawanna - Oxbow - Rebuild approximately 16.33 miles of transmission line to support bundled conductor		12/15/2011	Active	19.60	R04	Sunbury 500kV
n0902	Lackawanna - Oxbow - Upgrade disconnect switch at Oxbow substation		12/15/2011	Active	0.10		
n0903	Oxbow - N. Meshhoppen - Rebuild approximately 10.6 miles of transmission line to support bundled conductor, North Meshoppen Substation upgrade/replace two CT circuits and replace substation conductor		12/15/2011	Active	12.60		
n0904	North Meshhoppen - Add two 230kV circuit breakers, reconfigure 230kV bus into ring bus		12/15/2011	Active	1.50		
n0912	Lackawanna - Upgrade terminal equipment at 230kV substation, replace substation conductor and replace disconnect switch		4/1/2011	Active	0.13		

Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0955	Waiting for name from Aaron - 115kV 3 breaker ring bus	PENELEC	10/31/2007	Pending	2.76	P01	Westover-Madera 115kV
n0956	Waiting for name from Aaron - Install line tap structure from existing Westover South-Madera 115kV line to new network substation		10/31/2007	Pending	0.25		
n0957	Garman - Perform relay and control work at 115kV Substation		10/31/2007	Pending	0.25		
n0958	Shawville - Perform relay and control work on 115kV Substation		10/31/2007	Pending	0.25		
n0959	Altoona - Replace 230kV line trap at substation (Altoona - Raystown)		10/31/2007	Pending	0.13		

Penelec

Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0960	Bear Rock - Inspect/Upgrade grounding grid at existing 230kV Substation	PENELEC	7/1/2007	Active	0.02	P22	Johnstown Altoona 230kV
n0961	Lewistown - Replace linetrap a the 230kV substation		7/1/2007	Active	0.12		
n0962	Lewistown - Replace CT circuit at the 230kV Substation		7/1/2007	Active	0.14		
n0963	Mehoopany - Install 4 new 115kV breakers a the substation, Install Disconnect Switches and Bus Structures		11/1/2007	Active	1.50	P28	Mehoopany 115kV
n0964	Mehoopany - Install new tap structure at the 115kV Substation		11/1/2007	Active	0.25		
n0965	North Meshoppen - Perform relay and control work at 115kV Substation		11/1/2007	Active	0.36		
n0966	Mehoppany - Perform relay and control work at 115kV Substation		11/1/2007	Active	0.36		
n0967	Mehoppany - North Meshappen - Install approximately 6.56 miles of fiber optic cable between Substations		11/1/2007	Active	0.66		

Penelec

Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0968	Aaron to supply name - New 115kV 3 breaker ring bus termaination point at new interconnection substation	PENELEC	12/1/2009	Pending	2.76	P45A	Thompson 115kV
n0969	Aaron to supply name - Approx. .1 miles of 115kV transmission line extending from Tiffany-Thompson 115kV line to the generation plant substation		12/1/2009	Pending	0.25		
n0970	Tiffany - Relay and control work at Tiffany 115kV substation for P45A		12/1/2009	Pending	0.25		
n0971	Thompson - Realy and control work at Thompson 115kV susbstation for P45A		12/1/2009	Pending	0.25		
n0972	Tiffany - Install approx. 16 miles of fiber optic cable from Tiffany 115kV substation to the Interconnection substation for direct transfer trip of P45A		12/1/2009	Pending	1.62		
n0973	Shelocta - Keystone - Upgrade/reconductor of 2.26 miles of the 230kV line		12/1/2009	Pending	1.36		

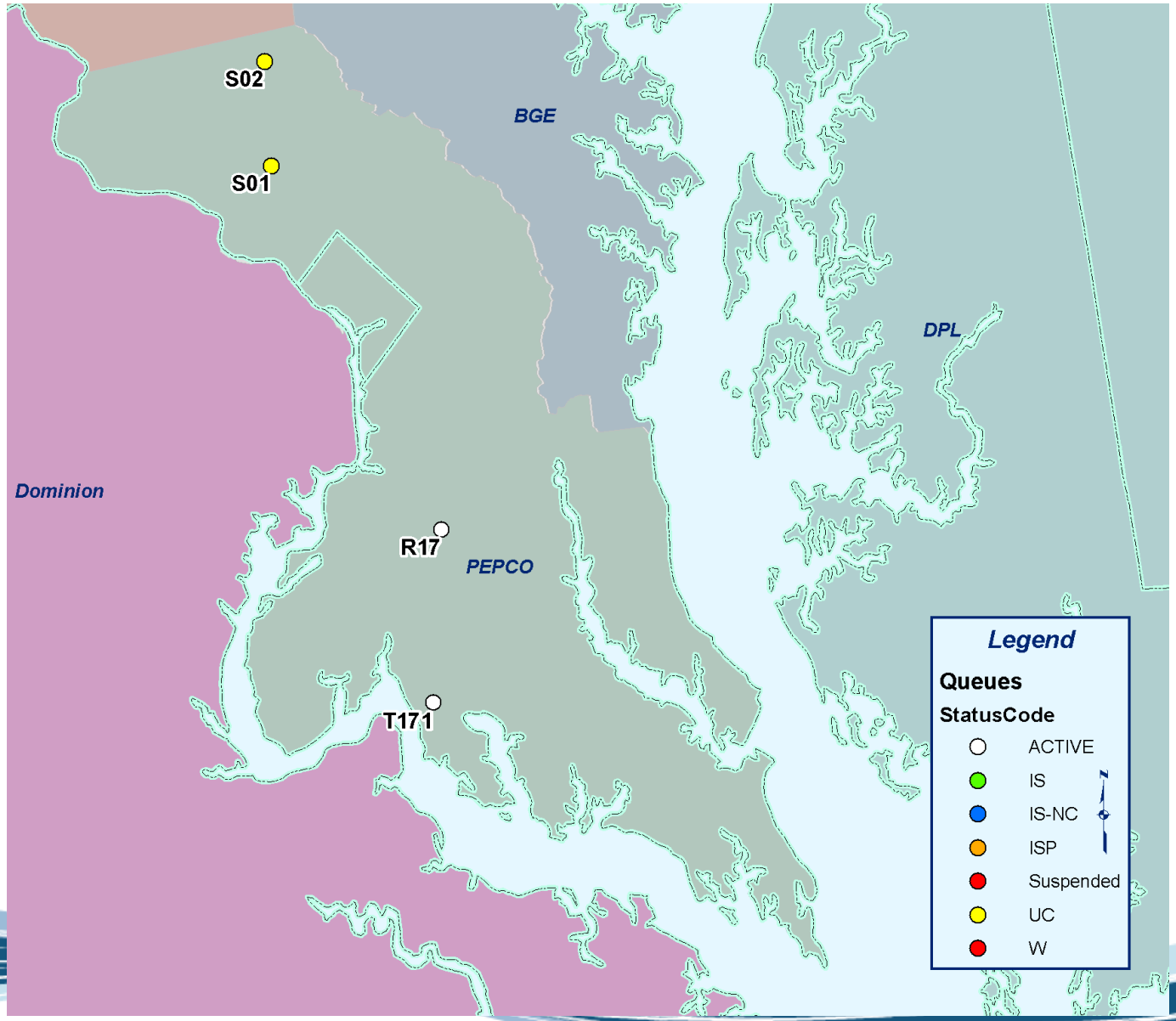
Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0974	Aaron to supply name - Install new 115kV 3 breaker ring bus substation approx. 15.46 miles east of Mansfield 115kV substation (disconnect switches, bus structures and a control house)	PENELEC	12/1/2009	Pending	2.76	P47	Mansfield-S. Troy 115kV
n0975	South Troy - East Towanda - New 115kV structure extending from the Mansfield - South Troy 115kV line to interconnection substation		12/1/2009	Pending	0.25		
n0976	Mansfield - Relay and control work at 115kV substation. Includes relays, carrier set, line trap and tuner		12/1/2009	Pending	0.25		
n0977	East Towanda - Realy and control work at 115kV substatin . Includes relays, carrier set, line trap and tuner		12/1/2009	Pending	0.25		
n0978	South Troy - East Towanda - Reconductor 19.54 miles of the South Troy - East Towanda 115kV transmission line		12/1/2009	Pending	5.37		
n0979	South Troy - Replace two disconnect switches at the 115kV substation (One on East Towanda line, second on Mansfield line)		12/1/2009	Pending	0.16		

Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0980	East Towanda - Replace two CT circuits at the 115kV substation	PENELEC	12/1/2009	Pending	0.25	P47	Mansfield-S. Troy 115kV
n0981	Mansfield - Relpace a CT circuit and disconnect switch at the 115kV substation		12/1/2009	Pending	0.33		
n0983	Keystone - Replace CT circuit at substation		12/31/2007	Pending	0.14		
n0989	Keystone - Replace #3 500/230kV Transformer		9/1/2007	Active	5.50	P60	New Baltimore 115kV (Stony Creek)
n0990	Keystone - Replace #4 500/230kV Transformer		9/1/2007	Active	5.50		

PEPCO Impact Studies

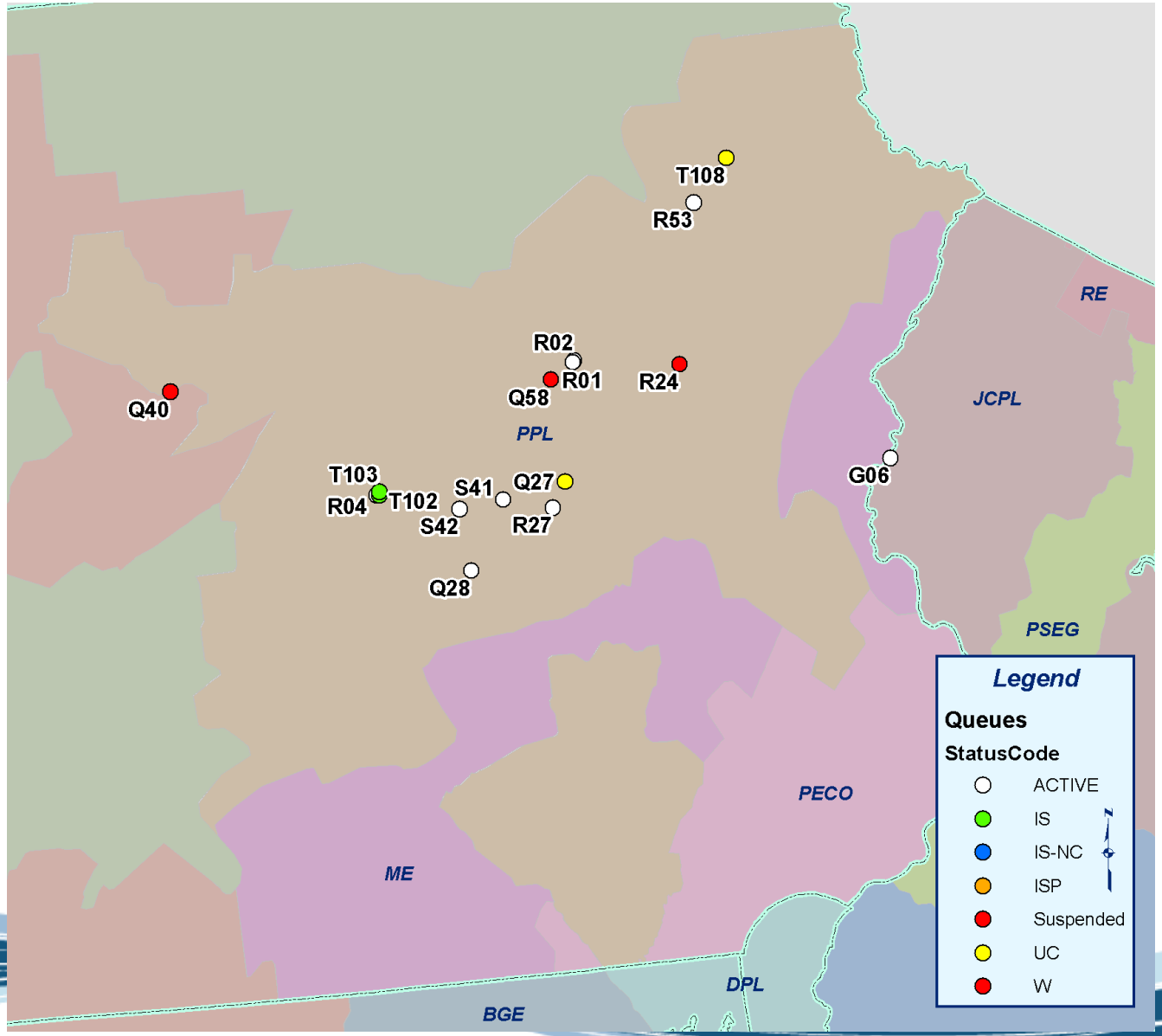
Queue	Description	Status	IS Date	Capacity MW	Energy MW	Fuel Type	Study Type
R17	Morgantown - Oak Grove 230kV	Active	12/31/2010	645	645	Natural Gas	Generation
S01	Derwood 13kV	Under Construction	7/1/2008	0	1	Methane	Generation
S02	Mt. Zion 13kV	Under Construction	7/1/2008	4	4	Methane	Generation
T171	Morgantown 69kV	Active	1/1/2009	20	20	Other	Generation

PEPCO



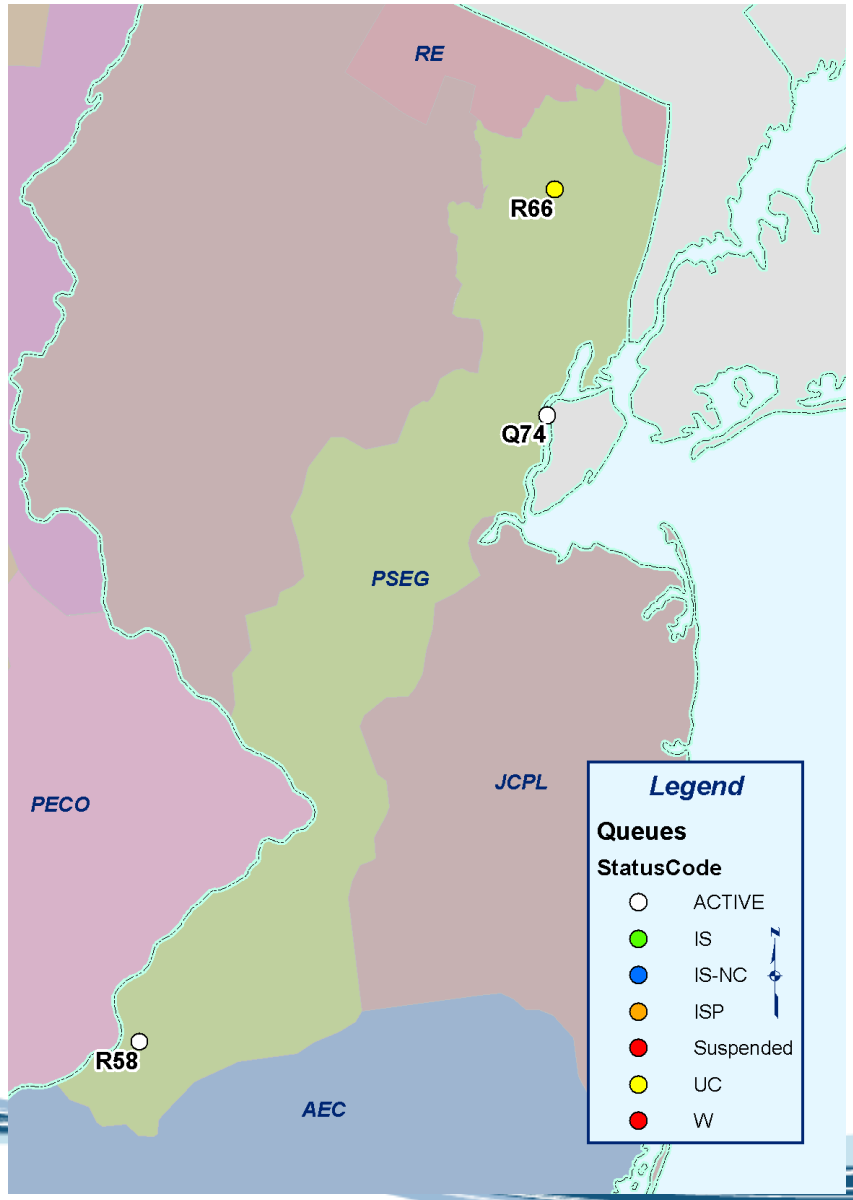
Queue	Description	Status	IS Date	Capacity MW	Energy MW	Fuel Type	Study Type
G06	Martins Creek #4	Active	12/1/2007	30	0	Coal	Generation
Q27	Frackville-Shennandoah 69kV	Under Construction	12/31/2007	20	100	Wind	Generation
Q28	Eldred-Frackville 230kV	Active	12/31/2008	44	220	Wind	Generation
R01	Susquehanna	Active	1/1/2013	800	800	Nuclear	Generation
R02	Susquehanna	Active	1/1/2013	800	800	Nuclear	Generation
R04	Sunbury 500kV	Active	12/15/2011	817	817	Coal	Generation
R27	Frackville	Active	6/1/2010	52	52	Coal	Generation
R53	Stanton-Brookside 69kV	Active	11/11/2008	12	60	Wind	Generation
S41	Eldred-Reed 69kV	Active	12/1/2008	12.5	12.5	Biomass	Generation
S42	Eldred-Fairview	Active	10/1/2008	3.6	18	Wind	Generation
T102	Sunbury 69kV	In-Service		10	10	Coal	Generation
T103	Sunbury 69kV	In-Service		10	10	Coal	Generation
T108	Archbald 69kV	Under Construction	1/1/2009	9.2	9.2	Methane	Generation
U1-067	Honey Brook	Active	12/20/2008	1.6	1.6	Methane	Generation

PEPCO



Queue	Description	Status	IS Date	Capacity MW	Energy MW	Fuel Type	Study Type
Q74	Linden 230kV	Active	6/1/2009	600	600	Oil	Generation
R58	Gloucester 230kV	Active	6/1/2008	55	55	Natural Gas	Generation
R66	Fair Lawn 138kV	Under Construction	3/1/2007	67	67	Natural Gas	Generation

PEPCO



Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0726	Dickerson "H" - 230kV substation upgrade to 63kA rating	PEPCO	6/30/2004	UC	0.10	G51_W62	Eastalco 230 kV

PPL Network Upgrades

Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0743	Peach Bottom	PPL	5/15/2006	ACTIVE	4.50	Q40	Renovo Lock Haven
n0744	Peach Bottom		5/15/2006	ACTIVE	3.50		
n0843	Frackville - Replace the overdutied Frackville 69kV (Hauto #3 line) Circuit Breaker		12/31/2007	UC	0.13	Q27	Frackville-Shennandoah 69kV
n0844	Frackville - Replace the overdutied Mowry line 69kV circuit braker		12/31/2007	UC	0.13		
n0905	Juniata - Replace 500/230kV transformer #2		12/15/2011	Active	10.00	R04	Sunbury 500kV
n0920	Lackawanna - Upgrade terminal equipment at the 230kV substation		12/15/2011	Active	0.70		
n0953	Martins Creek - Install automatic relay and control scheme to existing disconnect switches 230kV		12/31/2008	Active	0.10	Q28	Eldred-Frackville 230kV
n1020	Frackville - Shennandoah - Rebuild approx. 5.3 miles of existing 69kV line		12/31/2007	UC	5.25	Q27	Frackville-Shennandoah 69kV
n1021	Frackville - Shennandoah - Replace line protective relays and perform breaker control upgrades associated with the Frackville - Shennandoah 69kV line breaker at Frackville Substation		12/31/2007	UC	0.12		
n1022	Frackville - Shennandoah - Replace line protective relays and perform breaker control upgrades associated with the 69kV tie breaker at Frackville Substation		12/31/2007	UC	0.12		

PSEG Network Upgrades

Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0925	South Water Front - Newport - 230kV Replace the underground bus tie cable (including potheads) in Newport yard. Will increase ratings to Rate A=415, B=624	PSEG	5/31/2009	Pending	1.50	Q86	Hudson - Essex 230kV
n0926	Hudson 1-6 - Reconductor Approx. 1 mile long section to achieve the following ratings Rate A= 850MVA, Rate B = 1000MVA, may require tower reinforcements/replacement		5/31/2009	Pending	5.00		
n0927	Hudson 1-6 - South Water Front - Replace existing cable with 300 kcmil cable utilizing the existing pipe (Rate A = 520MVA, Rate B = 714MVA)		5/31/2009	Pending	16.00		
n0928	Hudson-Essex - Q86 Interconnection Substation - Construct a 3 breaker ring bus		5/31/2009	Pending	13.10		
n0929	Hudson-Essex - Q86 Interconnection Substation - Loop the (A-2227) circuit into the new substation		5/31/2009	Pending	13.90		
n0944	Fair Lawn - Upgrade the Z-598 circuit to a summer normal rating of 73MVA		3/1/2007	Active	0.50	R66	Fair Lawn 138kV

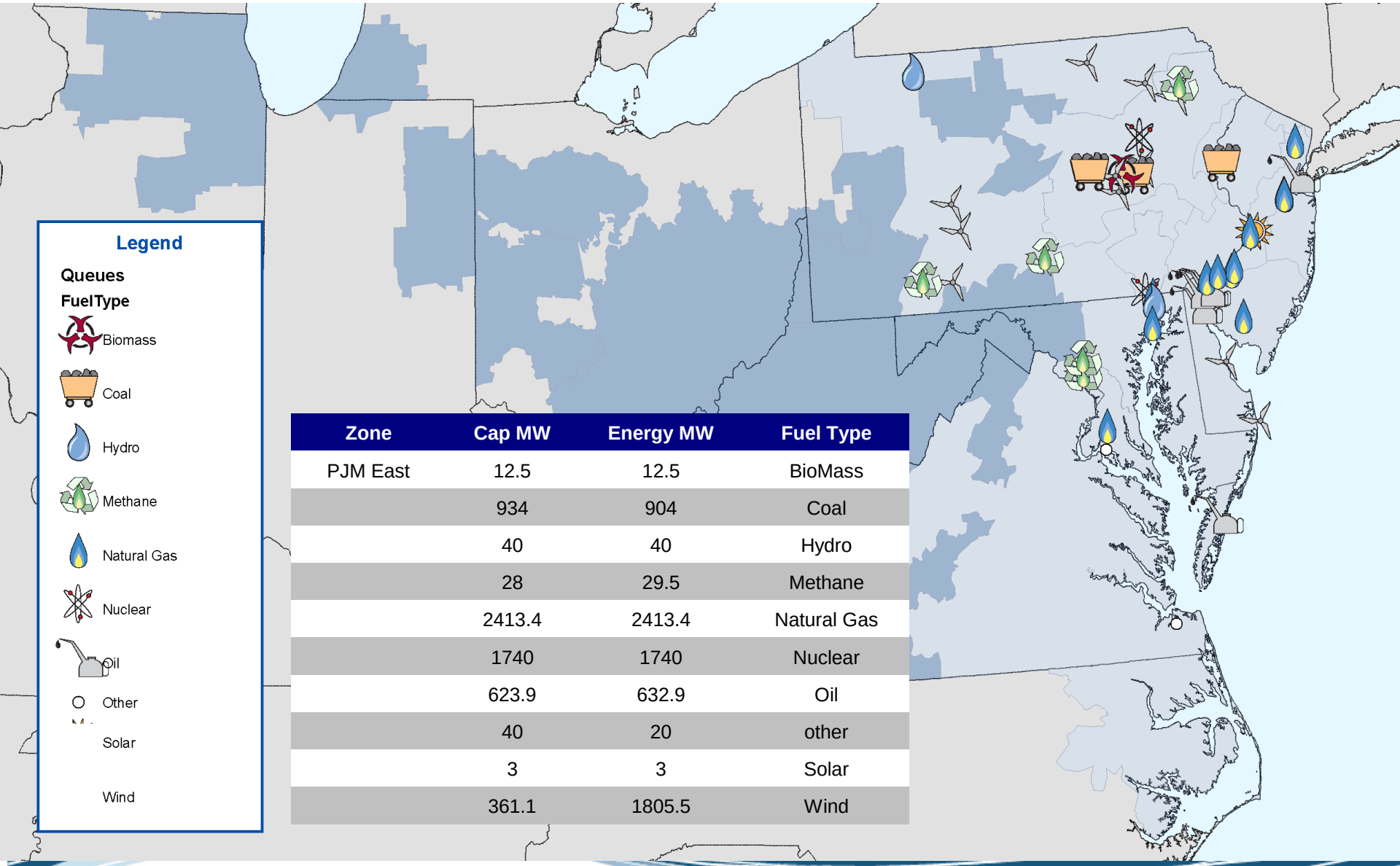
Upgrade ID	Description	TO	ISA In-Service Date	Status	Cost (M)	Queue	Project Name
n0945	South Waterfront - Replace the 12H circuit breaker at the 230kV substation		5/31/2009	Pending	0.40	Q86	Hudson - Essex 230kV
n0946	South Waterfront - Replace the 22H circuit breaker at the 230kV substation		5/31/2009	Pending	0.40		
n0947	South Waterfront - Replace the 32H circuit breaker at the 230kV substation		5/31/2009	Pending	0.40		
n0948	South Waterfront - Replace the 52H circuit breaker at the 230kV substation		5/31/2009	Pending	0.40		
n0949	South Waterfront - Replace the 62H circuit breaker at the 230kV substation		5/31/2009	Pending	0.40		
n0950	South Waterfront - Replace the 72H circuit breaker at the 230kV substation		5/31/2009	Pending	0.40		
n0951	South Waterfront - Replace the 82H circuit breaker at the 230kV substation		5/31/2009	Pending	0.40		
n0952	Athenia - Replace the 82H circuit breaker at the 230kV substation		5/31/2009	Pending	0.40		
n0984	Bergen 230 kV breaker 12H		7/1/2009	Active	0.40	O66	Bergen 230kV
n0985	Athenia 230 kV breaker 21H		7/1/2009	Active	0.40		
n0986	Athenia 230 kV breaker 11H		7/1/2009	Active	0.40		
n0987	Athenia 230 kV breaker 51H		7/1/2009	Active	0.40		
n0988	Athenia 138 kV breaker 2BH		7/1/2009	Active	0.40		

PJM Long Term Firm Transmission Impact Studies

Queue	Description	Status	IS Date	Capacity MW	Energy MW	Fuel Type	Study Type
S58C (LTF)	From PJM to Cinergy	Rights Granted		200		LTF	Long Term Firm
S59B (LTF)	From PJM to Cinergy	Rights Granted		20		LTF	Long Term Firm
T139 (LTF)	From FE to PJM	Active		707		LTF	Long Term Firm
T140 (LTF)	From FE to PJM	Active		2510		LTF	Long Term Firm
T15 (LTF)	From CPLE to PJM	Rights Granted		47		LTF	Long Term Firm
T190 (LTF)	From AMIL to PJM	Active		1045		LTF	Long Term Firm

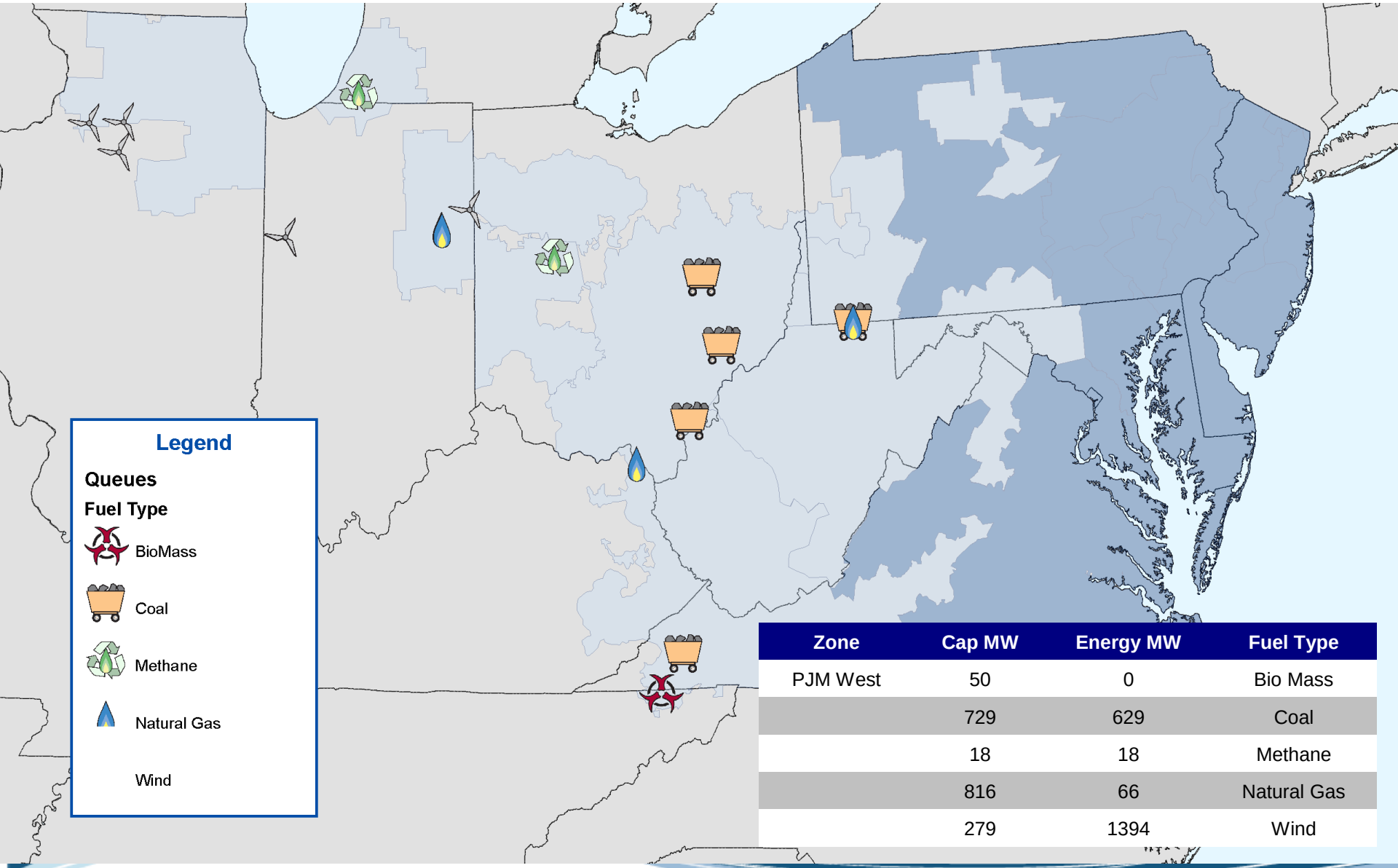
Recent Impact Study Data

PJM East Impact Studies by Fuel Type



Zone	Cap MW	Energy MW	Fuel Type
PJM East	12.5	12.5	BioMass
	934	904	Coal
	40	40	Hydro
	28	29.5	Methane
	2413.4	2413.4	Natural Gas
	1740	1740	Nuclear
	623.9	632.9	Oil
	40	20	other
	3	3	Solar
	361.1	1805.5	Wind

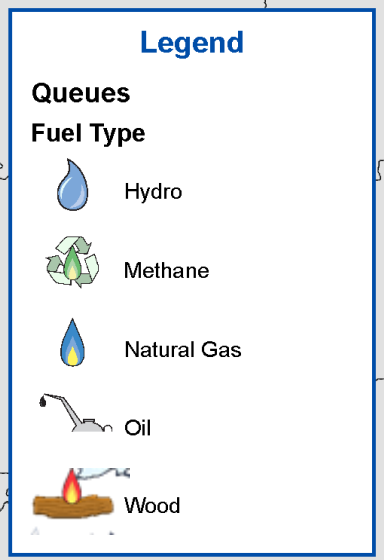
PJM West Impact Studies by Fuel Type



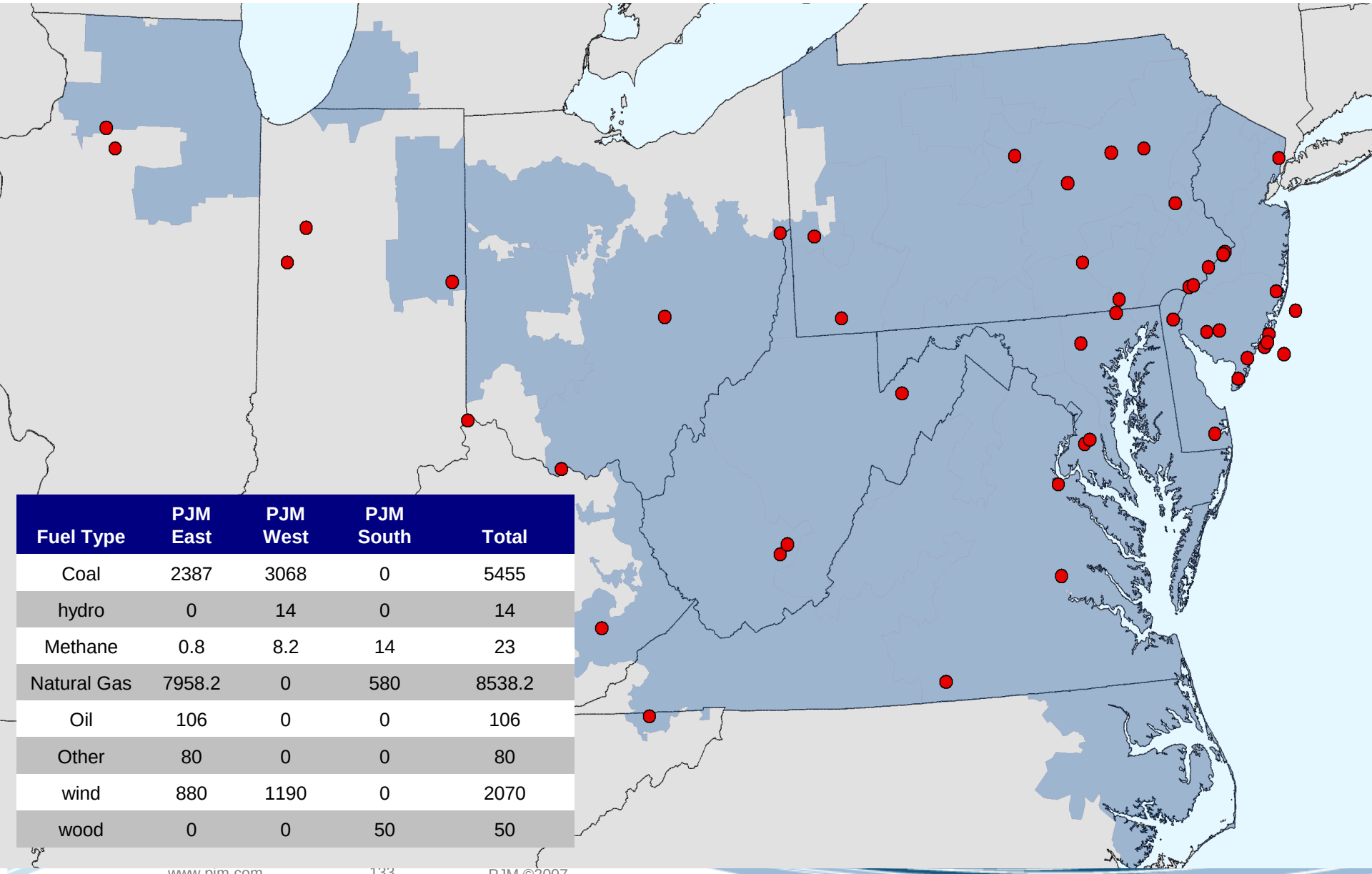
Zone	Cap MW	Energy MW	Fuel Type
PJM West	50	0	Bio Mass
	729	629	Coal
	18	18	Methane
	816	66	Natural Gas
	279	1394	Wind

PJM South Impact Studies by Fuel Type

Zone	Cap MW	Energy MW	Fuel Type
PJM Southt	91	0	Hydro
	16.3	16.3	Methane
	600	0	Natural Gas
	20	20	Oil
	78.4	0	Wood



Withdraws



Fuel Type	PJM East	PJM West	PJM South	Total
Coal	2387	3068	0	5455
hydro	0	14	0	14
Methane	0.8	8.2	14	23
Natural Gas	7958.2	0	580	8538.2
Oil	106	0	0	106
Other	80	0	0	80
wind	880	1190	0	2070
wood	0	0	50	50

- Comments on any of the material presented today can be sent to: RTEP@pjm.com