



Transmission Expansion Advisory Committee

May 8, 2014

Interregional Planning Update

- 2014 Scenario Analysis
 - Scenario A - Update rollup case
 - Scenario B - Severe Heat and Drought
 - May – July - target assumptions and model builds
 - July Stakeholder WebEx
 - June – August - target analysis
 - Sept – Oct - target draft report
 - November - target Stakeholder WebEx

- **NCTPC**
 - Study requested by NCUC
 - Reliability and Economic impact of BRA resources
 - Reliability Scope complete
 - Economic Scope under development
 - 2014 target completion
- **PJM/MISO Joint Planning Study**
 - Futures 1, 2, 3 analysis is complete
 - Stakeholder comments have been incorporated
 - Results under review
- **Northeast Protocol Studies Update – NCSP posted**

2014 RTEP Proposal Windows Update

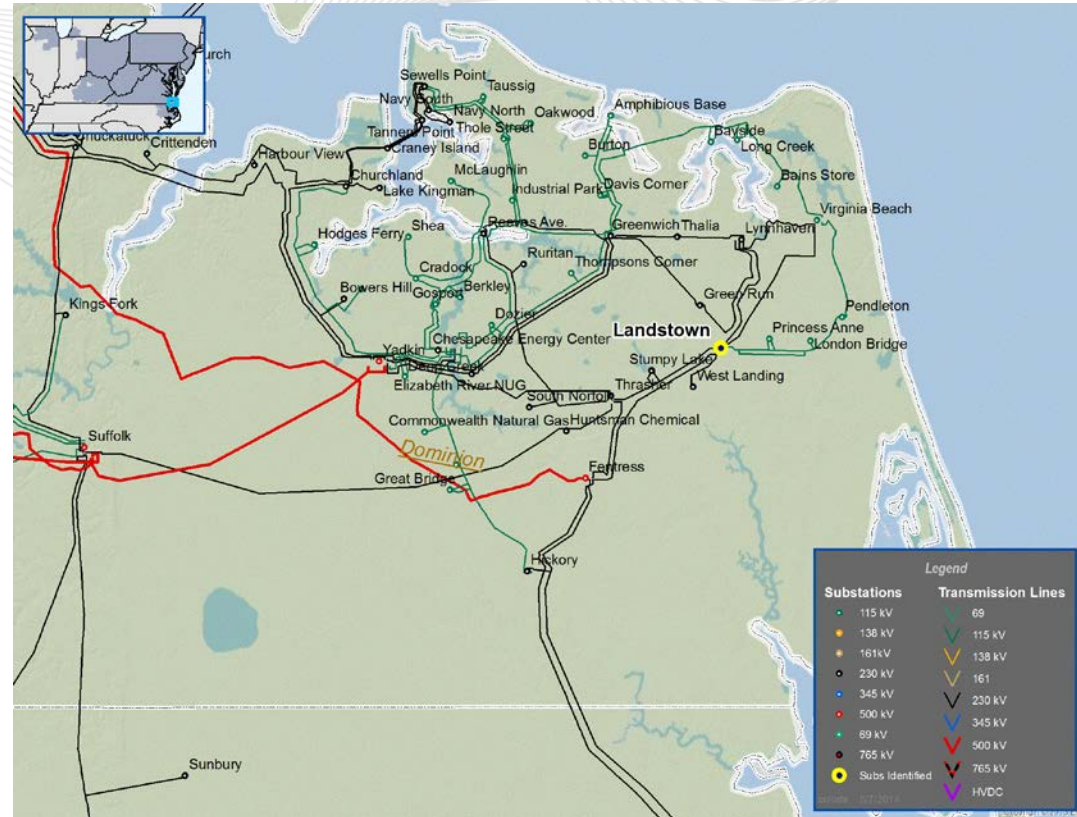
- 2014 RTEP Approach
 - 2019 Summer Baseline N-1 Thermal result
 - Posted to the 2014 RTEP proposal window participants www.pjm.com
 - 2019 Summer Generator Deliverability and Common Mode Outage result
 - Quality control check with TOs is in progress
 - To be distributed upon completion of quality control check
 - 2019 Summer Load Deliverability results
 - Analytical study in progress at PJM
 - 2019 Summer NERC Category C3 “N-1-1” result
 - To begin following load deliverability

Reliability Analysis Update

- **Operational Performance**
- **Midlothian 500kV Ring Bus**
- Midlothian is the last remaining substation on the Dominion system that has a 500/230kV transformer that is tapped directly to a 500kV line and has motor operated switches. This does not meet Dominion's minimum operating standards for 500kV.
- Proposed Solution: At Midlothian, replace 500kV breaker 563T576 and motor operated switches with a 3 breaker 500kV ring bus. Also, terminate Lines #563 Carson to Midlothian and #576 Midlothian to North Anna and Transformer #2 in the new ring.
- Projected IS Date: Nov 2015
- Estimated cost \$ 9 M



- **Baseline Project b1912 scope update**
 - Project B1912 was established due to the Chesapeake Units #1-4 Retirement
 - Re-consider scope due to electrical and physical considerations
 - Existing Problem: Voltage collapse in the Va Beach area for an N-1-1 outage of Suffolk-Yadkin 500 kV Line and the Yadkin – Fentress 500 kV Line
 - Previous Proposed Solution: (B1912) – Install a 500 MVAR SVC at Landstown.
 - Re-consider this solution due to electrical and physical considerations
 - Previous Estimated Project Cost: \$60 M.
 - Projected IS Date: 06/01/2016
- Continued on the next slide.....



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Chesapeake Units #1-4 Retirement - Revised Solution

- Existing solution:** Install a 500 MVAR SVC at Landstown.
- Estimated Project Cost: \$67 M

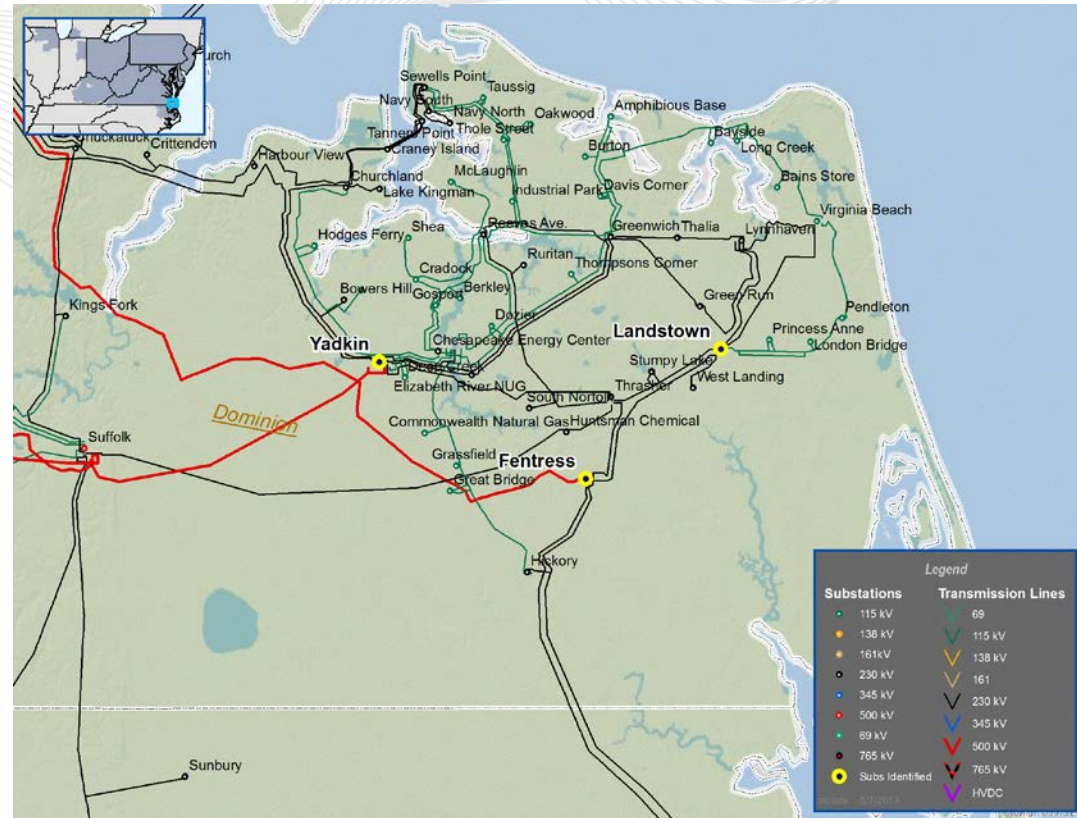
- New recommended solution:** Install three smaller +/- 125 MVAR STATCOM at three different Substations (Landstown, Yadkin, Fentress)

- New Estimated Project Cost \$70 M

New recommended solution benefits:

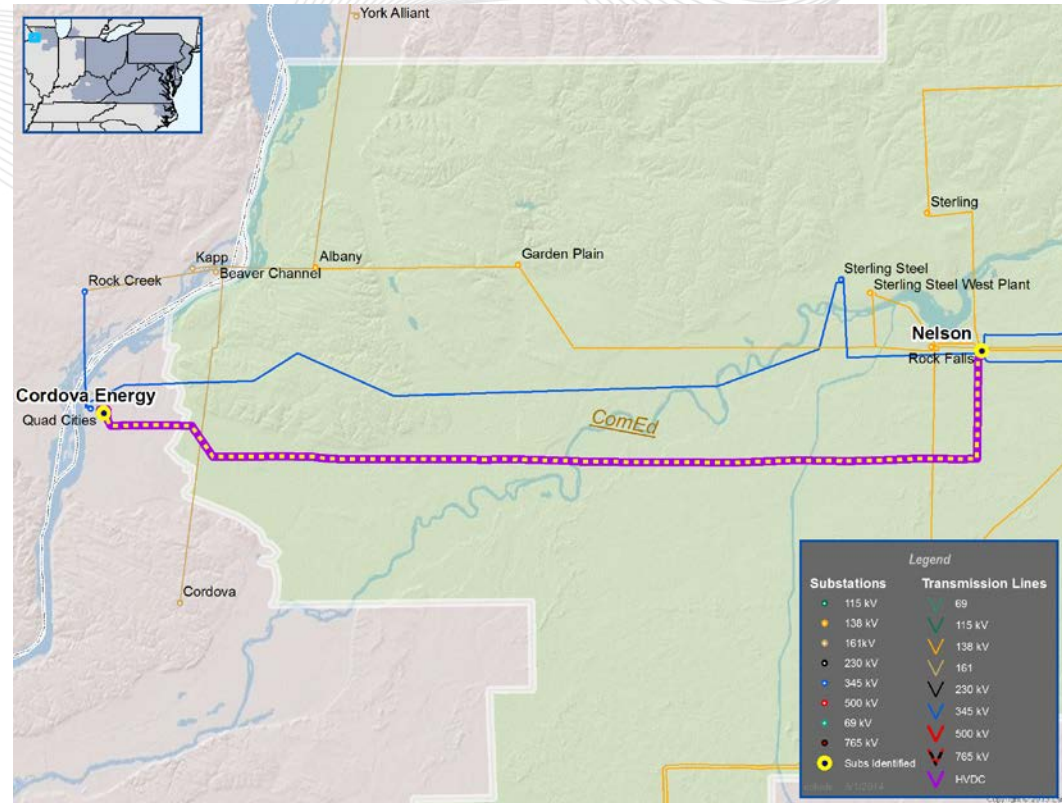
- Three smaller distributed resources, instead of a single larger resource
- Improved reliability in coastal environment due to the indoor configuration of a STATCOM
- Less acoustic noise in urban areas
- Three locations provide better physical security and a smaller foot print
- Device response
- Located closer to load centers

- Projected IS Date: 06/01/2016



Supplemental Projects

- **Supplemental Project**
- To improve reliability and operability in the ComEd Western zone by addressing constraints consistently observed in real-time and day-ahead studies.
- Reconductor 0.4 miles of 345 kV line 15503 from Cordova to Nelson and replace breaker leads at Nelson. (S0704)
- Estimated Project Cost: \$1.0 M
- Projected IS Date: 6/1/2015



Winter Peak Study Update

- PJM Winter Study Model
 - Topology - based on 2019 RTEP Summer Peak case
 - External model – 2019 MMWG winter model
 - Facility Ratings - winter thermal ratings
 - Forecast - PJM Winter load forecast
 - Demand - Winter load profile submitted by TOs
 - Dispatch
 - Area interchange is the net PJM Long Term Firm commitments
- In progress
 - Examination of pumped hydro modeling during winter peak
 - Continue to examine winter generation outage rates
 - Capacity Factor calculation from a 2019 market efficiency study

- Winter Peak Hours Capacity Factors

FUEL TYPE	Solar	Coal (<500MW)	Landfill Gas	Natural Gas	Nuclear	WAT Run of River	Wind	Coal (>500MW)
AVG CF (2008-2013)	0.05	0.51	0.46	0.25	0.98	0.38	0.33	0.73

- Capacity Factor Comparison between Summer and Winter (all hours)

Fuel Type	Solar	Coal (<500MW)	Landfill Gas	Natural Gas	Nuclear	WAT Run of River	Wind
SUMMER CF	0.2	0.52	0.52	0.13	0.94	0.33	0.16
Winter CF	0.09	0.63	0.46	0.22	0.98	0.1	0.34

- Capacity Factor Next Steps

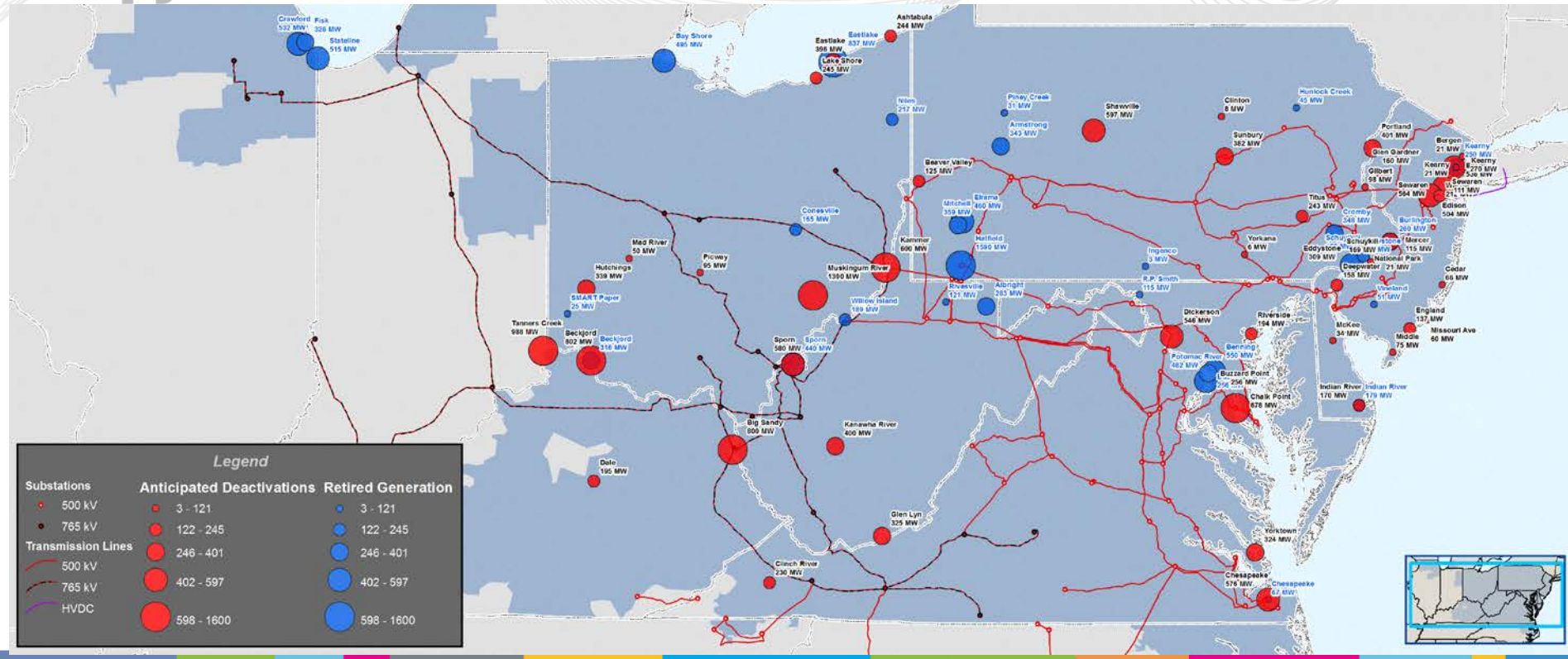
- Evaluate the capacity factor data to determine appropriate base case and ramping values for generation by fuel type

- Changes might impact capacity factors in the next several years
 - Significant coal generation retirement
 - Gas price change
- ProMOD Study to predict the future CF for different type of generators
- Analytical studies to perform
 - Contingencies
- Potential next steps
 - Deliverability test similar to light load test with different ramping level using the uniform dispatched case
 - Ramping of hydro
 - Ramping of wind
 - Similar to other deliverability tests, the ramping limit for the remaining generators will be 100%
 - Sensitivity to change of the generator dispatch in base case

- Next Steps
 - ProMOD Study to predict the future CF is targeted to be done in June
 - The initial deliverability test will start in June

Generation Deactivation Notification Update

Unit(s)	Transmission Zone	Requested Deactivation Date	PJM Reliability Status
Dale Units 1-4 (193MWs total)	EKPC	4/16/2015	Reliability analysis complete. No impacts identified.
- UPDATED Sunbury 1-4 (382MWs total)	PPL	7/18/2014 (Previous 6/1/2015)	Reliability analysis underway
- UPDATED Riverside 4 (76MWs)	BGE	6/1/2015 (Previous 6/1/2016)	Reliability analysis underway
-UPDATED Chalk 1, 2 & Dickerson 1-3 (1224MWs)	PEPCO	5/31/2018 (Previous 5/31/2017)	Reliability analysis underway

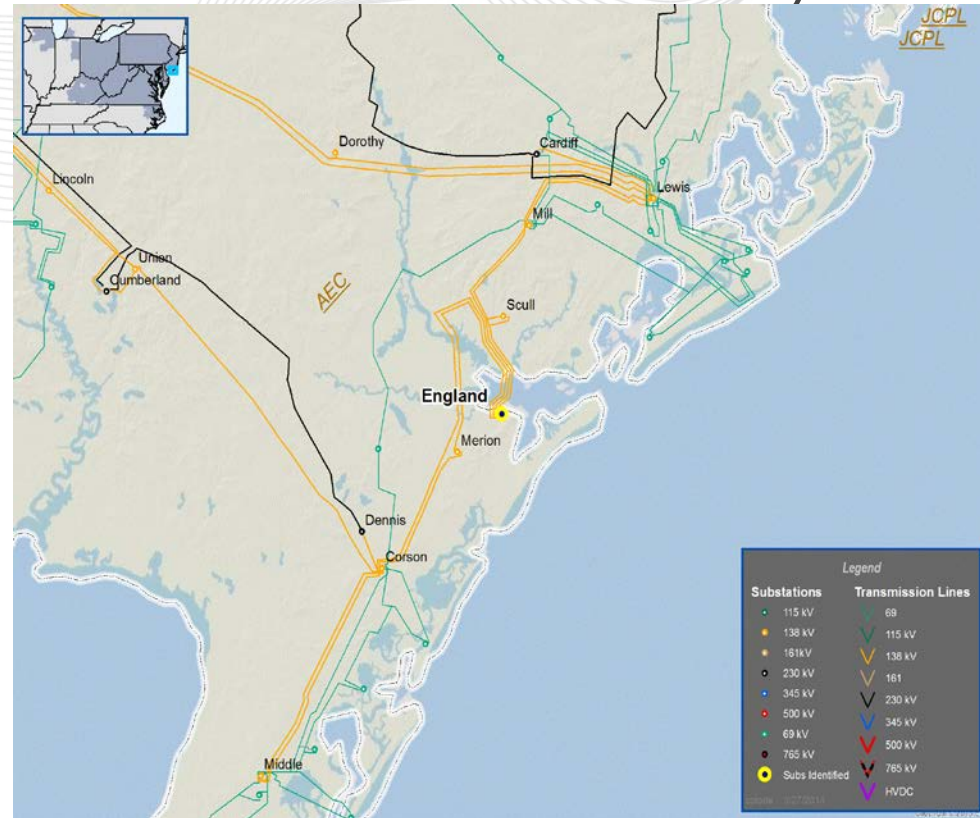


At-Risk Generation Analysis

Deactivation At Risk Analysis

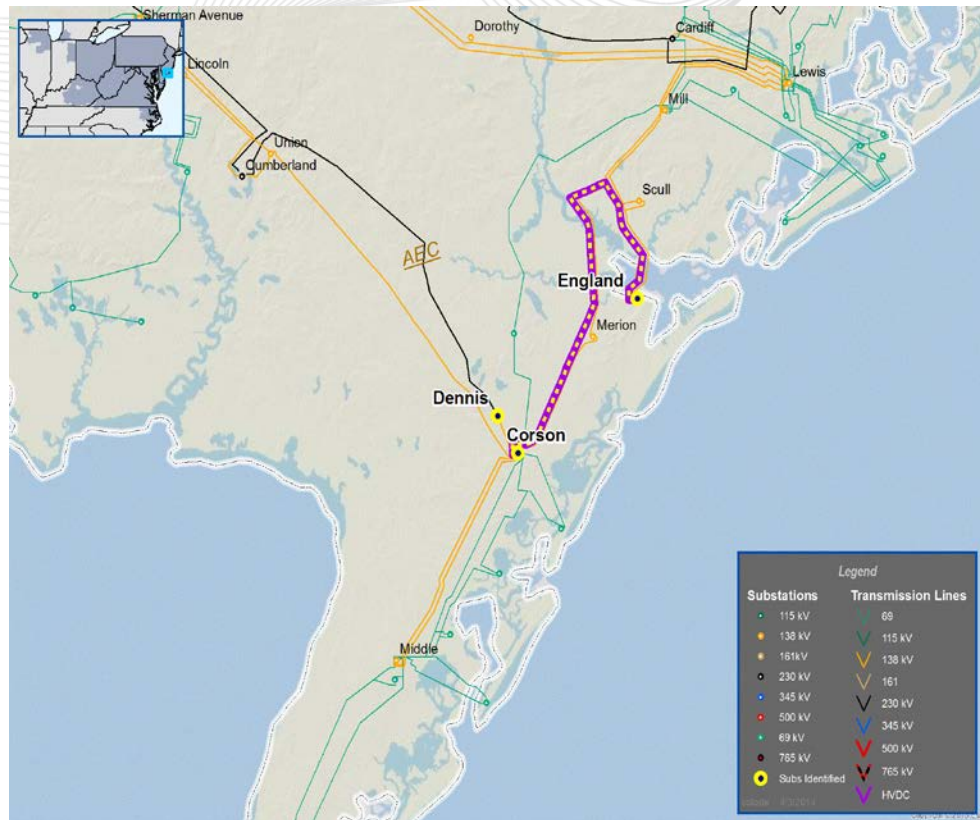
- BL England diesel: 8 MW
- BL England unit 2: 155MW
- BL England unit 3: 148.9MW
 - ACE Transmission Zone
 - 288 MW Total
 - Deactivation date: 06/01/2015

- BL England unit1 was modeled offline in this study as it was already studied for deactivation



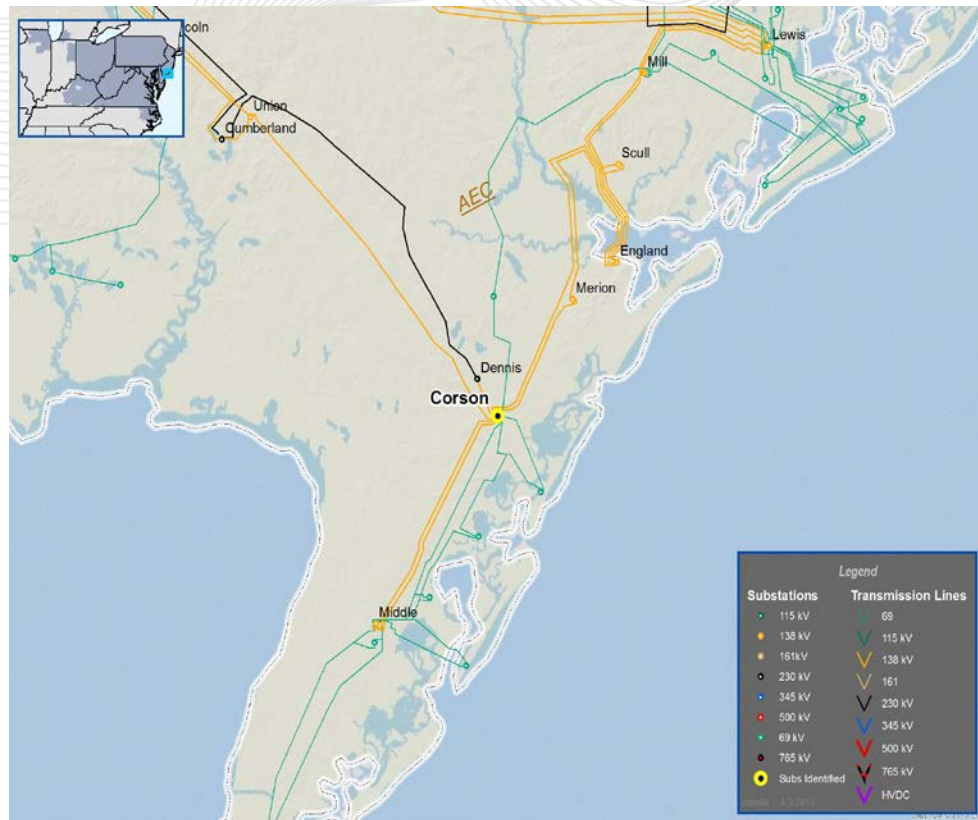
ACE Transmission Zone

- N-1-1 Violation
- The DENNIS 230/138kV transformer is overloaded to 119.35% and DENNIS – CORSON 2 138kV line is overloaded to 114.37% for the loss of the New Freedom to Cardiff 230 kV line (CONTINGENCY 'NEWFDM-CARD') followed by the loss of Corson 3 – Union 138kV line (CONTINGENCY 'CORSON-UNION')
- *The MDLE TP – BLE 138kV line is overloaded to 102.81% for the loss of New Freedom – Cardiff 230 kV line followed by the loss of Oyster Creek – Cedar 230 kV line*
- Install new Dennis 230/69kV transformer
- Cost Estimate: \$15.2M
- Required IS Date: 6/1/2015
- Expected IS Date: 6/01/2016

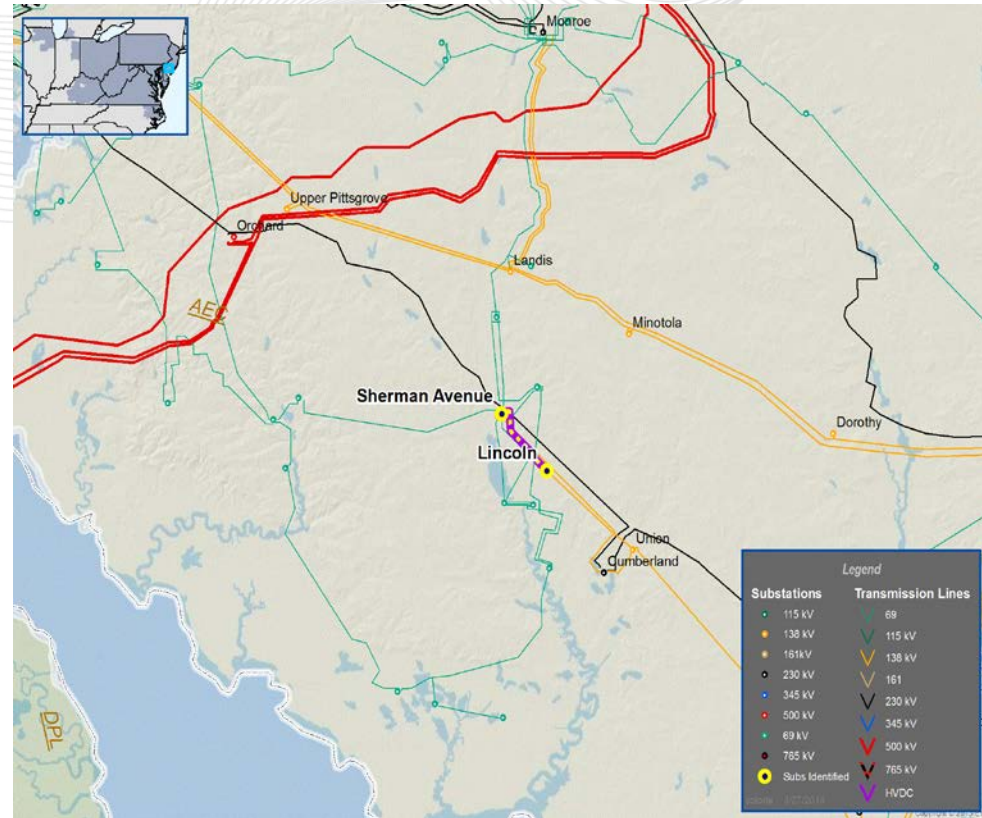


ACE Transmission Zone

- N-1-1 Violation
- The CORSON 2 - CORSON 1 138kV line is overloaded to 115.97% for the loss of the New Freedom to Cardiff 230 kV line (*CONTINGENCY 'NEWFDM-CARD'*) followed by the loss of Corson 2 – MDLE TP kV 138kV line ('228107(CORSON 2)-228111(MDLE TP)_1')
- The CORSON 2 - MDLE TP 138kV line is overloaded to 114.31% *for the loss of New Freedom – Cardiff 230 kV line followed by the loss of Corson 1 – Corson 2 138kV line* (*CONTINGENCY '228106(CORSON 1)-228107(CORSON 2)_1'*)
- Upgrade 138kV and 69kV breakers at Corson substation
- Cost Estimate: \$0.8M
- Required IS Date: 6/1/2015
- Expected IS Date: 6/01/2016



- N-1-1 Violation
- The SHRMAN#3 - LINCOLN 138kV line is overloaded to 103.22% for the loss of the Dennis – Corson 2 138kV (CONTINGENCY 'DENN-COR') followed by the loss of Union – Cumberland 138kV line (CONTINGENCY '228210(UNION)-228262(CUMB)_1')
- Reconductor 2.74 miles Sherman-Lincoln 138 kV line
- Sherman substation work
 - Cost Estimate: \$0.11M
- Lincoln substation work
 - Cost Estimate: \$0.11M
- Cost Estimate: \$4.0M
- Required IS Date: 6/1/2015
- Expected IS Date: 6/01/2016

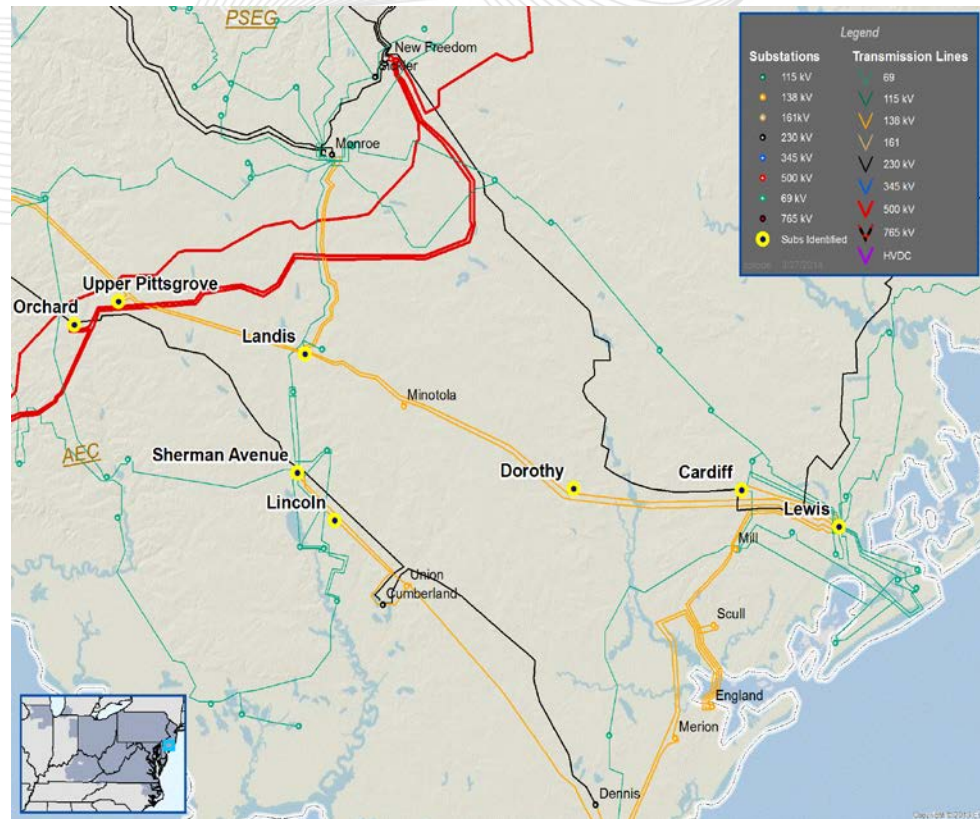


ACE Transmission Zone

Multiple N-1-1 Thermal and N-1-1 Voltage magnitude and drop violations in ACE area are addressed by this set of upgrades

- IS Date 6/1/2015
- Expected IS Date: 6/01/2017-06/01/2018
- New Orchard – Cardiff 230kV line (Remove, rebuild and reconfigure existing 138 kV)
 - Cost Estimate: \$57.0M
- New Upper Pittsgrove – Lewis 138kV line
 - Cost Estimate: \$28.0M
- New Cardiff – Lewis #2 138kV line
 - Cost Estimate: \$3.5M
- Orchard substation work to accommodate new Orchard – Cardiff 230kV line
 - Cost Estimate: \$3.6M
- Upper Pittsgrove substation work
 - Cost Estimate: \$0.05M

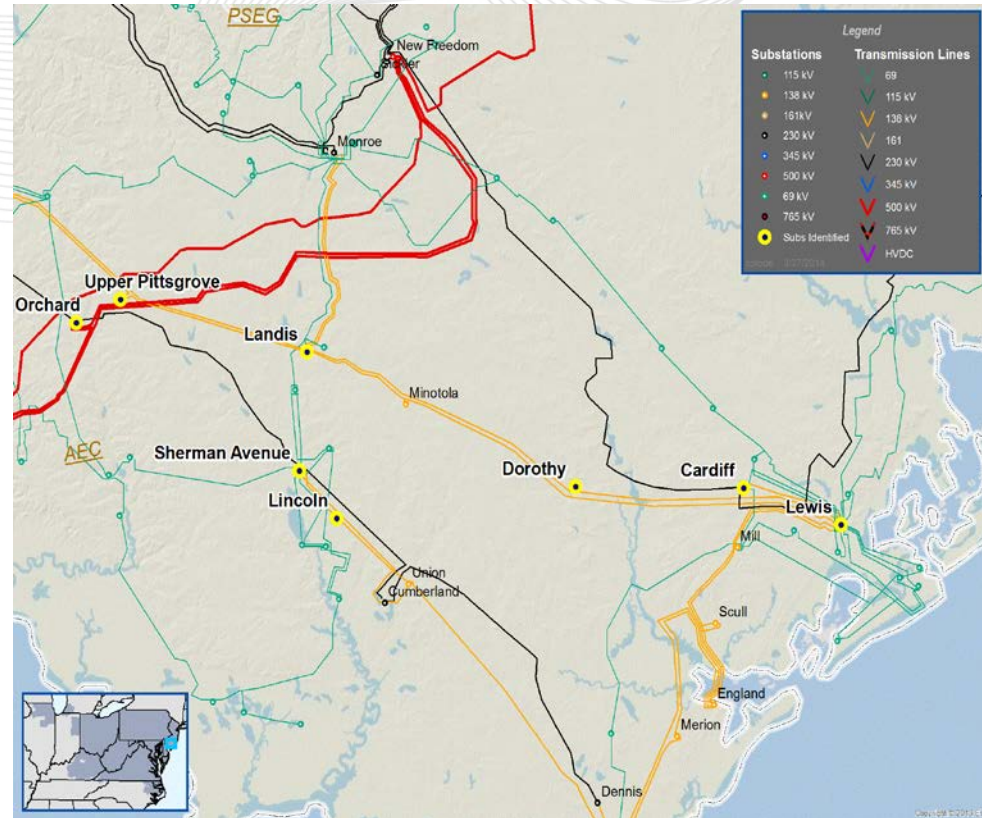
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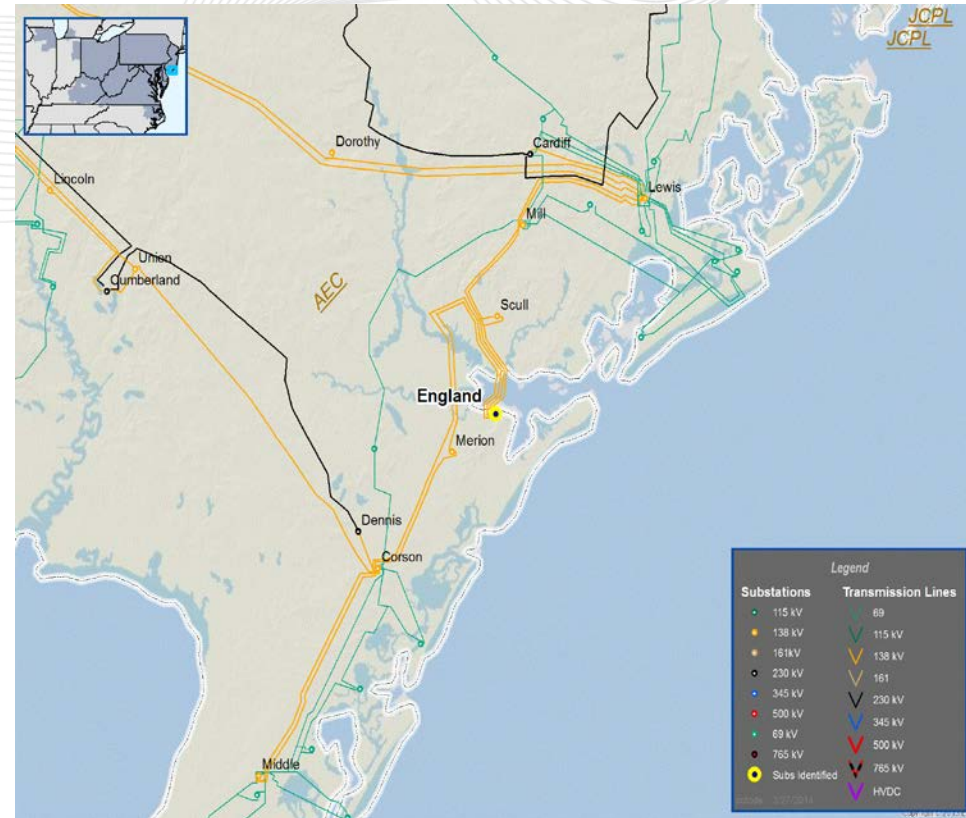
- Landis substation work to convert Landis to a ring bus and connect 3 lines to it
 - Cost Estimate: \$13.4M
- Dorothy substation work – replace two switches with breakers
 - Cost Estimate: \$4.0M
- Cardiff substation work to accommodate new Orchard – Cardiff 230kV line and new Cardiff – Lewis 138kV line
 - Cost Estimate: \$16.4M
- Lewis substation work
 - Cost Estimate: \$0.1M
- Environmental
 - Cost Estimate: \$2M

Note: These upgrades will use existing ROW and will also address significant existing age and condition issue of 40 mile 138 kV double circuit tower line.

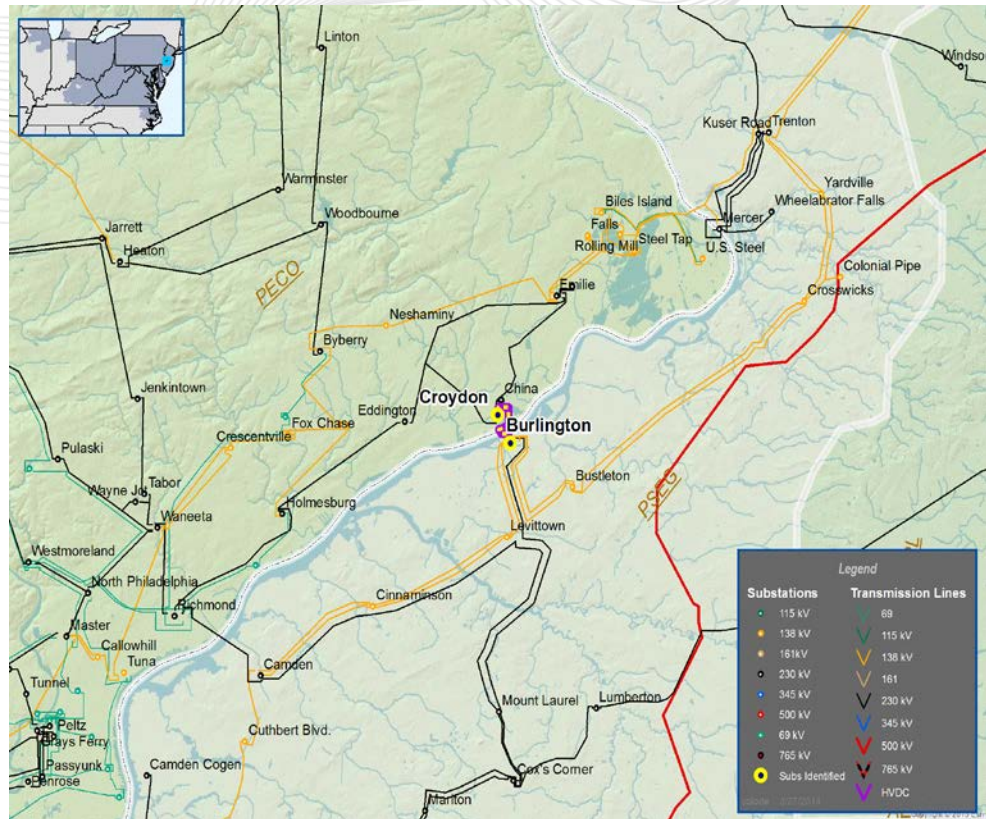


- Short term solution to multiple N-1-1 Voltage Violation in ACE area is to install a 100 MVar capacitor at BLE
- Cost Estimate: \$4.0M
- Required IS Date: 6/1/2015
- Expected IS Date: 6/1/2016

ACE Transmission Zone

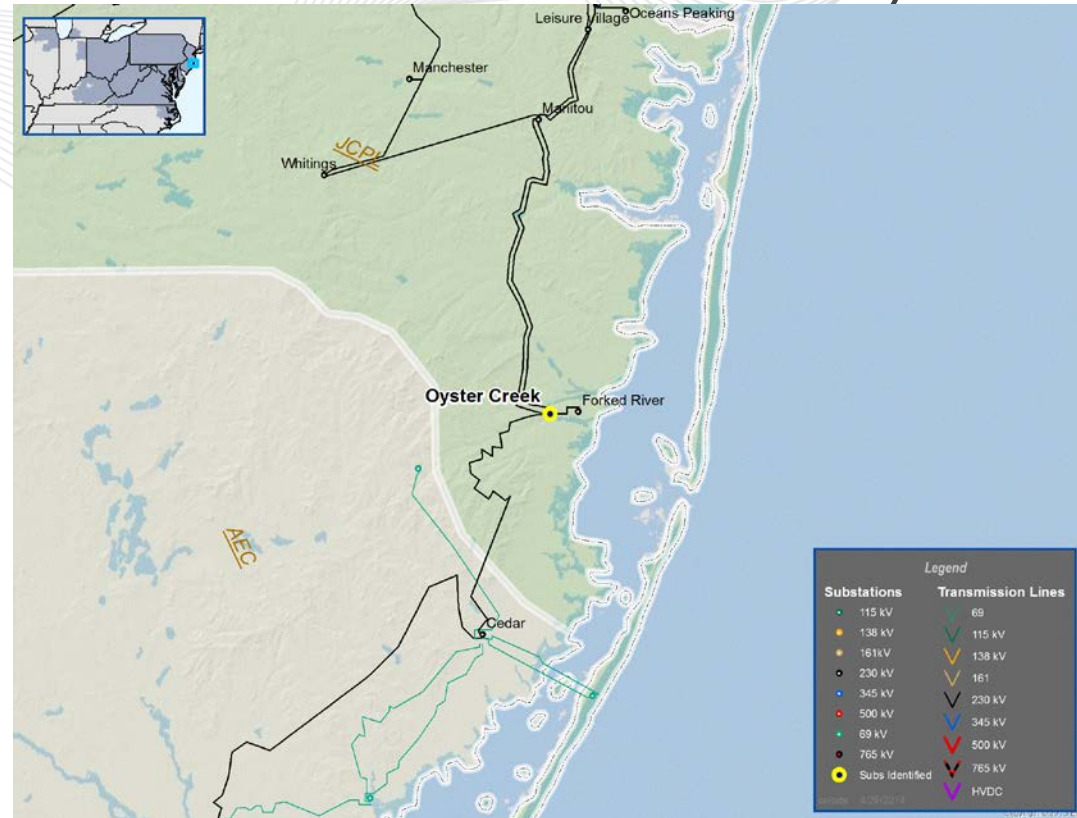


- **Generator Deliverability Violation**
- Croydon – Burlington 230kV line is overloaded to 107.61%% for the loss of Neshaminy 138kV bus (*CONTINGENCY '130-25/* \$ BUCKS \$ 130-25 \$ L'*)
- *Existing baseline upgrades b1197 and b1197.1 – reconductor Croydon – Burlington 230kV line*
- Cost Estimate: \$8.6M
- Required IS Date: 6/1/2015
- Expected IS Date: 6/1/2015



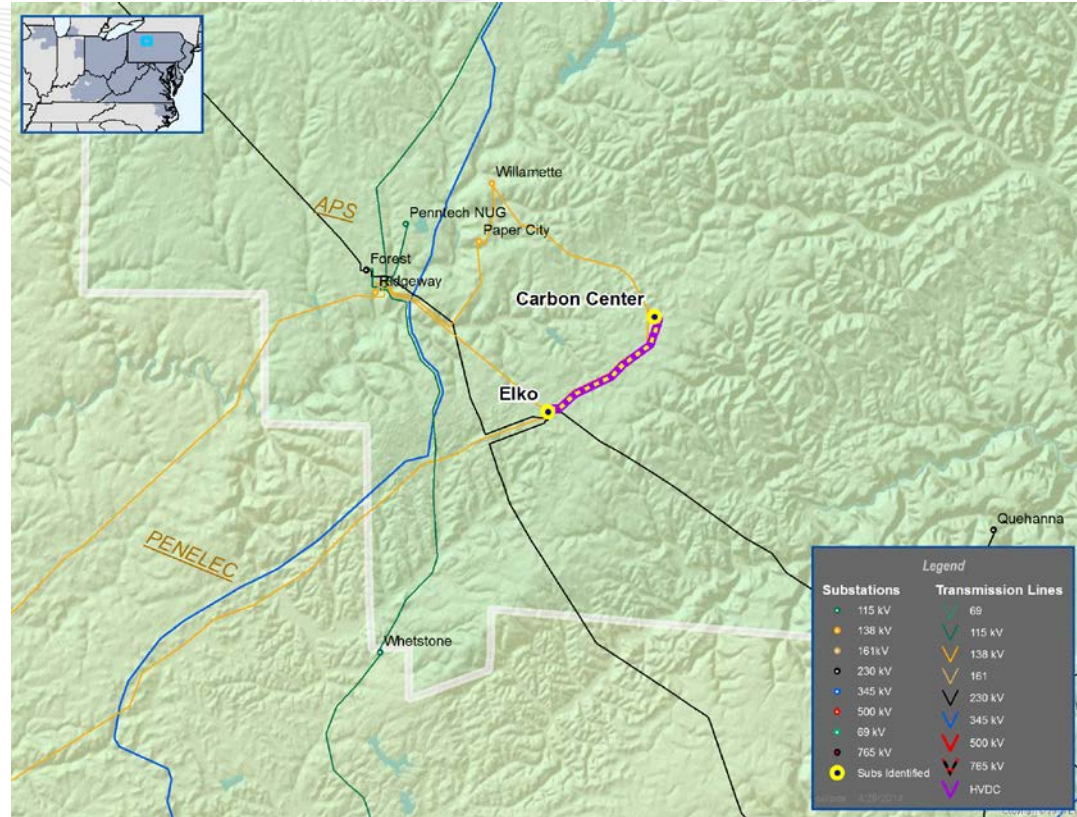
Deactivation At Risk Analysis

- Study Assumptions
 - Oyster Creek Nuclear unit: 614.5 MW
 - Deactivation date: 06/01/2017
 - BL England Units deactivated
 - Upgrades noted on the previous slides in-service
- Results – No new problems in southern NJ
- Following slides include potential issues and solutions outside southern NJ for this scenario



APS Transmission Zone

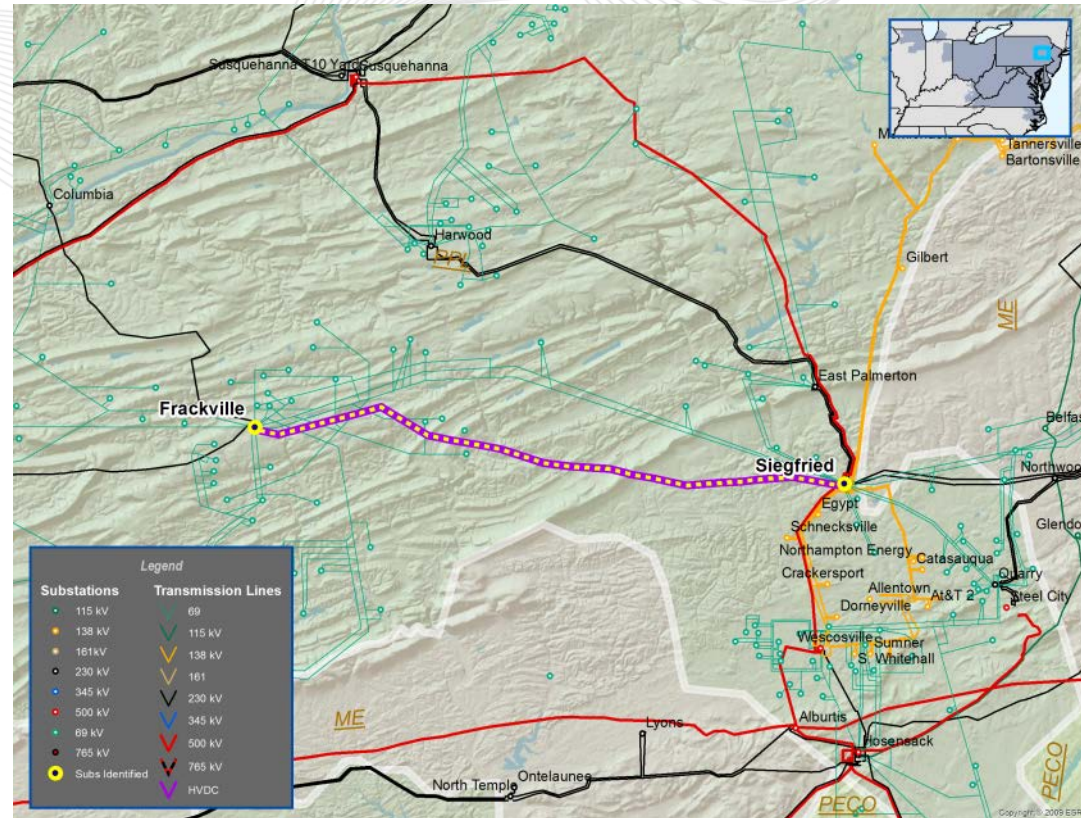
- N-1 Common Mode violation
- Elko to Carbon Center Junction 138 kV line is overloaded to 115.95% of its emergency rating (132 MVA) for the outage of Elko to Squab Hollow 230 kV line and Elko 230/138 kV transformer for the stuck breaker failure at Elko 230kV TR#1 ('AP_SB_442').
- New Upgrade: Reconductor 138 kV bus at Elko. New Rating: 160 MVA (SN) 192 MVA (SE)
- Cost Estimate: \$150,000
- Required IS Date: 6/1/2017





- Generation Deliverability Violation
- Frackville to Siegfried 230 kV line is overloaded to 106.42% of its emergency rating (628.63 MVA) for the outage of Sunbury 500/230 kV transformer#24, Sunbury unit 4 for the stuck breaker at Sunbury 230 kV 5S ('PL101002').
- Existing Upgrade: b2282 - Rebuild the Siegfried-Frackville 230 kV line
- Cost Estimate: \$84.5 M
- Required IS Date: 6/1/2018

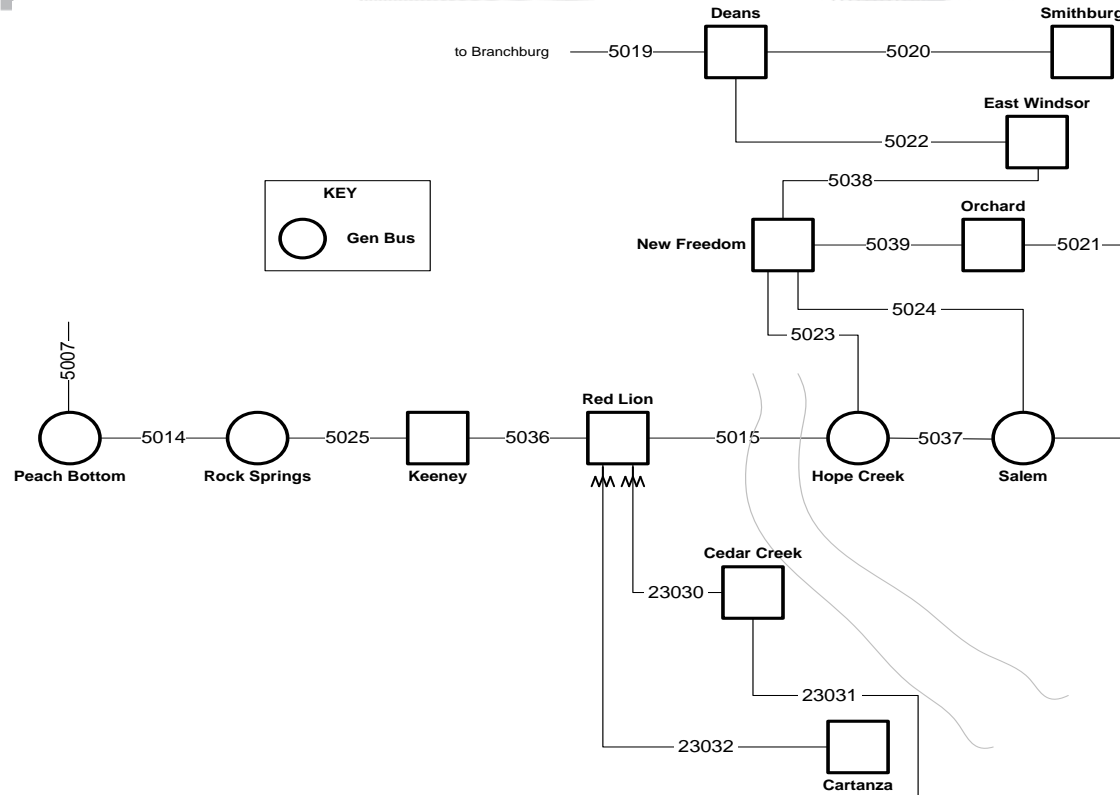
PPL Transmission Zone



- Study of other generation which may be at risk for deactivation due to economics, environmental regulations, etc.

Artificial Island Update

Artificial Island Area Network



Artificial Island Proposals - Overview

- 26 proposed solutions
- Approximate cost range of \$100 M to \$1,550 M
- Technology includes transmission at both 500 kV and 230 kV, new transformation, substations and associated equipment, additional circuit breakers, system reconfiguration, dynamic reactive, dynamic series compensation
- Diversity of project risk, requirements and timelines

Project ID	TO	Cost (\$)	Major Components	Supporting info
P2013_1-1A	Virginia Electric and Power Corp	\$ 133	500 MVAR SVC near New Freedom	Two (2) Thyristor Controlled Series Compensation (TCSC) Devices near New Freedom
P2013_1-1B	Virginia Electric and Power Corp	\$ 126	New 500 kV from Salem - a new station in Delaware	New 500/230 kV station in Delaware that taps existing Cedar Creek - Red Lion 230kV and Catanza - Red Lion 230kV
P2013_1-1C	Virginia Electric and Power Corp	\$ 202	New 500 kV from Hope Creek - a new Station in Delaware	Install a new 500kV line from Hope Creek - Red Lion; New Salem - Hope Creek 500 kV line
P2013_1-2A	Transource	\$213 - \$269	Salem - Cedar Creek 230 kV	Two (2) 500/230 Transformers near Salem; Loop in Red Lion - Catanza 230 to Cedar Creek
P2013_1-2B	Transource	\$165 - \$208	Salem - North Cedar Creek (new) 230 kV	Two (2) 500/230 transformers near Salem and loop in Red Lion - Catanza 230 and Red Lion - Cedar Creek 230 kV
P2013_1-2C	Transource	\$123 - \$156	Salem - Red Lion 500 kV	
P2013_1-2D	Transource	\$788 - \$994	New Freedom - Lumberton - North Smithburg (New) 500 kV line	New Salem - Hope Creek 500 kV line and new 500/230 station east of Lumberton
P2013_1-3A	First Energy	\$410.7 (Only FirstEnergy portion)	New Freedom-Smithburg 500 kV line with a loop into Larrabee	Hope Creek - Red Lion 500 kV line
P2013_1-4A	PHI Exelon	\$ 475	Peach Bottom - Keeney - Red Lion - Salem 500 kV	Remove Keeney - Red Lion 230 kV; Reconfigure 230 around Hay Road; Reconnector Harmony-Chapel St 138 kV
P2013_1-5A	LS Power	\$116.3M - \$148.3M	Salem - Silver Run (new) 230 kV; Salem 500/230 kV Transformer	New 230 kV station that taps existing Cedar Creek - Red Lion 230kV and Catanza - Red Lion 230kV
P2013_1-5B	LS Power	\$ 170	Salem - Red Lion 500 kV	
P2013_1-6A	Atlantic Wind	\$ 1,012	320 kV HVDC Salem/Hope Creek - Cardiff	SVC at Salem/Hope Creek; New HVDC Stations at Cardiff and Salem
P2013_1-7A	PSE&G	\$ 1,371	Salem-Hope Creek to Peach Bottom 500 kV	Existing ROW
P2013_1-7B	PSE&G	\$ 1,372	Salem-Hope Creek to Peach Bottom 500 kV	Same as 7A with Loop into Keeney
P2013_1-7C	PSE&G	\$ 1,372	Salem-Hope Creek to Peach Bottom 500 kV	Same as 7A with Loop into Red Lion
P2013_1-7D	PSE&G	\$ 831	Salem-Hope Creek to Peach Bottom 500 kV	Same as 7A with New ROW
P2013_1-7E	PSE&G	\$ 692	New Freedom - Deans 500 & Salem - Hope Creek 500 kV lines	
P2013_1-7F	PSE&G	\$ 879	New Freedom - Smithburg and Salem-Hope Creek 500 kV lines	Existing ROW
P2013_1-7G	PSE&G	\$ 1,034	New Freedom - Smithburg and Salem-Hope Creek 500 kV lines	Same as 7F with a Loop into a new Larrabee 500 kV station
P2013_1-7H	PSE&G	\$ 1,177	New Freedom - Whitpain and Salem - Hope Creek 500 kV lines	Northern Route
P2013_1-7I	PSE&G	\$ 1,353	New Freedom - Whitpain and Salem - Hope Creek 500 kV lines	Same as 7H with the Southern Route
P2013_1-7J	PSE&G	\$ 915	New Freedom - New Station on Branchburg-Eloy 500 kV line ("5017 Junction") and Salem - Hope Creek 500 kV line	Existing ROW
P2013_1-7K	PSE&G	\$ 1,066	New Freedom - Deans & Salem - Hope Creek - Red Lion 500 kV lines w/ Hope Creek - Red Lion (new);	Same as 7E with Hope Creek - Red Lion
P2013_1-7L	PSE&G	\$ 1,250	New Freedom - Smithburg & Salem - Hope Creek - Red Lion 500 kV lines w/ Hope Creek - Red Lion (new);	Same as 7F with Hope Creek - Red Lion
P2013_1-7M	PSE&G	\$ 1,548	New Freedom - Whitpain (North) & Salem - Hope Creek - Red Lion 500 kV lines w/ Hope Creek - Red Lion (new);	Same as 7H with Hope Creek - Red Lion
P2013_1-7N	PSE&G	\$ 1,289	New Freedom - a new Station on the Branchburg-Eloy 500 kV line ("5017 Junction") & Salem-Hope Creek - Red Lion 500 kV lines w/ Hope Creek - Red Lion (new);	

- Example allocation for project proposal P2013_1-4A
- P2013_1-4A
 - Build a new Peach Bottom - Keeney - Red Lion - Salem 500 kV
- See Schedule 12 of the PJM Tariff for the cost allocation method
 - <http://pjm.com/~media/documents/agreements/tariff.ashx>

Transmission Zone	Load Ratio Share Allocation Portion	"DFAX" Allocation Portion	Resulting Combined Allocation
AEC	1.70%	38.08%	19.89%
AEP	14.18%	0%	7.09%
APS	5.39%	0%	2.70%
ATSI	8.16%	0%	4.08%
BGE	4.24%	0%	2.12%
ComEd	13.82%	0%	6.91%
ConEd	0.56%	0%	0.28%
Dayton	2.12%	0%	1.06%
DEOK	3.19%	0%	1.60%
DL	1.83%	0%	0.92%
Dominion	11.65%	0%	5.83%
DPL	2.49%	4.46%	3.48%
ECP**	0.20%	0.12%	0.16%
EKPC	1.57%	0%	0.79%
HTP***	0.01%	1.21%	0.61%
JCPL	3.96%	50.73%	27.35%
ME	1.87%	0%	0.94%
NEPTUNE*	0.42%	5.40%	2.91%
PECO	5.35%	0%	2.68%
PENELEC	1.92%	0%	0.96%
PEPCO	4.05%	0%	2.03%
PPL	4.59%	0%	2.30%
PSEG	6.46%	0%	3.23%
RECO	0.27%	0%	0.14%

*Neptune Regional Transmission System, LLC

**East Coast Power, LLC

***Hudson Transmission Partners, LLC

- Example allocation for project proposal P2013_1-5A
- P2013_1-5A
 - P2013_1-5A
 - Salem - Silver Run (new station) 230 kV
 - Salem 500/230 kV Transformer
 - New 230 kV Silver Run station that taps existing Cedar Creek - Red Lion 230kV and Catanza - Red Lion 230kV

Transmission Zone	Allocation
DPL	100.00%



Artificial Island Conceptual Market Efficiency Examples

- Market Efficiency Analysis Sensitivity Study
- Two scenarios
 - Scenario #1 – New 500 kV path from the AI to Red Lion
 - Result: Approximate benefit to cost ratio of 0.15
 - Scenario #2 – New path from the AI to Delaware (on the Cedar Creek - Catanza / Red Lion – Catanza path)
 - Result: Approximate benefit to cost ratio of 0.25

Artificial Island Technical Summary

		Southern Crossing Lines (Submarine)			Southern Crossing Lines (Overhead)		Red Lion to Artificial Island Lines				
							From Salem			From Hope Creek	
		LS Power 5A - Submarine Option	Transource 2B - North Cedar Creek	Transource 2A - Cedar Creek Expansion	LS Power 5A - Overhead	Dominion 1B - 500kV Overhead	PHI/Exelon 4A - Red Lion to Salem	LS Power 5B - Red Lion to Salem	Transource 2C - Red Lion to Salem	Dominion 1C - Red Lion to Hope Creek	PSE&G 7K- Red Lion to Hope Creek
Technical Analysis Criteria	Stability	Maximum angle swing range of 80 - 112 degrees, dependant on solution and SVC location			Maximum angle swing range of 80 - 110 degrees, dependent on solution and SVC location		Maximum angle swing range of 77 - 102 degrees, dependant on solution and SVC location				
	Thermal	Preliminary analysis indicates no thermal overloads			Preliminary analysis indicates no thermal overloads		Preliminary analysis indicates no thermal overloads				
	Market Efficiency Results	Approximate \$92 M cost savings over 15 Years			Approximate \$92 M cost savings over 15 Years		Approximate \$57 M cost savings over 15 Years				
	Short Circuit	Three overdutied 500 kV breakers		No overdutied breakers	Three overdutied 500 kV breakers		No overdutied breakers				

- Additional stability analysis
 - Evaluating the scenario of Hope Creek – Red Lion 500 kV without a second tie between Hope Creek – Salem plus an SVC
 - Stakeholder suggestion that a Salem – Peach Bottom 500 kV line without an SVC would satisfy the Artificial Island problem statement
 - PJM analysis indicates that this configuration does not meet applicable stability testing criteria without an SVC

TEAC Notification for special TEAC Artificial Island Meetings on 5/19 & 6/16

Project Class		Southern Crossing 230kV Lines (Submarine)			Southern Crossing Lines (Overhead)		Red Lion to Salem 500kV Lines			Red Lion to Hope Creek 500kV Lines	
Criteria	Proposal	LS Power 5A - Submarine Option	Transource 2B - North Cedar Creek	Transource 2A - Cedar Creek Expansion	LS Power 5A - 230kV Overhead	Dominion 1B - 500kV Overhead	PHI/Exelon 4A - Red Lion to Salem	LS Power 5B - Red Lion to Salem	Transource 2C - Red Lion to Salem	Dominion 1C - Red Lion to Hope Creek	PSE&G 7K - Red Lion to Hope Creek
	Sub-Criteria										
Technical Analysis	Stability										
	Thermal										
	Market Efficiency Results										
	Short Circuit										
	Route Diversity										
	NERC Cat-D Contingencies										
Cost Factors	PJM Estimated Project Cost										
	Market Efficiency										
	Outage Costs										
Project Schedule	Permitting										
	Property Acquisition										
	Construction										
	Long Lead Time Materials										
	Outages										
Risk Factors to Cost and Schedule	Project Complexity	Line Crossings									
		Outage Requirements									
		Modification of Red Lion Sub									
		Modification of other Transmission Facilities									
		Modification of AI Subs									
	RoW and Land Acquisition	No Eminent Domain in Delaware									
		New Right of Way Required									
		Substation Land Required									
	Siting and Permitting	Wetlands Impact									
		Public Opposition Risk									
		Historic and Scenic Highway									
		Delaware River Crossing									
	Operational Impact	Impact to Artificial Island Facility									
		Blackstart									
		Operational Performance									

- Artificial Island Technical Review
- 09:00 – 12:00 at the PJM CTC and WebEx/Teleconference
- PJM Review of analytical and constructability progress
- Stakeholder Q&A

- **Monday, May 19th Special TEAC**
 - 3 hour stakeholder technical meeting
 - In-person at PJM CTC
- Monday, June 2nd – Due date for stakeholder comment/feedback (14 day comment period)
- June 5th TEAC
- **Monday, June 16th – PJM review of stakeholder comment/feedback and final decision meeting**
 - Webex / Teleconference
- Comment Period to the PJM Board (36 days for comment period)
- July 10th TEAC
- **Tuesday, July 22nd – PJM Board meeting**
 - Artificial Island solution recommendation to the PJM Board

Questions?

Email: RTEP@pjm.com

- Version 1 – 5/6/2014 – Original Version Distributed to PJM TEAC
- Version 2 – 5/6/2014 – Updated slide #43 – AI evaluation categories
- Version 3 – 5/7/2014 – Updated slide #6 to 2019 study year & updated slides 39 and 40 regarding Market Efficiency
 - Added slides 8-10 for the Dominion Transmission Zone to the Reliability Analysis Update section
 - Updated Slide 31 contingency and costs
- Version 4 – 5/9/2014 – Updated with feedback received at the 5/8/2014 TEAC meeting