

July 2016

Pennsylvania State Report

1. Planning

- Generation Portfolio Analysis
- Transmission Analysis
- Load Forecast
- Gas Pipeline Information

- **Existing Capacity:** Nuclear represents approximately 24 percent of the total installed capacity in Pennsylvania while natural gas represents approximately 26 percent and coal represents approximately 32 percent. This differs from PJM where nuclear is 20 percent and natural gas and coal are relatively even at 34 and 35 percent respectively.
- **Interconnection Requests:** Natural gas represents 92 percent of new interconnection requests in Pennsylvania.
- **Deactivations:** Approximately 177 MW of capacity in Pennsylvania retired in 2015. This represents only 1.5 percent of the 10,800 MW that retired RTO-wide in 2015.
- **Load Forecast:** Pennsylvania load growth is nearly flat, averaging less than 1 percent per year over the next 10 years. This aligns with PJM RTO load growth projections.
- **Natural Gas:** About 18 percent (2,400MW) of Pennsylvania's natural gas generation is behind a local distribution company.



PJM operates the bulk electric system transmission facilities (and others monitored at lower voltages) within the Commonwealth of Pennsylvania. This map includes transmission facilities of Allegheny Power (AP), Duquesne Light Company (DLCO), Metropolitan Edison Company (METED), Pennsylvania Electric Company (PENELEC), PECO Energy Company (PECO), PPL Electric Utilities Corporation (PPL), UGI Corporation (UGI) and American Transmission Systems, Inc. (ATSI). ATSI is a wholly owned subsidiary of FirstEnergy who also owns the transmission assets of Pennsylvania Power Company (Penn Power).

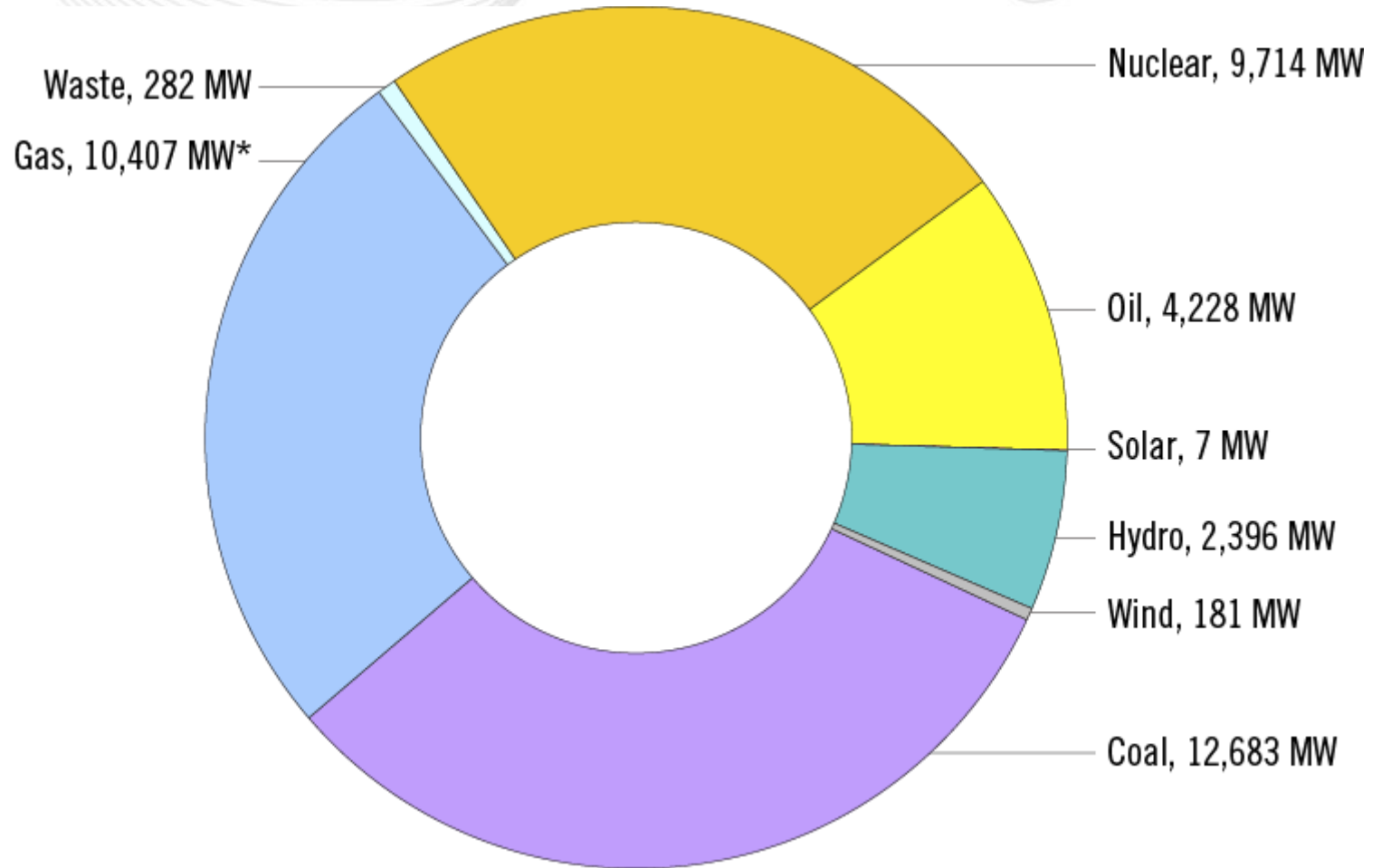
Planning

Generation Portfolio Analysis

Summary:

Natural gas represents approximately 26 percent of the total installed capacity in Pennsylvania while coal represents approximately 32 percent.

Overall in PJM, natural gas and coal are relatively even at 34 percent and 35 percent respectively.



* Gas Contains

Natural Gas	10,273 MW
Other Gas	133 MW

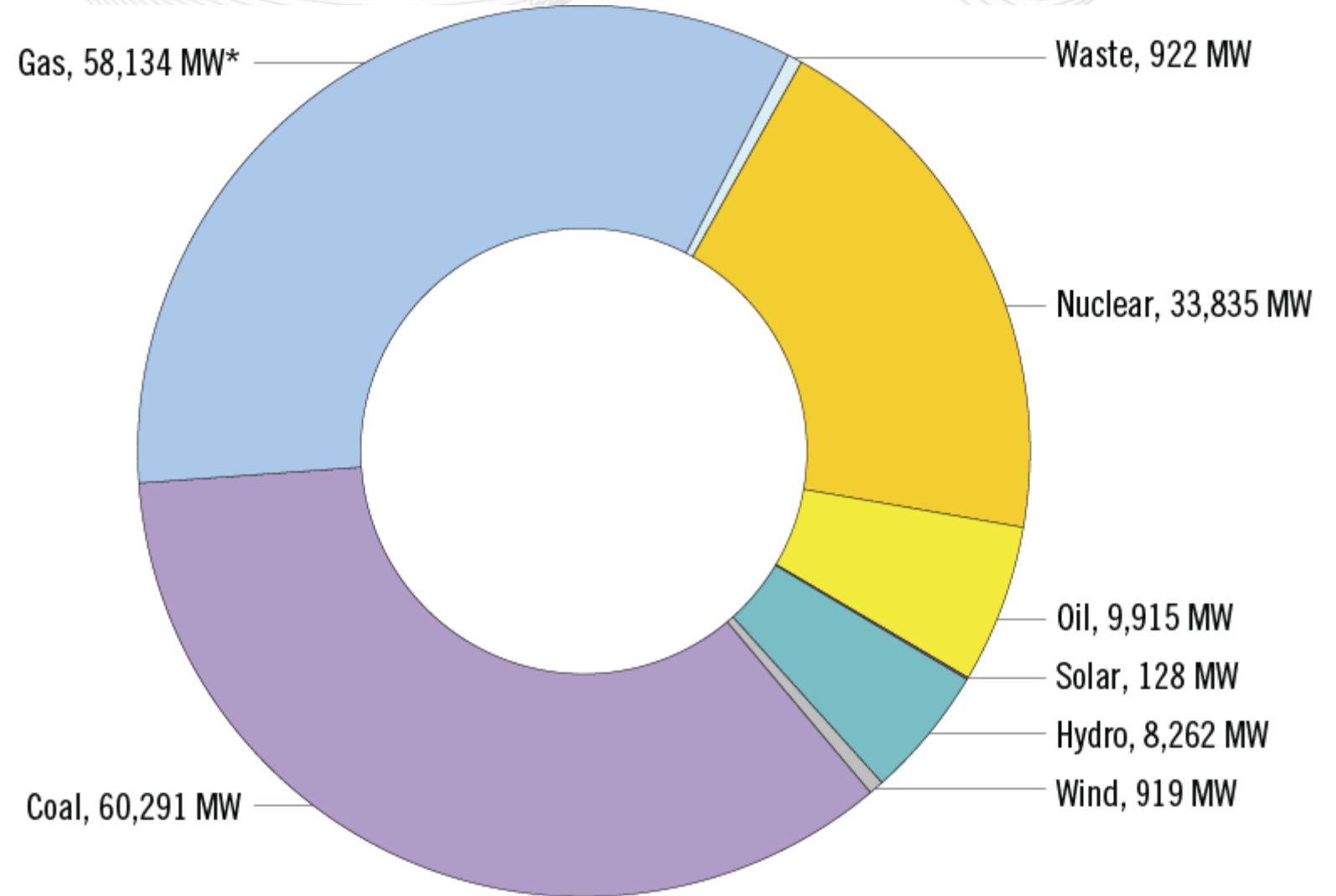
PJM - Existing Installed Capacity

(Capacity Rights, December 31, 2015)

In PJM, natural gas and coal make up nearly 70 percent total installed capacity.

* Gas Contains

Natural Gas	57,735 MW
Other Gas	399 MW

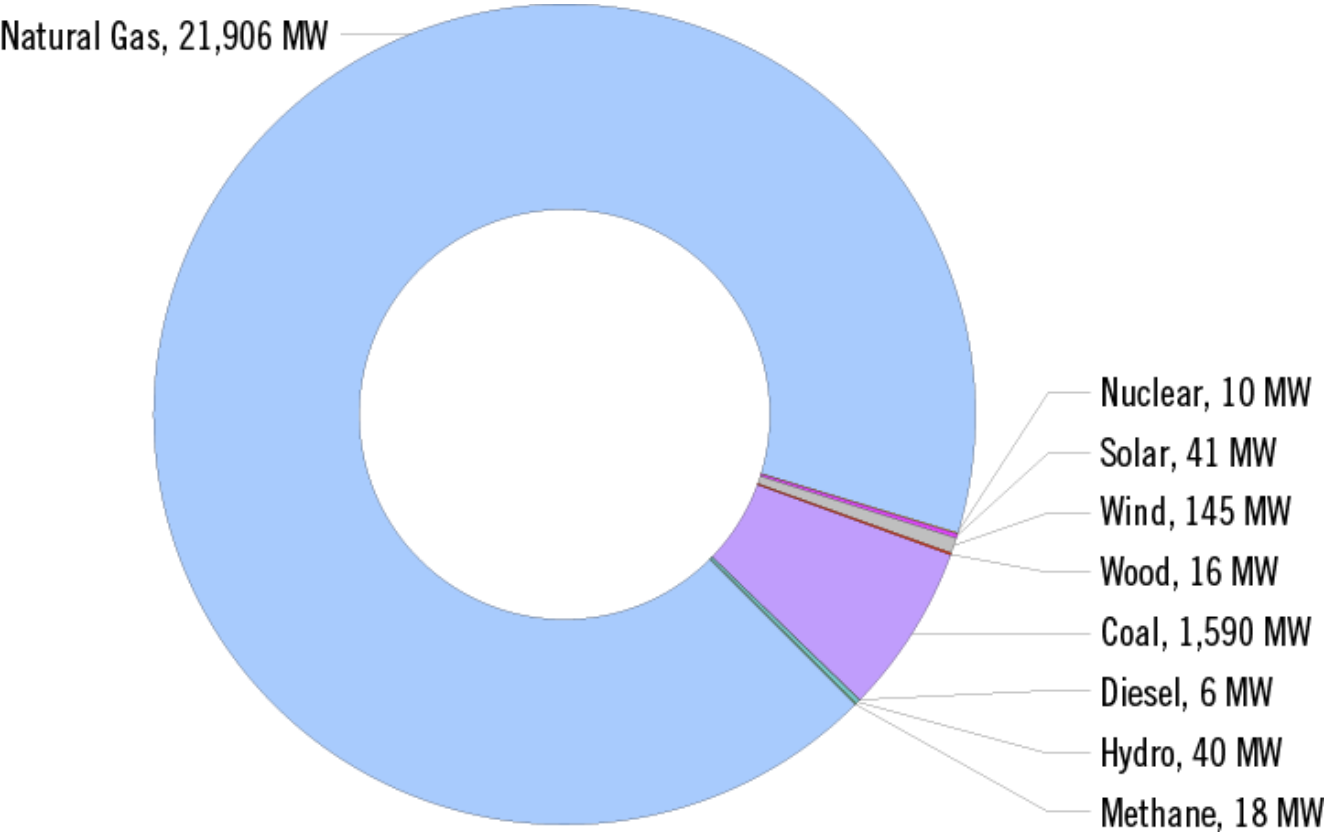


Pennsylvania - Interconnection Requests

(Requested Capacity Rights, December 31, 2015)

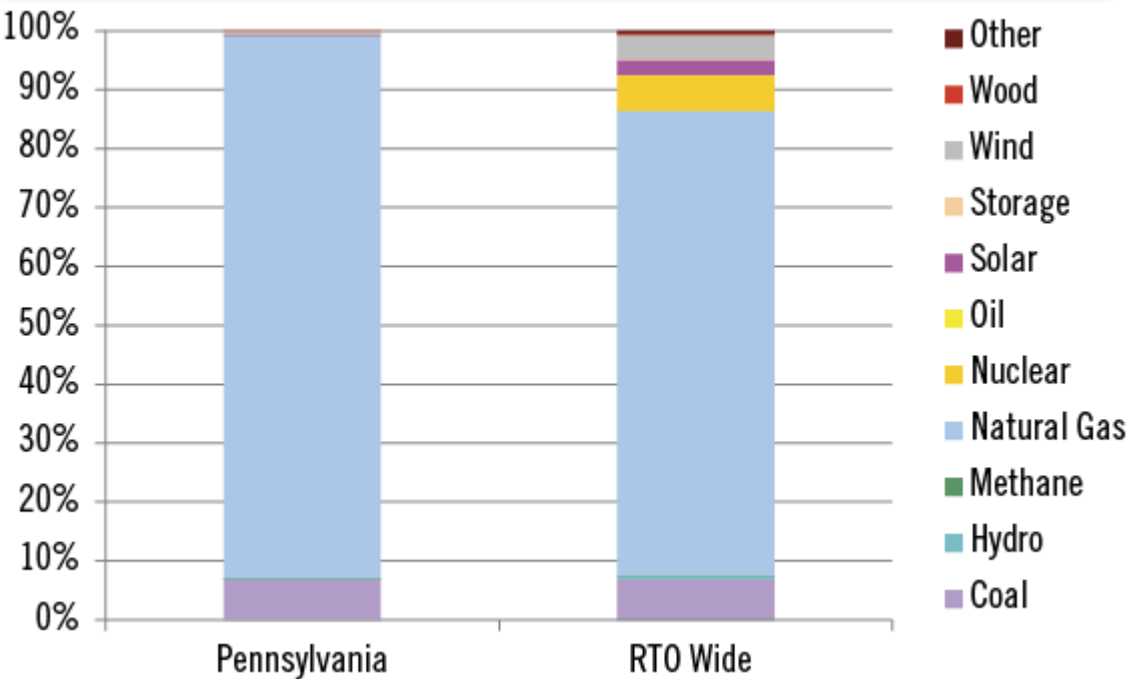
Natural gas represents more than 92 percent of new interconnection requests in Pennsylvania.

Total MW Capacity by Fuel Type



	MW	# of Projects
Active	15,441.3	83
Under Construction	8,201.5	33
Suspended	128.6	12
Total	23,771.3	128

Fuel as a Percentage of Projects in Queue





Pennsylvania - Interconnection Requests

(Requested Capacity Rights, December 31, 2015)

	Active		In Service		Suspended		Under Construction		Withdrawn		Total Sum	
	MW	# of Projects	MW	# of Projects	MW	# of Projects	MW	# of Projects	MW	# of Projects	MW	# of Projects
Biomass	0.0	0	31.4	3	0.0	0	0.0	0	36.5	4	67.9	7
Coal	0.0	0	229.0	16	0.0	0	1,590.0	1	12,764.6	26	14,583.6	43
Diesel	6.1	1	33.3	3	0.0	0	0.0	0	51.5	12	90.9	16
Hydro	40.0	1	1,118.8	12	0.0	0	0.0	0	188.6	15	1,347.4	28
Methane	4.0	1	126.4	24	1.5	1	12.2	3	189.7	33	333.8	62
Natural Gas	15,273.7	55	9,373.8	48	85.6	6	6,546.6	22	74,757.9	187	106,037.6	318
Nuclear	10.0	2	2,621.8	17	0.0	0	0.0	0	1,681.0	8	4,312.8	27
Oil	0.0	0	9.4	3	0.0	0	0.0	0	1,307.0	9	1,316.4	12
Solar	28.5	4	6.8	3	8.9	2	3.4	3	485.3	80	532.9	92
Storage	0.0	12	0.1	5	0.0	0	0.0	0	0.1	6	0.2	23
Wind	79.0	7	268.5	38	32.5	3	33.3	3	1,475.0	115	1,888.2	166
Wood	0.0	0	0.0	0	0.0	0	16.0	1	0.0	0	16.0	1
Other	0.0	0	326.5	3	0.0	0	0.0	0	344.0	4	670.5	7
Total	15,441.3	83	14,145.7	175	128.6	12	8,201.5	33	93,281.1	499	131,198.1	802



Following ISA/WMPA execution 1,730 MW of capacity with ISAs and 91 MW of capacity with WMPAs withdrew from PJM's interconnection process. Another 8,330 MW have executed agreements but were not in service as of December 31, 2015. Overall, 12% of requested capacity MW reaches commercial operation.

Pennsylvania– 2015 Generation Deactivations

(MW Capacity, As of December 31, 2015)

Unit	MW Capacity	TO Zone	Age	Actual/Projected Deactivation Date
AES Beaver Valley	125	DLCO	26	6/1/2015
Arnold (Green Mountain) Wind Farm	0.7	PenElec	15	8/7/2015
Pottstown LF (Moser)	2	PECO	26	10/15/2015
MH50 Marcus Hook Co-gen	50	PECO	27	5/8/2015

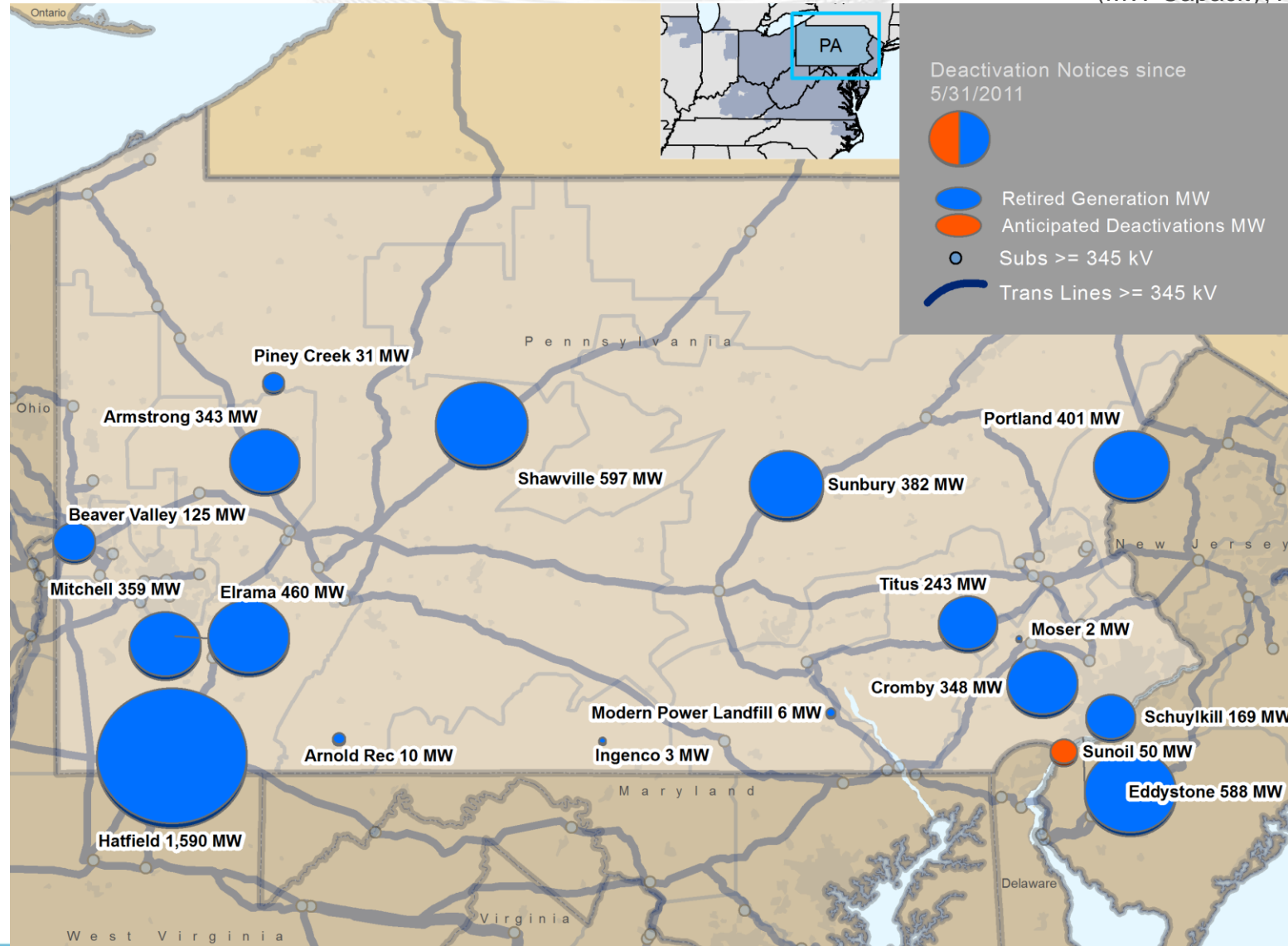
Summary:

177 MW of capacity in PA retired in 2015. Compared with 10,800 MW that retired RTO-wide in 2015.

The average unit age was 24 years.

Pennsylvania – 2015 Generation Deactivations

(MW Capacity, As of December 31, 2015)



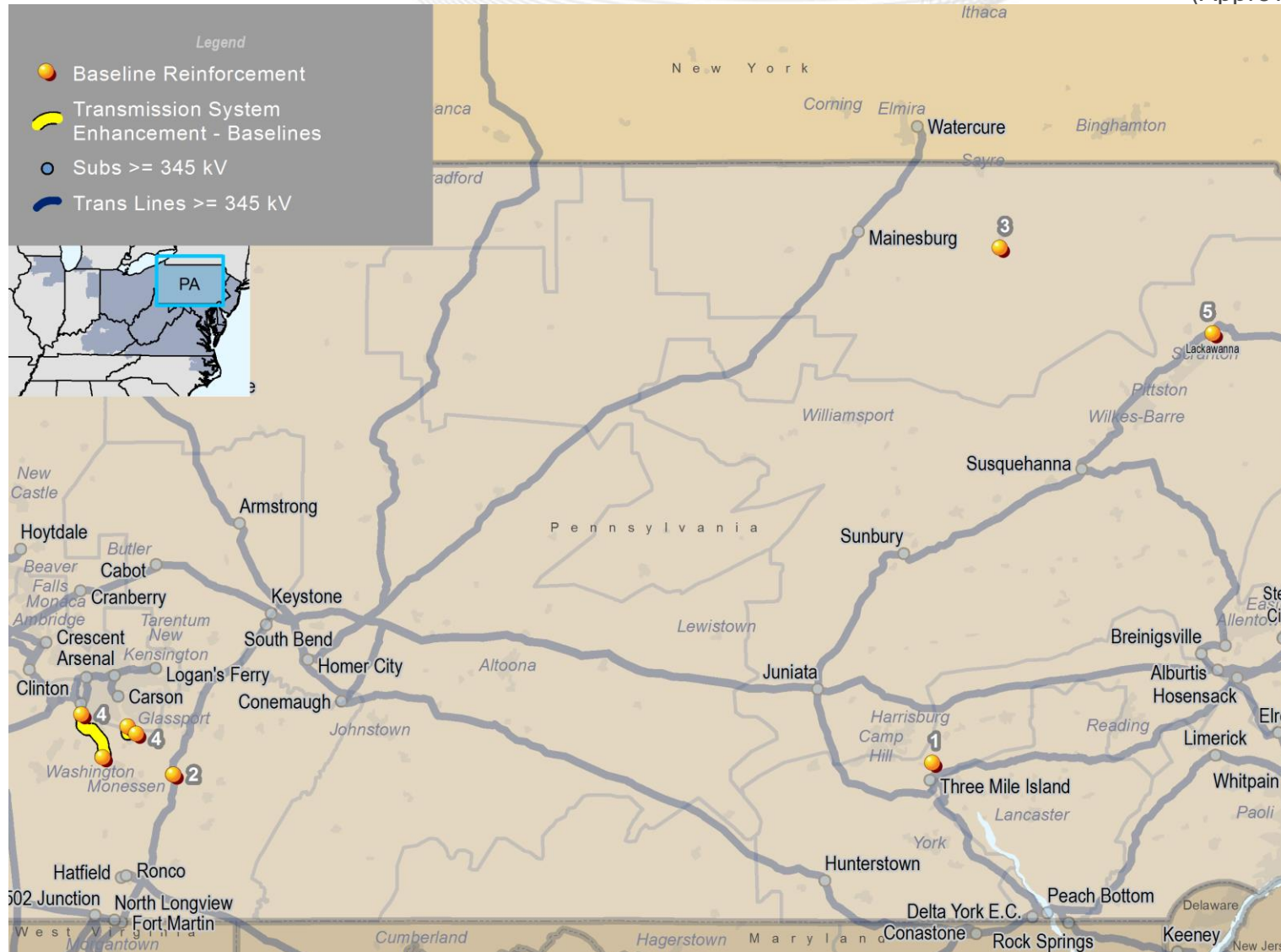
This map illustrates the known generating unit deactivation request in Pennsylvania since 2011 as of December 31, 2015.

Planning

Transmission Infrastructure Analysis

Pennsylvania - RTEP Baseline Projects

(Approved in 2015, greater than \$10 million)



Baseline Projects are transmission enhancements identified as part of reliability criteria tests, operational performance issues and market efficiency studies that identify upgrade need driven by thermal, voltage, short circuit, stability and light load issues

Pennsylvania - RTEP Baseline Projects

PA Baseline Project Driver

(Approved in 2015, greater than \$10 million)

Map ID	Project ID	Project	Baseline Load Growth / Deliverability & Reliability	Congestion Relief – Economic	Operational Performance	Generator Deactivation	TO Criteria Violation	Date	Cost (\$M)	TO Zone(s)	2015 TEAC Review
1	b2637	Convert Middletown Junction 230 kV substation to nine bay double breaker configuration.	•					6/1/2015	\$15.50	ME	5/7/2015
	b2666	Yukon 138 kV Breaker Replacement.	•					June 2020	\$11.50	APS	9/10/2015
2	b2666.1	Replace Yukon 138kV breaker "Y-11(CHARL1)" with an 80kA breaker.	•					June 2020		APS	9/10/2015
	b2666.10	Replace Yukon 138kV breaker "Y12(1-1BUS)" with an 80kA breaker.	•					June 2020		APS	9/10/2015
	b2666.11	Replace Yukon 138kV breaker "Y14(4-1BUS)" with an 80kA breaker.	•					June 2020		APS	9/10/2015
	b2666.12	Replace Yukon 138kV breaker "Y2(1B-BETHE)" with an 80kA breaker.	•					June 2020		APS	9/10/2015
	b2666.13	Replace Yukon 138kV breaker "Y21(SHEPJ)" with an 80kA breaker.	•					June 2020		APS	9/10/2015
	b2666.14	Replace Yukon 138kV breaker "Y22(SHEPHJT)" with an 80kA breaker.	•					June 2020		APS	9/10/2015

Pennsylvania - RTEP Baseline Projects

PA Baseline Project Driver

(Approved in 2015, greater than \$10 million)

Map ID	Project ID	Project	Baseline Load Growth / Deliverability & Reliability	Congestion Relief – Economic	Operational Performance	Generator Deactivation	TO Criteria Violation	Date	Cost (\$M)	TO Zone(s)	2015 TEAC Review
2	b2666.2	Replace Yukon 138kV breaker "Y-13(BETHEL)" with an 80kA breaker.	•					6/1/2015	\$15.50	ME	5/7/2015
	b2666.3	Replace Yukon 138kV breaker "Y-18(CHARL2)" with an 80kA breaker.	•					June 2020	\$11.50	APS	9/10/2015
	b2666.4	Replace Yukon 138kV breaker "Y-19(CHARL2)" with an 80kA breaker.	•					June 2020		APS	9/10/2015
	b2666.5	Replace Yukon 138kV breaker "Y-4(4B-2BUS)" with an 80kA breaker.	•					June 2020		APS	9/10/2015
	b2666.6	Replace Yukon 138kV breaker "Y-5(LAYTON)" with an 80kA breaker.	•					June 2020		APS	9/10/2015
	b2666.7	Replace Yukon 138kV breaker "Y-8(HUNTING)" with an 80kA breaker.	•					June 2020		APS	9/10/2015
	b2666.8	Replace Yukon 138kV breaker "Y-9(SPRINGD)" with an 80kA breaker.	•					June 2020		APS	9/10/2015
	b2666.9	Replace Yukon 138kV breaker "Y10(CHRL-SP)" with an 80kA breaker.	•					June 2020		APS	9/10/2015

Pennsylvania - RTEP Baseline Projects

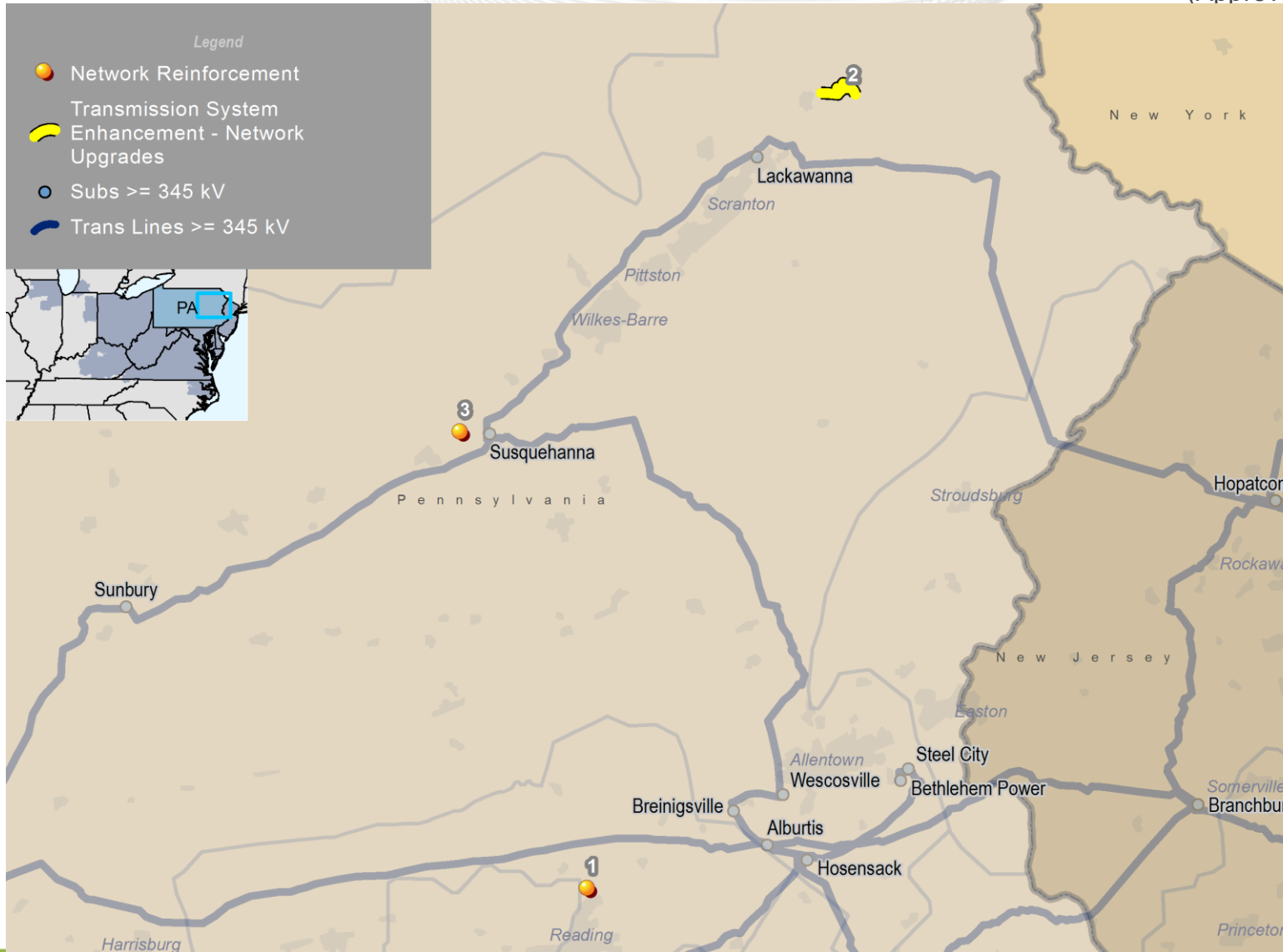
PA Baseline Project Driver

(Approved in 2015, greater than \$10 million)

Map ID	Project ID	Project	Baseline Load Growth / Deliverability & Reliability	Congestion Relief – Economic	Operational Performance	Generator Deactivation	TO Criteria Violation	Date	Cost (\$M)	TO Zone(s)	2015 TEAC Review
3	b2678	Convert the East Towanda 115 kV substation to breaker and half configuration.	●					6/1/2020	\$13.25	PENELEC	9/10/2015
	b2689.1	Reconductor approximately 7 miles of the Woodville - Peters (Z-117) 138 kV circuit.		●				June 2018	\$11.20	DL	9/10/2015
4	b2689.2	Reconfigure West Mifflin-USS Clairton(Z-15) 138 kV circuit to establish Dravosburg-USS Clairton(Z-14) 138 kV circuit and West Mifflin-Wilson(Z-15) 138 kV circuit.		●				June 2018		DL	9/10/2015
	b2716	Add a 200 MVAR shunt reactor at Lackawanna 500 kV substation.			●			12/1/2018	\$10.00	PPL	12/3/2015
5											

Pennsylvania - RTEP Network Projects

(Approved in 2015, greater than \$10 million)



Network Projects are transmission upgrades identified as part of the interconnection process System Impact Studies. Network upgrades are necessary to interconnect new generation and merchant transmission facilities to the existing transmission grid or to provide new long-term firm transmission service.

The generation project associated with Map ID #1 was withdrawn by the developer. The associated network upgrade has since been removed.

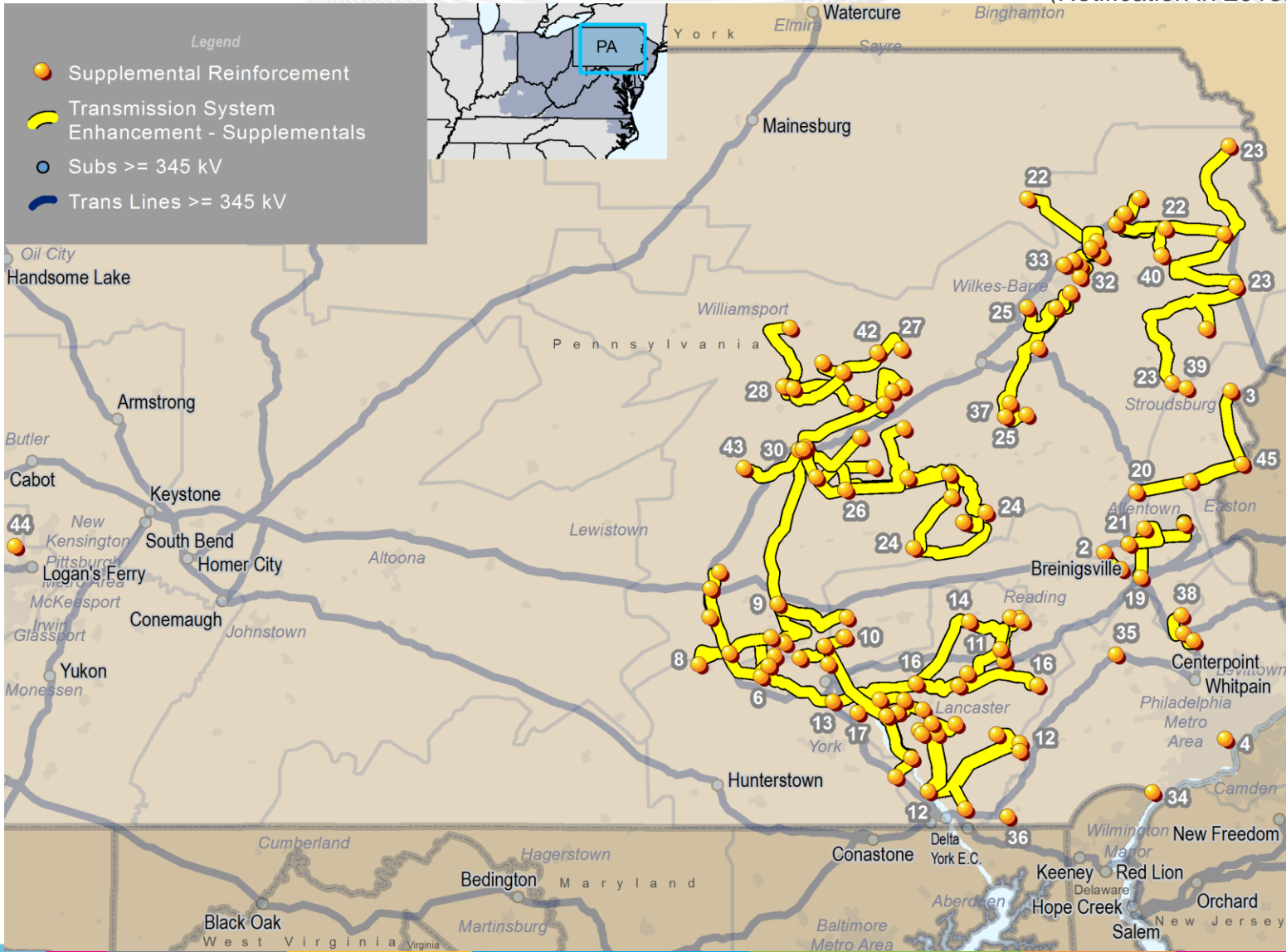
Pennsylvania - RTEP Network Projects

(Approved in 2015, greater than \$10 million)

Map ID	Project ID	Project	PA Network Project Drivers			Date	Cost (\$M)	TO Zone(s)	2015 TEAC Review
			Generation Interconnection	Merchant Transmission Interconnection	Long-Term Firm Transmission Service				
1		PROJECT WAS WITHDRAWN. NETWORK UPGRADE HAS SINCE BEEN REMOVED							
2	n4393	Rebuild 4.5 miles of the conductor using 556 ACSR, remove 110 structures, install 55 new conductors, remove 24,000ft of (3) 336 MCM 30/7 ACSR.	Z2-107			12/31/2015	\$13.50	PPL	9/10/2015
3	n4400	Build new 500kV substation to connect Z2-046.	Z2-046			6/1/2018	\$30.00	PPL	9/10/2015

Pennsylvania - TO Supplemental Projects

(Notification in 2015, greater than \$10 million)



Pennsylvania - TO Supplemental Projects

(Notification in 2015, greater than \$10 million)

			PA Supplemental Projects			
Map ID	Project ID	Project	Date	Cost (\$M)	TO Zone(s)	2015 TEAC Review
1	s0858	Upgrade Clinton 230 kV yard.	12/31/2018	\$11.00	PPL	1/7/2015
2	s0864	Build approx. 6 miles of 2nd circuit on existing Alburtis-Breinigsville; Reconfigure Wescosville 500 kV station to double breaker arrangement; Install new Wescosville 230/138 kV transformer.	12/31/2017	\$58.40	PPL	1/7/2015
3	s0866	Build a new 230 kV circuit from Martins Creek to Monroe using existing Martins Creek-Stroudsburg 69 kV decommissioned line, and reconfigure Martins Creek and Monroe substations.	12/31/2019	\$44.86	PPL	1/7/2015
4	s0901	Build a new 230/13kV distribution substation (Master) and install two circuit breakers at the 230 kV Master bus.	6/1/2016	\$33.80	PECO	3/5/2015
5	s0932	Install new 500/230 kV transformer at Sunbury.	12/31/2017	\$10.00	PPL	4/9/2015
6	s0943	Build new 20.2 mi. Brunner Island-Williams Grove 230 kV line: break existing 16 mi. Brunner Island-West Shore #1 line outside West Shore, extend 4.2 mi. to Williams Grove by rebuilding West Shore-Williams Grove 230 kV line as double circuit tower line.	12/31/2018	\$15.00	PPL	7/9/2015
7	s0944.1	Rebuild the West Shore 230/69 kV Substation.	12/31/2020	\$30.00	PPL	7/29/2015
	s0944.2	Rebuild the West Shore - White Hill 1 & 2 69 kV lines (3.85 mi).	12/31/2020	\$9.60	PPL	7/29/2015

Pennsylvania - TO Supplemental Projects

(Notification in 2015, greater than \$10 million)

			PA Supplemental Projects			
Map ID	Project ID	Project	Date	Cost (\$M)	TO Zone(s)	2015 TEAC Review
8	s0945.1	Rebuild the Juniata 230/69 kV Substation.	12/31/2021	\$36.00	PPL	7/29/2015
	s0945.2	Rebuild the Juniata - Richfield/Newport 69 kV Lines (3.5 mi).	12/31/2021	\$42.60	PPL	7/29/2015
	s0945.3	Rebuild the Juniata - Shermansdale 69 kV Line (13 mi).	12/31/2021	\$23.00	PPL	7/29/2015
	s0945.4	Rebuild the Cumberland 230/69 kV substation.	12/31/2021	\$27.20	PPL	7/29/2015
	s0945.5	Rebuild the Cumberland - West Carlisle 1 & 2 69 kV (10.5 mi).	12/31/2021	\$27.20	PPL	7/29/2015
	s0945.6	Rebuild the Cumberland - West Shore 1 & 2 69 kV (14 mi).	12/31/2021	\$27.40	PPL	7/29/2015
	s0945.7	Rebuild the Cumberland - West Shore 3 & 4 69 kV (5 mi).	12/31/2021	\$1.20	PPL	7/29/2015
	s0945.8	Rebuild the Juniata - Cumberland 230 kV Line (14.2 mi).	12/31/2021	\$30.60	PPL	8/13/2015
9	s0947.1	Rebuild Dauphin - Capital Park 1 & 2 69 kV lines (1 mi).	5/31/2024	\$1.50	PPL	7/29/2015
	s0947.2	Rebuild Harrisburg - Capital Park 1 & 2 69 kV lines (1 mi).	5/31/2024	\$1.50	PPL	7/29/2015
	s0947.3	Rebuild Dauphin - Copperstone 1 & 2 69 kV lines (3.8 mi).	5/31/2024	\$4.20	PPL	7/29/2015
	s0947.4	Rebuild Harrisburg Substation to 230/69 kV GIS.	5/31/2024	\$64.00	PPL	7/29/2015
	s0947.5	Rebuild Sunbury - Dauphin 69 kV line (47 mi).	5/31/2024	\$50.00	PPL	7/29/2015

Pennsylvania - TO Supplemental Projects

(Notification in 2015, greater than \$10 million)

			PA Supplemental Projects			
Map ID	Project ID	Project	Date	Cost (\$M)	TO Zone(s)	2015 TEAC Review
10	s0948.1	Rebuild Hummelstown - Middletown Junction #1 230 kV line (7 mi).	12/31/2018	\$19.00	PPL	8/13/2015
	s0948.2	Rebuild Hummelstown - Steelton 230 kV line (6.8 mi).	12/31/2018	\$18.00	PPL	8/13/2015
	s0948.3	Rebuild Hummelstown - South Hershey 69 kV line (4.7 mi).	12/31/2018	\$ 9.30	PPL	7/29/2015
	s0948.4	Rebuild Hummelstown - Hershey 69 kV line (8.3 mi).	12/31/2018	\$15.90	PPL	7/29/2015
	s0948.5	Rebuild South Hershey-Hershey 69 kV line (3.5 mi).	12/31/2018	\$6.80	PPL	7/29/2015
	s0948.6	Rebuild West Hempfield-Hummelstown 69 kV line (10.6 mi).	12/31/2018	\$32.50	PPL	7/29/2015
11	s0949.1	Build new State Hill - Berkshire Mall 1 & 2 69 kV line (5 mi).	12/31/2021	\$13.20	PPL	7/29/2015
	s0949.2	Build new Lauschtown - Berks 1 & 2 69 kV line (5 mi).	12/31/2021	\$10.70	PPL	7/29/2015
	s0949.3	Rebuild Berks - South Akron 69 kV line (5 mi).	12/31/2021	\$10.90	PPL	7/29/2015
	s0949.4	Build new Lauschtown - Wyomissing 69 kV line (14 mi).	12/31/2021	\$30.00	PPL	7/29/2015
	s0949.5	Rebuild Berks 230/69 kV Substation.	12/31/2021	\$30.00	PPL	7/29/2015
	s0949.6	Rebuild Berks - Lavino 69 kV line (8 mi).	12/31/2021	\$17.20	PPL	7/29/2015

Pennsylvania - TO Supplemental Projects

(Notification in 2015, greater than \$10 million)

			PA Supplemental Projects			
Map ID	Project ID	Project	Date	Cost (\$M)	TO Zone(s)	2015 TEAC Review
12	s0950.1	Rebuild Kinzer Tap 69 kV (7.3 mi).	12/31/2019	\$6.20	PPL	7/29/2015
	s0950.2	Rebuild South Akron - Morgantown 2 69 kV line (27.5 mi).	12/31/2019	\$14.80	PPL	7/29/2015
	s0950.3	Rebuild Face Rock - Kinzer 13 & 14 69 kV lines (18.6 mi).	12/31/2019	\$17.20	PPL	7/29/2015
	s0950.4	Rebuild Face Rock - Millwood 2 69 kV line (8.8 mi).	12/31/2019	\$4.70	PPL	7/29/2015
	s0950.5	Rebuild Atglen, Quebecor, Wakefield and Chester Water 69 kV Taps (17 mi).	12/31/2019	\$13.00	PPL	7/29/2015
13	s0951.2	Rebuild Brunner Island - South Manheim 230 kV (17.8 mi).	12/31/2021	\$31.00	PPL	8/13/2015
	s0951.3	Upgrade Brunner Island 230 kV Switchyard.	12/31/2021	\$2.00	PPL	8/13/2015
	s0951.4	Rebuild South Manheim 230 kV yard.	12/31/2021	\$19.00	PPL	8/13/2015
14	s0952.1	Rebuild South Manheim - Lavino 69 kV line (20.7 mi).	12/31/2021	\$41.10	PPL	7/29/2015
	s0952.2	Rebuild South Manheim 69 kV Yard.	12/31/2021	\$8.00	PPL	7/29/2015
15	s0953.1	Rebuild McGovernville 69 kV Tap (1.2 mi).	12/31/2018	\$2.70	PPL	7/29/2015
	s0953.2	Rebuild West Hempfield - South Manheim 69 kV Line between McGovernville and Silver Springs (4.4 mi).	12/31/2018	\$10.90	PPL	7/29/2015
	s0953.3	Rebuild West Hempfield - South Manheim 69 kV Line between West Hempfield and Silver Springs (4.9 mi).	12/31/2018	\$10.90	PPL	7/29/2015
	s0953.4	Rebuild Donegal 1 & 2 – Landisville 69 kV Tap (4.9 mi).	12/31/2018	\$10.90	PPL	7/29/2015

Pennsylvania - TO Supplemental Projects

(Notification in 2015, greater than \$10 million)

			PA Supplemental Projects			
Map ID	Project ID	Project	Date	Cost (\$M)	TO Zone(s)	2015 TEAC Review
16	s0954.1	Rebuild South Akron - Morgantown 1 69 kV line (1.2 mi).	12/31/2022	\$2.70	PPL	7/29/2015
	s0954.2	Rebuild South Akron - Morgantown 3 69 kV line (7.5 mi).	12/31/2022	\$14.90	PPL	7/29/2015
	s0954.3	Rebuild Ephrata 69 kV Tap (1.9 mi).	12/31/2022	\$4.40	PPL	7/29/2015
	s0954.4	Rebuild South Akron 230/69 kV Substation.	12/31/2022	\$32.50	PPL	7/29/2015
	s0954.5	Rebuild South Akron - South Manheim 3 69 kV line(9.5 mi).	12/31/2022	\$23.00	PPL	7/29/2015
17	s0955.1	Rebuild West Hempfield 230/69 kV Substation.	11/30/2023	\$20.90	PPL	7/29/2015
	s0955.2	Rebuild Manor 230/69 kV Substation.	11/30/2023	\$21.00	PPL	7/29/2015
	s0955.3	Rebuild West Hempfield - Manor 1 69 kV line (8.5 mi).	11/30/2023	\$7.00	PPL	7/29/2015
	s0955.4	Rebuild West Hempfield - Hummelstown and West Hempfield - Armstrong Marietta 69 kV lines (10.9 mi).	11/30/2023	\$17.20	PPL	7/29/2015
	s0955.5	Rebuild West Hempfield - Manor 2 230 kV line (9.1 mi).	11/30/2023	\$22.70	PPL	8/13/2015
	s0955.6	Rebuild Manor - Otter Creek 230 kV line (5.9 mi).	11/30/2023	\$5.40	PPL	8/13/2015
18	s0956.1	Rebuild the taps to Millersville Sub and Millersville University off Manor-Engleside 1 & 2 69 kV line (0.6 mi).	12/31/2019	\$1.00	PPL	7/29/2015
	s0956.2	Rebuild Engleside - Greenland 1 & 2 69 kV line (1.7 mi).	12/31/2019	\$4.10	PPL	7/29/2015
	s0956.3	Upgrade Engleside 69 kV switchyard.	12/31/2019	\$7.00	PPL	7/29/2015

Pennsylvania - TO Supplemental Projects

(Notification in 2015, greater than \$10 million)

PA Supplemental Projects

Map ID	Project ID	Project	Date	Cost (\$M)	TO Zone(s)	2015 TEAC Review
19	s0957.1	Upgrade the Quarry 230/69 kV Substation.	5/31/2018	\$30.00	PPL	7/29/2015
	s0957.2	Rebuild the south section of Hosensack - Quarry #1 and #2 69 kV lines (15 mi).	5/31/2018	\$41.00	PPL	7/29/2015
20	s0958.1	Rebuild the Siegfried 230/69 kV Substation.	6/30/2021	\$51.70	PPL	7/29/2015
	s0958.2	Rebuild the Siegfried - Nazareth #1 and #2 69 kV lines (11 mi).	6/30/2021	\$25.00	PPL	7/29/2015
	s0958.3	Rebuild the Martins Creek - Nazareth #1 and #2 69 kV lines (13 mi).	6/30/2021	\$36.20	PPL	7/29/2015
21	s0960	Rebuild the underground cable sections of Wescosville - Central Allentown #2 (1.3 mi) and Allentown - Central Allentown #1 & #2 (0.8 mi) 138 kV lines.	12/31/2016	\$11.10	PPL	7/29/2015
22	s0961.1	Rebuild the Lackawanna - East Carbondale 69 kV line (19 mi).	6/30/2021	\$39.40	PPL	7/29/2015
	s0961.2	Rebuild the Lackawanna - Pocono and Lackawanna – Varden 69 kV line (3 mi).	6/30/2021	\$7.80	PPL	7/29/2015
	s0961.3	Rebuild the Stanton - Brookside and Providence - Morgan 69 kV line (10 mi).	6/30/2021	\$22.30	PPL	7/29/2015
	s0961.4	Rebuild the East Carbondale Tap and install Jermyn 69 kV cap (7 mi).	6/30/2021	\$24.80	PPL	7/29/2015
23	s0962.1	Rebuild the Blooming Grove - West Damascus 69 kV line (8.4 mi).	12/31/2019	\$23.00	PPL	7/29/2015
	s0962.2	Rebuild the Blooming Grove - Jackson 69 kV line (21 mi), rebuild the Canadensis Tap 69 kV line (8.2 mi).	12/31/2018	\$56.00	PPL	7/29/2015
	s0962.3	Install second circuit on the Blooming Grove - West Damascus 69 kV line (2.3 mi), Install second circuit on Bohemia 69 kV Tap (3.9 mi).	12/31/2017	\$8.00	PPL	7/29/2015

Pennsylvania - TO Supplemental Projects

(Notification in 2015, greater than \$10 million)

PA Supplemental Projects

Map ID	Project ID	Project	Date	Cost (\$M)	TO Zone(s)	2015 TEAC Review
24	s0963.1	Rebuild the Pine Grove - Cressona 69 kV Line (3.1 mi).	8/31/2018	\$4.70	PPL	7/29/2015
	s0963.2	Rebuild the Orwigsburg - Cressona 69 kV Tap & Pine Grove - Aluminum 69 kV Tap (0.4 mi).	8/31/2018	\$0.80	PPL	7/29/2015
	s0963.3	Rebuild the Frackville - Orwigsburg 69 kV Line (10.3 mi).	8/31/2018	\$27.20	PPL	7/29/2015
	s0963.4	Rebuild the Fishbach - Pine Grove 69 kV Line (8.8 mi).	8/31/2018	\$8.80	PPL	7/29/2015
	s0963.5	Rebuild the Frackville - Fishbach 3 69 kV Line (8.5 mi).	8/31/2018	\$18.30	PPL	7/29/2015
	s0963.6	Rebuild the Orwigsburg 69 kV Tap (2.6 mi).	8/31/2018	\$6.00	PPL	7/29/2015
	s0963.7	Rebuild the Frackville - Fishbach 1&2 69 kV Lines (7.2 mi).	8/31/2018	\$15.60	PPL	7/29/2015
25	s0964.1	Rebuild the Wright 69 kV Tap 1&2 (2.3 mi).	10/31/2019	\$4.50	PPL	7/29/2015
	s0964.2	Rebuild the Harwood - Valmont 69 kV Line & Valmont 69 kV Tap 2 & Harleigh 69 kV Tap (4.8 mi).	10/31/2019	\$9.40	PPL	7/29/2015
	s0964.3	Rebuild the Harwood - East Hazleton 1&2 69 kV Lines (1.4 mi).	10/31/2019	\$2.60	PPL	7/29/2015
	s0964.4	Extend the Harwood - East Hazleton 1&2 69 kV Lines (7.9 mi).	10/31/2019	\$15.50	PPL	7/29/2015
	s0964.5	Rebuild the Harwood - Jenkins 1&2 69kV lines (11.2 mi).	10/31/2019	\$21.10	PPL	7/29/2015
	s0964.6	Rebuild the Jenkins - Plymouth 69 kV line (3.4 mi).	10/31/2019	\$6.00	PPL	7/29/2015
	s0964.7	Install three 5% Series Reactors for the 3 Jenkins 230/69 kV transformers.	10/31/2019	\$1.40	PPL	7/29/2015
	s0964.8	Upgrade the Jenkins 69 kV Yard to Double Breaker, Double Bus.	10/31/2019	\$3.00	PPL	7/29/2015

Pennsylvania - TO Supplemental Projects

(Notification in 2015, greater than \$10 million)

PA Supplemental Projects

Map ID	Project ID	Project	Date	Cost (\$M)	TO Zone(s)	2015 TEAC Review
26	s0965.1	Rebuild the Frackville - Mowry 69 kV Line & Frackville - Reed 69 kV Tie (11 mi).	2/28/2022	\$20.90	PPL	7/29/2015
	s0965.2	Rebuild the Eldred - Cleveland 69 kV Line (9.7 mi).	2/28/2022	\$18.80	PPL	7/29/2015
	s0965.3	Upgrade the Eldred - Fairview 69 kV Line (7.8 mi).	2/28/2022	\$8.90	PPL	7/29/2015
	s0965.4	Rebuild the Eldred - Reed 69 kV Line (12.9 mi).	2/28/2022	\$20.50	PPL	7/29/2015
	s0965.5	Rebuild the Sunbury - Reed 69kV Line (5.5 mi).	2/28/2022	\$10.50	PPL	7/29/2015
	s0965.6	Rebuild the Sunbury - Hunter 69 kV Line (16.6 mi).	2/28/2022	\$31.10	PPL	7/29/2015
	s0965.7	Rebuild the Eldred 230 kV Yard.	2/28/2022	\$9.10	PPL	8/13/2015
27	s0967.1	Rebuild the Rohrsburg 69kV Tap (7.2 mi).	12/31/2017	\$9.20	PPL	7/29/2015
	s0967.2	Build a new Williams 69 kV Tap (1.8 mi) by tapping the Columbia - Scott 69 kV line.	12/31/2017	\$2.20	PPL	7/29/2015
	s0967.3	Install a new 32.4 MVAR, 69 kV Capacitor at Columbia Substation.	12/31/2017	\$1.00	PPL	7/29/2015
28	s0968.1	Rebuild the Clinton - Milton 69kV Line (19.1).	3/31/2020	\$39.50	PPL	7/29/2015
	s0968.2	Rebuild the Watson 69kV Tap & Montour Pump 69 kV Tap (5.1 mi).	3/31/2020	\$9.60	PPL	7/29/2015
	s0968.3	Rebuild the Clinton - Kelly 69 kV line & Millville - Kelly 69 kV Tap (1.9 mi).	3/31/2020	\$3.50	PPL	7/29/2015
	s0968.4	Build new 69 kV line from Kelly substation/Kelly tap to Lewisburg Substation (5.1 mi).	3/31/2020	\$9.40	PPL	7/29/2015
	s0968.5	Rebuild the Sunbury - Lewisburg 69kV Line (8.8 mi).	3/31/2020	\$15.60	PPL	7/29/2015



Pennsylvania - TO Supplemental Projects

PA Supplemental Projects

Map ID	Project ID	Project	Date	Cost (\$M)	TO Zone(s)	2015 TEAC Review
29	s0969.1	Rebuild the Columbia - Danville 69kV Line (11.6 mi).	10/31/2021	\$22.00	PPL	7/29/2015
	s0969.2	Rebuild the Danville - Milton 69 kV Line (1.4 mi).	10/31/2021	\$2.80	PPL	7/29/2015
	s0969.3	Rebuild the Sunbury - Columbia 69 kV Line (24.5 mi).	10/31/2021	\$43.50	PPL	7/29/2015
30	s0970	Install a 3rd 230/69 kV Transformer at Sunbury 500/230/69 kV substation.	7/31/2017	\$10.40	PPL	7/29/2015
31	s0972	Rebuild Enola 69 kV Taps off the Cumberland - West Shore 1 & 2 69 kV lines (4 mi).	12/31/2017	\$10.00	PPL	7/29/2015
32	s0974.1	Rebuild Stanton - Old Forge 69kV line (3.57 mi).	5/31/2018	\$11.60	PPL	7/29/2015
	s0974.2	Rebuild Stanton - Avoca 69kV line (6.41 mi), rebuild part of Avoca Tap to double circuit (0.4 mi), re-configure Avoca Substation.	5/31/2018	\$22.60	PPL	7/29/2015
	s0974.3	Build Summit 230/69kV Substation.	5/31/2018	\$50.90	PPL	7/29/2015
	s0974.4	Extend Keyser Avenue tap line (2 mi).	5/31/2018	\$7.80	PPL	7/29/2015
33	s0975	Rebuild Stanton 230/69 kV substation.	11/30/2017	\$52.20	PPL	7/29/2015
34	s1002	Build a new 230/13 kV distribution substation (Post Substation) near Linwood.	10/1/2016	\$51.90	PECO	7/29/2015
35	s1004	Build a new 230/34 kV distribution substation (Lock Substation) near Limerick.	6/1/2018	\$24.60	PECO	7/29/2015
36	s1005	Expand Nottingham substation with 230/34 kV additional transformer.	6/1/2018	\$23.00	PECO	7/29/2015
37	s1026.1	Reconfigure the Harwood 69 kV yard.	12/31/2020	\$8.10	PPL	12/8/2015
	s1026.2	Rebuild Jenkins - River 1 & 2 69 kV Line (3.5 mi).	12/31/2020	\$4.20	PPL	12/8/2015
38	s1028.1	Rebuild the Buxmont-Elroy 1 & 2 69 kV Lines (6 mi).	12/31/2018	\$12.80	PPL	12/8/2015
	s1028.2	Rebuild the Elroy-Hatfield 1 & 2 69 kV Lines (0.25 mi).	12/31/2018	\$0.50	PPL	12/8/2015

PA Supplemental Projects

Map ID	Project ID	Project	Date	Cost (\$M)	TO Zone(s)	2015 TEAC Review
39	s1031	Rebuild approximately 3.2 miles of Bartonsville 69 kV tap to double circuit.	5/31/2019	\$5.30	PPL	12/8/2015
40	s1032	Rebuild approximately 6.6 miles of Hamlin 69 kV tap to double circuit.	12/31/2019	\$14.50	PPL	12/8/2015
41	s1033	Rebuild approximately 9.8 miles of Milton-Millville 69 kV line.	1/31/2021	\$17.00	PPL	12/8/2015
42	s1035.1	Rebuild the existing Columbia - Scot 69 kV line from Columbia sub to Bloomsburg sub to single circuit (Approximately 2.5 Miles).	2/28/2017	\$5.80	PPL	12/8/2015
	s1035.2	Rebuild the existing Columbia-Scot 69 kV line from Bloomsburg sub to Scott sub to double circuit (Approximately 3.3 Miles).	12/31/2017	\$7.60	PPL	12/8/2015
	s1035.3	Rebuild the existing Rohrsburg - Millville 69 kV tap (Approximately 5.9 Miles).	5/31/2019	\$10.60	PPL	12/8/2015
43	s1036.1	Expand and upgrade the Sunbury 69 kV Yard #1 substation.	4/30/2018	\$1.70	PPL	12/8/2015
	s1036.2	Expand and upgrade the Sunbury 69 kV Yard #2 substation.	6/30/2018	\$1.90	PPL	12/8/2015
	s1036.3	Rebuild the Sunbury - Middleburg 69 kV circuit (Approximately 23.7 Miles).	3/31/2022	\$38.90	PPL	12/8/2015
44	s1083	Construct a new West Deer 138/23 kV substation, which is radially fed from the Pine Creek substation and the newly constructed 138kV feed will be designated as Z-105.	June 2019	\$10.60	DL	11/20/2015
45	s1093	Upgrade Martins Creek 230-69 kV substation.	5/31/2023	\$35.00	PPL	12/8/2015



Merchant Projects

● Under Study

○ Subs >= 345 kV

— Trans Lines >= 345 kV

Queue	Project Name	MW	Status	Schedule	TO
Y3-092	Erie West 345kV	1000	Under Study	Q1 2017	PenElec
AB1-019	Cochranville	100	Under Study	2Q 2018	PECO

Planning

Load Forecast



Pennsylvania - 2016 Load Forecast Report

(December 31, 2015)

Transmission Owner	Summer Peak (MW)			Winter Peak (MW)		
	2016	2026	Growth Rate (%)	2015/16	2025/26	Growth Rate (%)
Allegheny Power *	3,995	4,329	0.8%	3,863	4,109	1.1%
American Transmission Systems, Inc. *	873	907	0.4%	713	878	0.5%
Duquesne Light Company	2,893	2,985	0.3%	2,158	2,223	0.3%
Metropolitan Edison Company	2,940	3,176	0.8%	2,593	2,784	0.7%
PECO Energy Company	8,547	9,122	0.7%	6,654	7,030	0.6%
Pennsylvania Electric Company	2,890	2,919	0.1%	2,814	2,834	0.1%
PPL Electric Utilities Corporation	6,563	6,813	0.4%	5,386	5,684	0.5%
UGI	188	190	0.1%	192	193	0.1%
PJM RTO	130,243	140,912	0.8%	152,131	161,891	0.6%

* PJM notes that Allegheny Power and ATSI serve load other than in Pennsylvania. The Summer peak and Winter Peak MW values in this table each reflect the estimated amount of forecasted load to be served by each of those transmission owners solely in Pennsylvania. Estimated amounts were calculated based on the average share of each transmission owner's real-time summer and winter peak load located in Pennsylvania over the past five years.

Operations

Gas Pipeline Information

Gas Generators	Dual Fuel Capable (MW)	Total Generator (MW)
Connected to Interstate Pipelines	4,500	10,700 (82%)
Behind the Local Distribution Company	1,400	2,400 (18%)
Total Gas Fired Generators	5,900	13,100

Interstate Pipelines	Local Distribution Companies
Columbia Gas Transmission (COL)	Borough of Chambersburg Gas
Dominion Transmission (DTI)	Columbia Gas of Pennsylvania
National Fuel Gas Supply Corporation (NFG)	National Fuel Gas Distribution
Texas Eastern Transmission - Spectra Energy (TETCO)	PECO Energy
Transcontinental Pipeline – Williams (TRANSCO)	Peoples Natural Gas
	UGI Utilities
	Valley Energy