



2018 Pennsylvania State Infrastructure Report

(January 1, 2018 – December 31, 2018)

May 2019

1. Planning

- Generation Portfolio Analysis
- Transmission Infrastructure Analysis
- Load Forecast

2. Markets

- Capacity Market Results
- Market Analysis

3. Operations

- Emissions Data

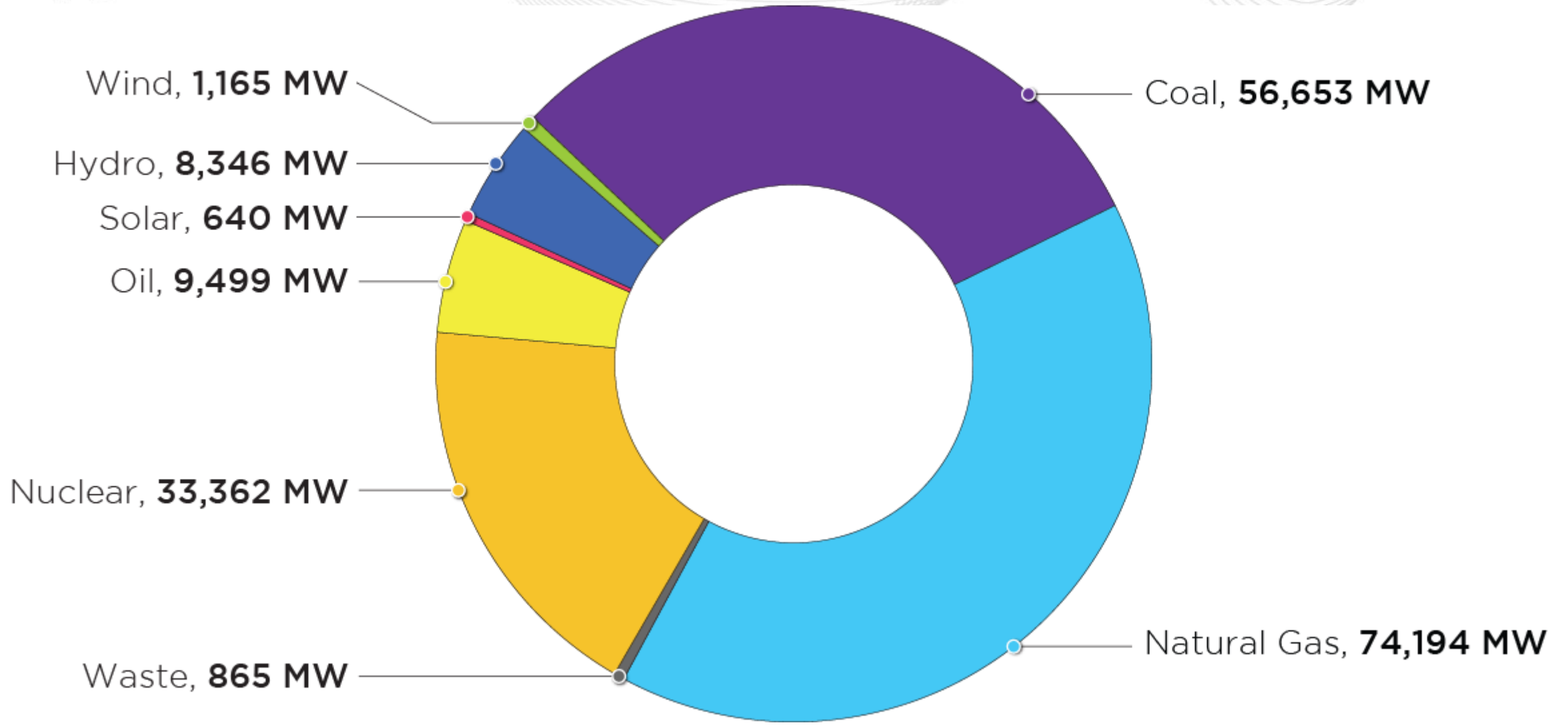
- **Existing Capacity:** Natural gas represents approximately 34.0 percent of the total installed capacity in Pennsylvania while coal represents 28.3 percent and nuclear represents 21.9 percent. In PJM natural gas and coal are at 40.2 and 30.7 percent of total installed capacity.
- **Interconnection Requests:** Natural gas represents approximately 85.3 percent of new interconnection requests in Pennsylvania.
- **Deactivations:** 76.1 MW of capacity deactivated within Pennsylvania in 2018. An additional 4,391.5 MW of capacity gave a notification of deactivation in 2018.
- **RTEP 2018:** Pennsylvania RTEP 2018 projects total more than \$949 million in investment. Approximately 66.1 percent of that represents supplemental projects. These investment figures only represent RTEP projects that cost at least \$5 million.
- **Load Forecast:** Pennsylvania load growth is nearly flat, between -0.1 and 0.8 percent per year over the next 10 years. This aligns with PJM RTO load growth projections.

- **2021/22 Capacity Market:** Pennsylvania cleared 328 MW more Demand Response and Energy Efficient resources than in the prior auction.
- **1/1/18 – 12/31/18 Market Performance:** Except for the cold snap in early 2018, Pennsylvania's average locational marginal prices were consistently at or below PJM average LMPs for the year. Nuclear resources represented 40.0 percent of generation used in Pennsylvania while natural gas and coal averaged 29.6 percent and 20.7 percent, respectively. Pennsylvania exports 24.0 percent of the energy produced in the state.
- **Emissions:** 2018 carbon dioxide, nitrogen oxides, and sulfur dioxide emissions are all slightly down from 2017.



Planning

Generation Portfolio Analysis



Pennsylvania – Existing Installed Capacity

(MW submitted to PJM, December 31, 2018)

Natural Gas, **15,195 MW**

Waste, **252 MW**

Nuclear, **9,801 MW**

Oil, **4,170 MW**

Solar, **7 MW**

Hydro, **2,413 MW**

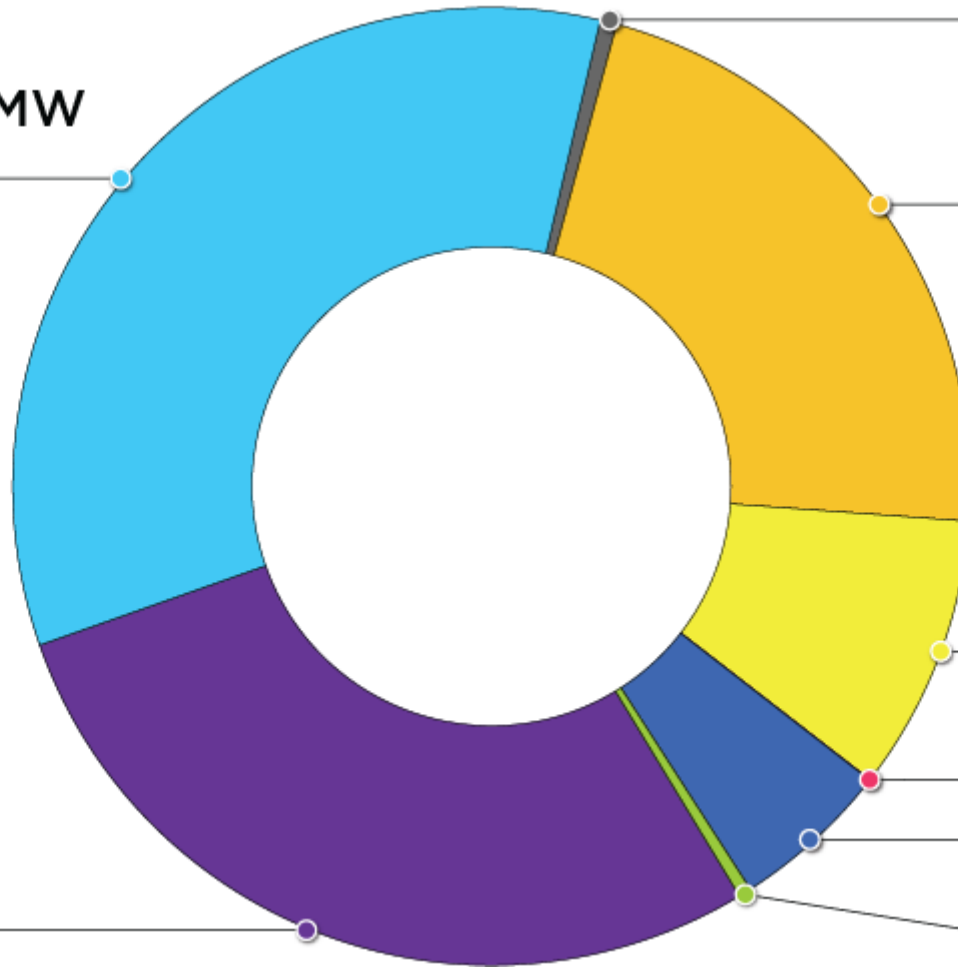
Wind, **188 MW**

Coal, **12,634 MW**

Summary:

Natural gas represents approximately 34.0 percent of the total installed capacity in Pennsylvania while coal represents approximately 28.3 percent.

Overall in PJM, natural gas represents approximately 40.2 percent of installed capacity while coal represents 30.7 percent.



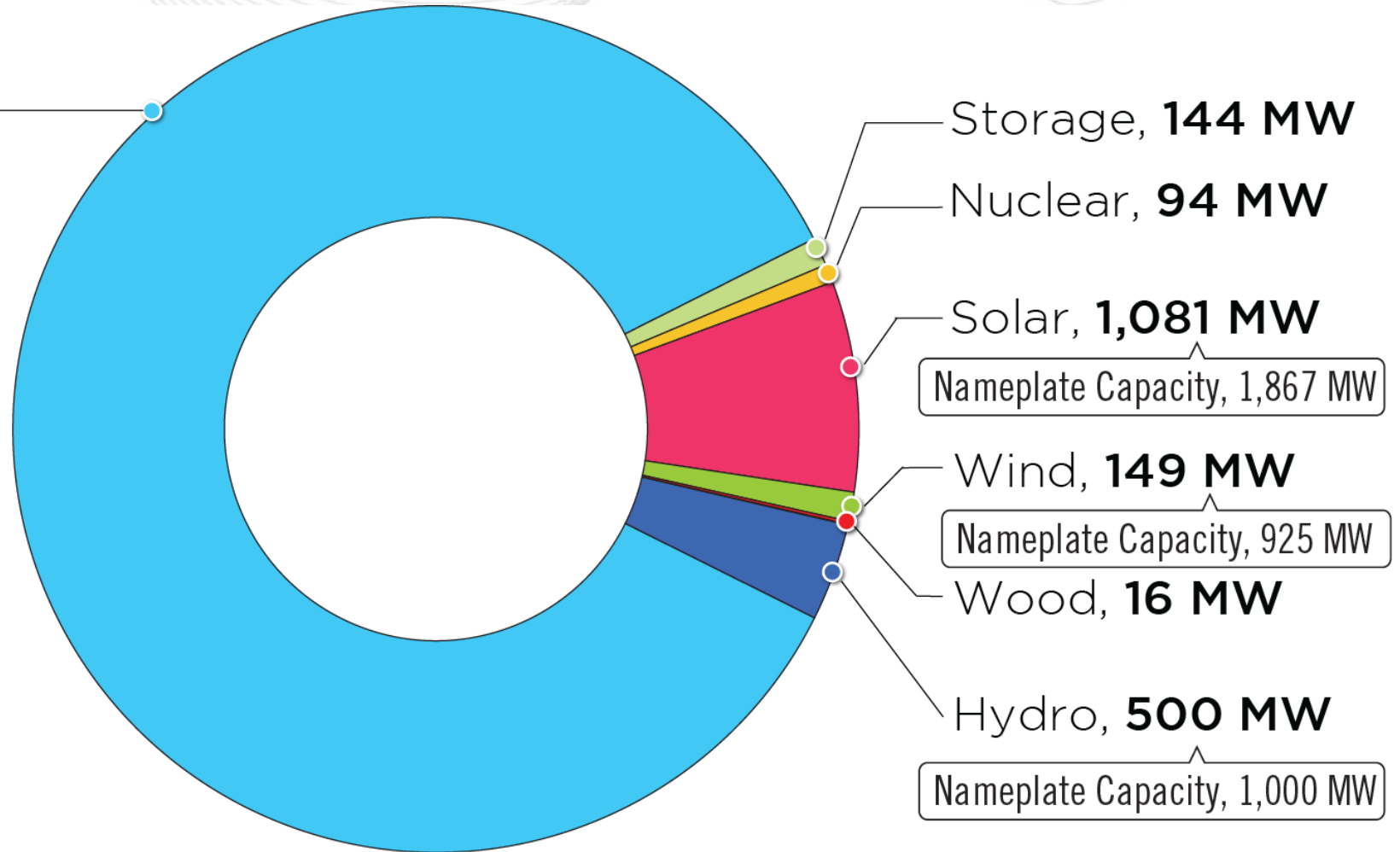
Pennsylvania – Queued Capacity (MW) by Fuel Type

(as of December 31, 2018)

Natural Gas, **11,467 MW**

Natural gas represents approximately 85.3 percent of new interconnection requests in Pennsylvania.

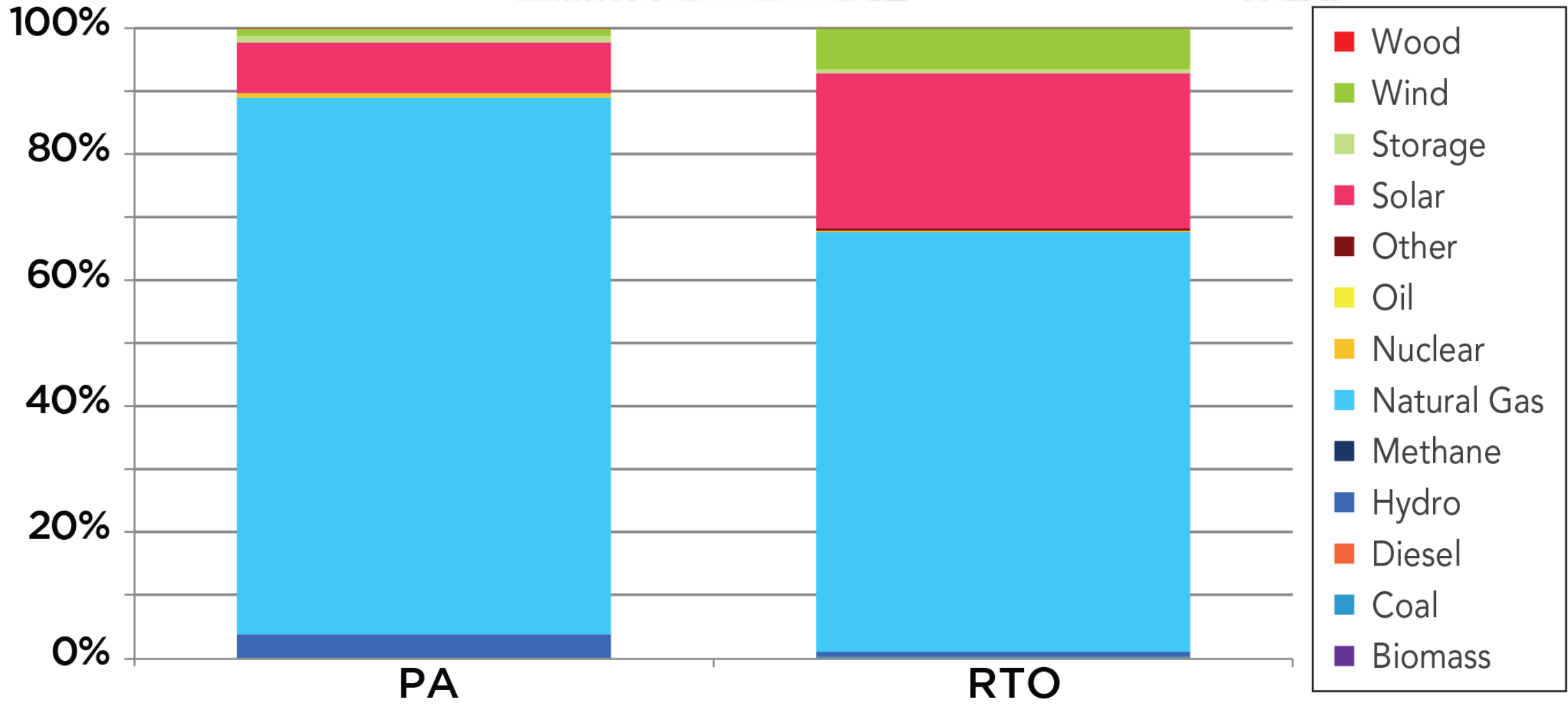
* **Note:** Nameplate Capacity represents a generator's rated full power output capability.





Pennsylvania – Percentage of Projects in Queue by Fuel Type

(as of December 31, 2018)





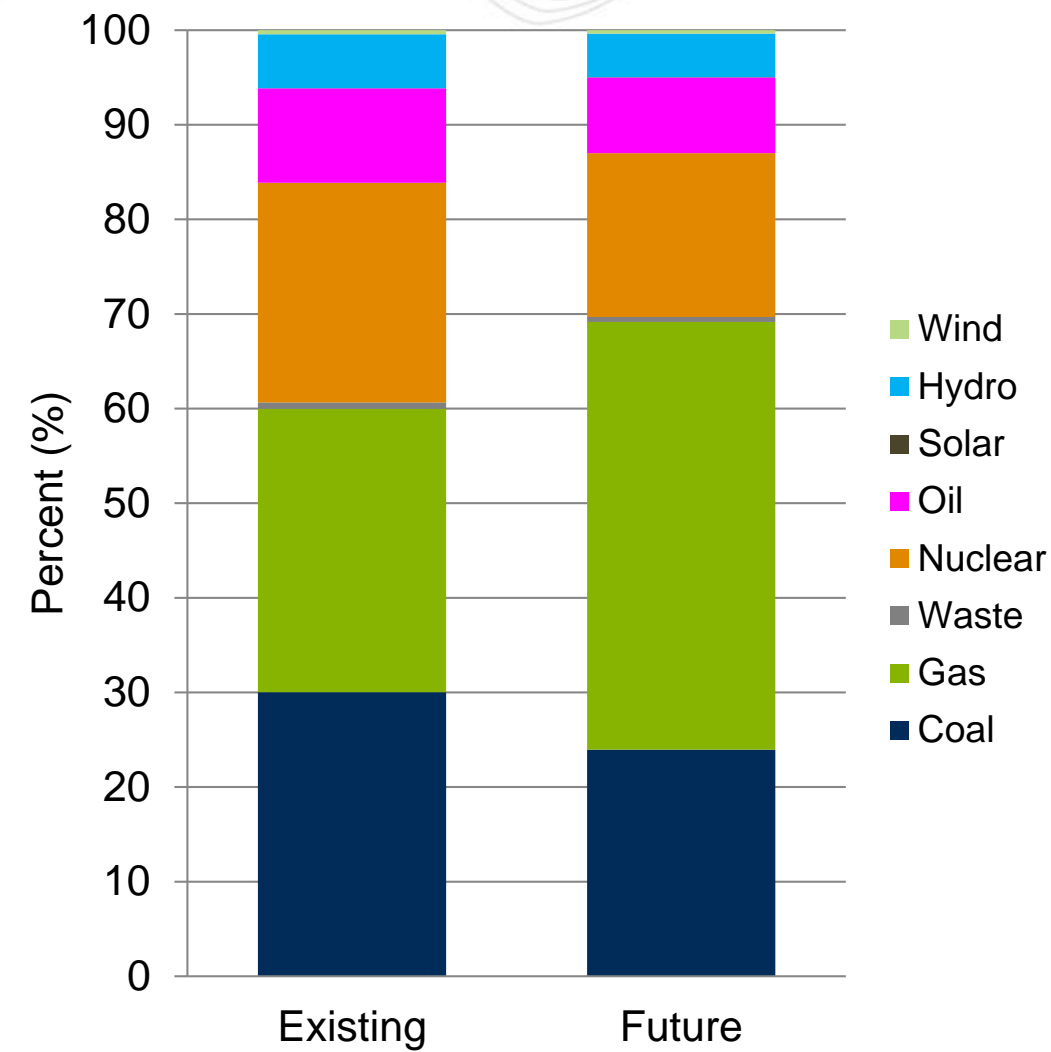
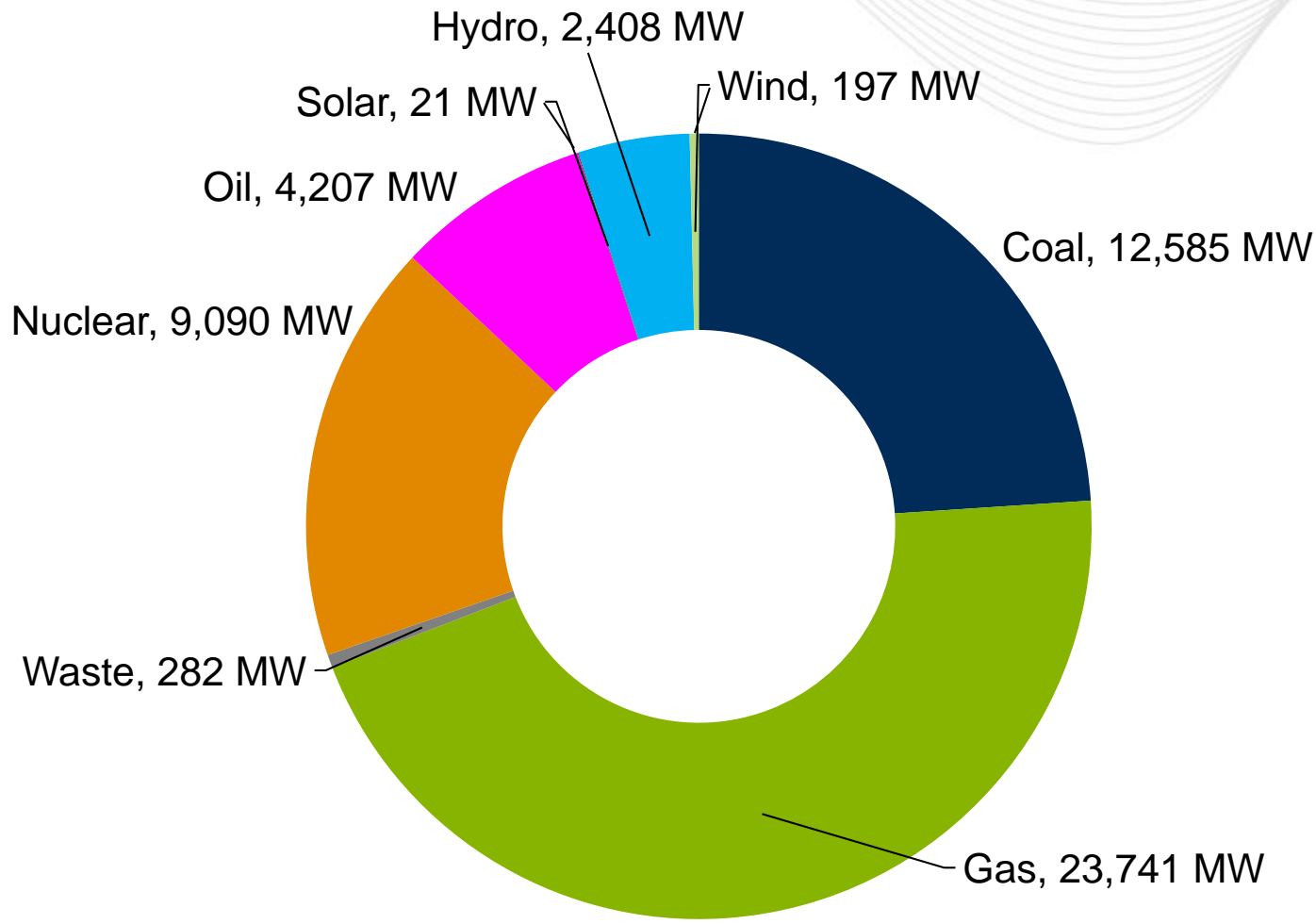
Pennsylvania – Interconnection Requests

(Unforced Capacity, As of December 31, 2018)

	Complete				In Queue						Grand Total	
	In Service		Withdrawn		Active		Suspended		Under Construction			
	No. of Projects	Capacity, MW	No. of Projects	Capacity, MW	No. of Projects	Capacity, MW	No. of Projects	Capacity, MW	No. of Projects	Capacity, MW	No. of Projects	Capacity, MW
Non-Renewable	124	18,792.0	313	104,078.0	40	3,876.0	10	1,371.0	25	6,462.0	512	134,579.0
Coal	17	229.0	28	14,354.6	0	0.0	0	0.0	0	0.0	45	14,583.6
Diesel	3	33.3	12	51.5	0	0.0	0	0.0	1	4.1	16	88.9
Natural Gas	78	15,612.3	227	86,077.7	26	3,682.2	10	1,371.4	21	6,413.5	362	113,157.1
Nuclear	15	2,581.8	8	1,681.0	4	50.0	0	0.0	1	44.0	28	4,356.8
Oil	3	9.4	9	1,307.0	0	0.0	0	0.0	0	0.0	12	1,316.4
Other	3	326.5	6	344.0	0	0.0	0	0.0	0	0.0	9	670.5
Storage	5	0.1	23	262.1	10	143.8	0	0.0	2	0.0	40	406.0
Renewable	82	897.0	281	3,065.0	42	1,548.0	6	58.0	16	140.0	427	5,708.0
Biomass	3	31.4	4	36.5	0	0.0	0	0.0	0	0.0	7	67.9
Hydro	12	480.8	15	188.6	2	500.0	0	0.0	0	0.0	29	1,169.4
Methane	27	135.7	37	201.3		0.0	0	0.0	0	0.0	64	337.0
Solar	3	6.8	95	940.1	37	1,009.7	3	16.3	8	54.7	146	2,027.6
Wind	37	242.5	130	1,698.7	3	38.5	2	25.7	8	85.0	180	2,090.4
Wood	0	0.0	0	0.0	0	0.0	1	16.0	0	0.0	1	16.0
Grand Total	206	19,689.6	594	107,143.1	82	5,424.3	16	1,429.4	41	6,601.3	939	140,287.6

Pennsylvania – Future Capacity Mix

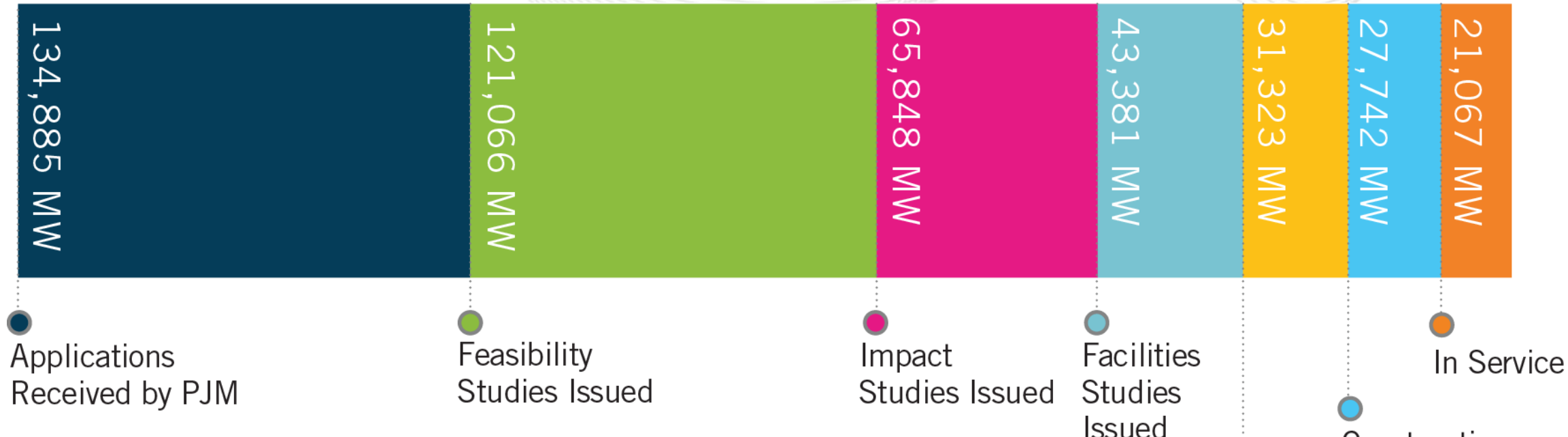
Based on known queued interconnection requests and deactivation notices through December 31, 2022, adjusted to reflect the probability of commercialization as indicated by historical trends specific to an interconnection request's state/zonal location and fuel type.





Pennsylvania – Progression History Interconnection Requests

Projects under construction, suspended, in service, or withdrawn (as of December 31, 2018)



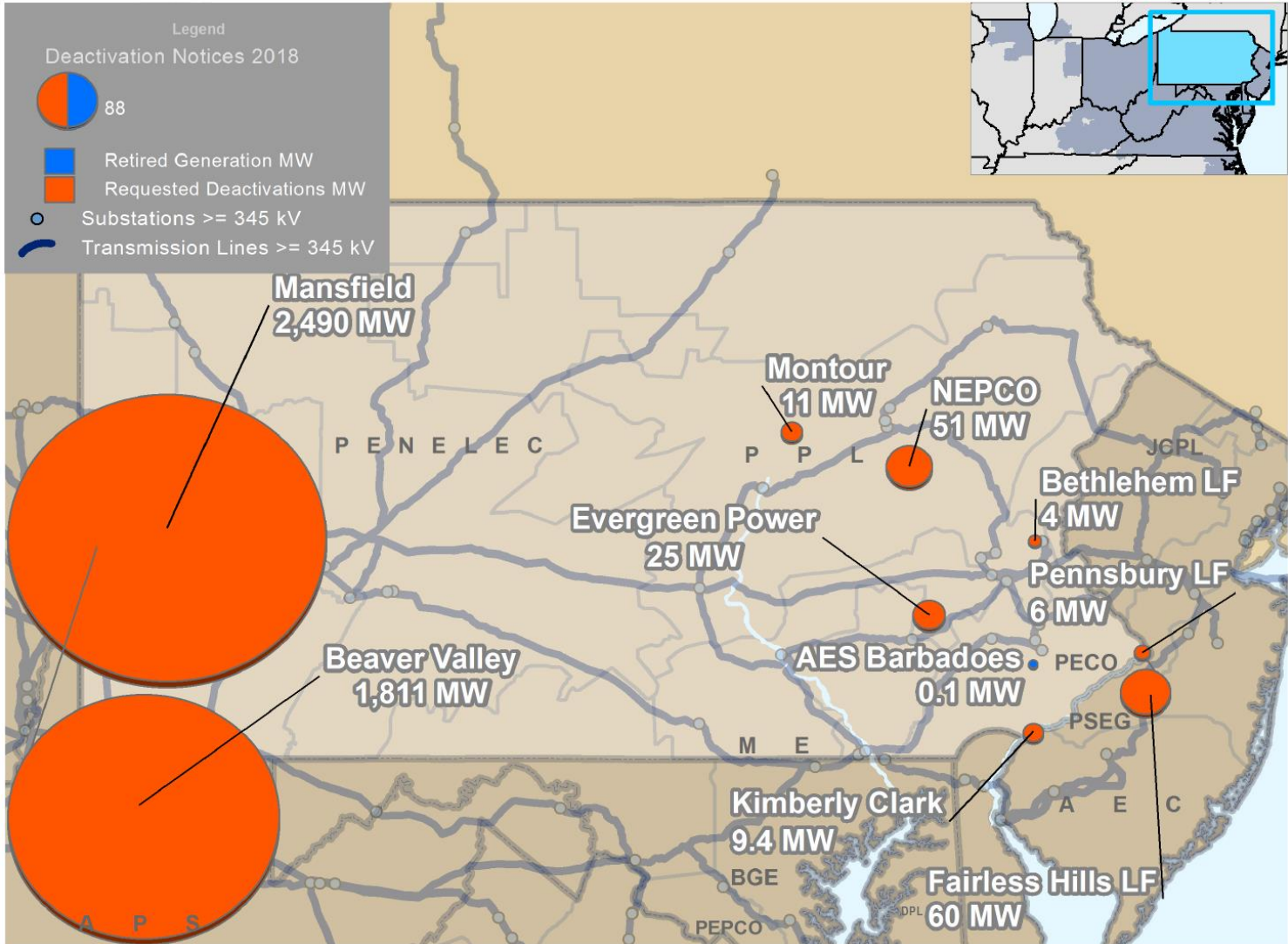
Projects withdrawn after final agreement

- 47 Interconnection Service Agreements – 4,899 MW { Nameplate Capacity, 6,401 MW }
- 41 Wholesale Market Participation Agreements – 186 MW { Nameplate Capacity, 247 MW }

Percentage of planned capacity and projects reached commercial operation

- 16 % requested capacity megawatt
- 25 % requested projects

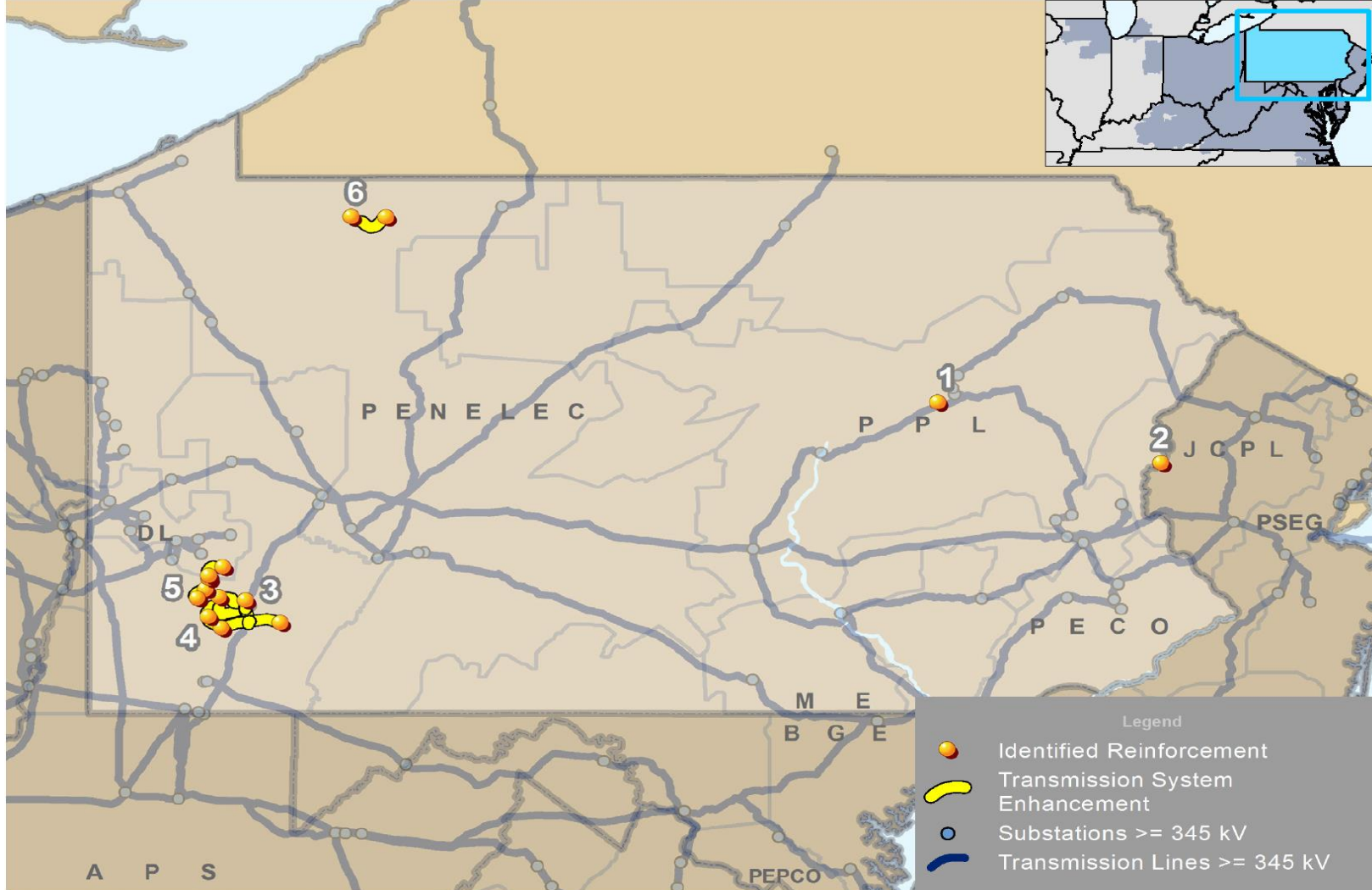
Pennsylvania – Actual Generation Deactivations and Deactivation Notifications Received in 2018



Unit	Capacity (MW)	TO Zone	Age (Years)	Projected/Actual Deactivation Date
Beaver Valley 1	909.0	DLCO	42	5/31/2021
Beaver Valley 2	902.0	DLCO	31	10/31/2021
Northeastern Power NEPCO	51.0	PPL	29	10/24/2018
Fairless Hills Unit A	30.0	PECO	22	6/1/2020
Fairless Hills Unit B	30.0	PECO	22	6/1/2020
Evergreen	25.0	METED	8	5/1/2018
Montour ATG	11.4	PPL	45	2/18/2019
Kimberly Clark	9.4	PECO	32	8/1/2019
Bethlehem	3.7	PPL	10	6/1/2020
Pennsbury 1	3.0	PECO	22	6/1/2020
Pennsbury 2	3.0	PECO	22	6/1/2020
Barbados Battery	0.1	PECO	10	7/29/2018
Mansfield 1	830	ATSI	42	2/5/2019
Mansfield 2	830	ATSI	41	2/5/2019
Mansfield 3	830	ATSI	38	6/1/2021

Planning

Transmission Infrastructure Analysis



Note: Baseline upgrades are those that resolve a system reliability criteria violation.



Pennsylvania - RTEP Baseline Projects

(Greater than \$5 million)

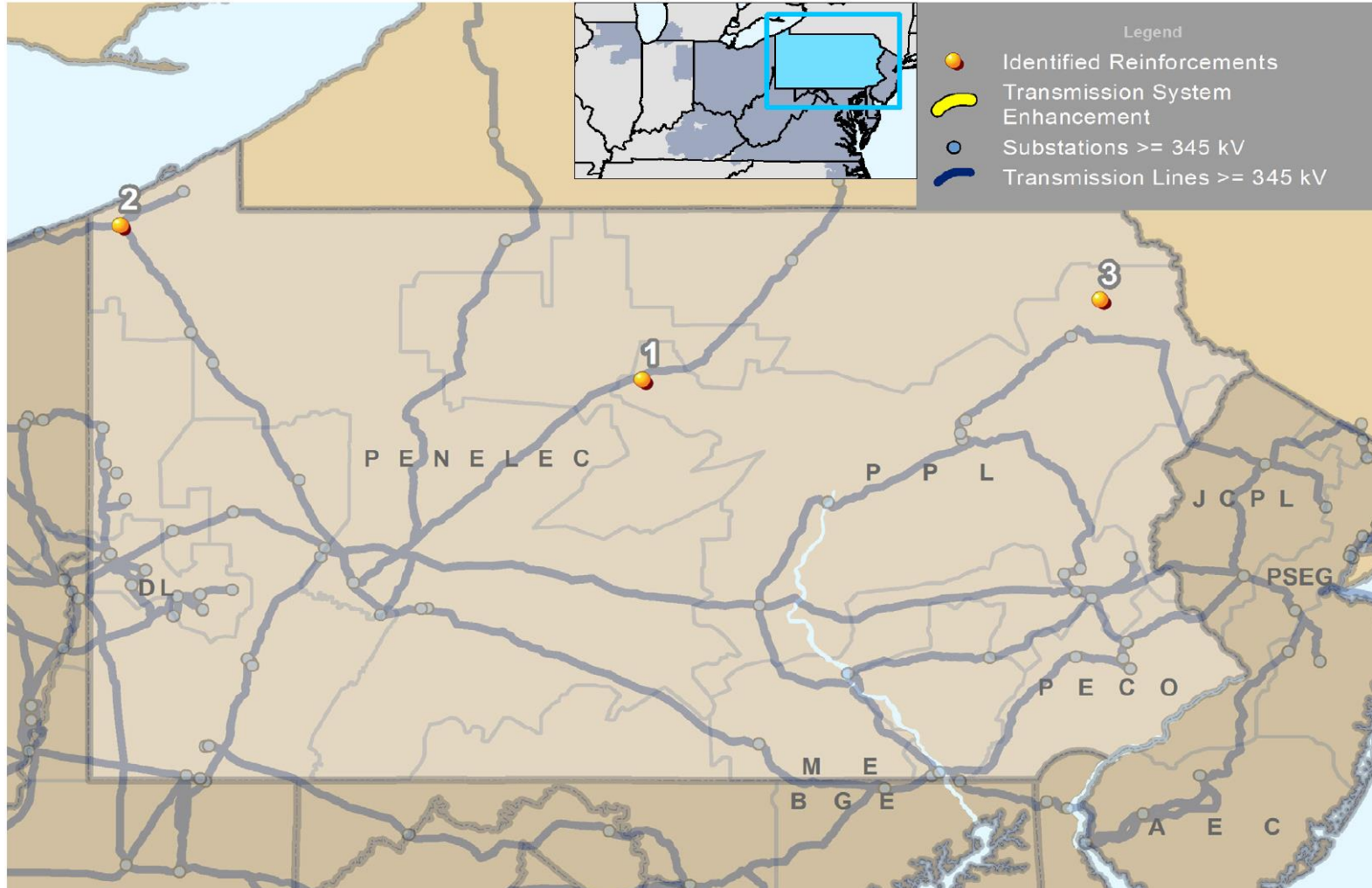
Map ID	Project	Sub ID	Description	Required In-Service Date	Project Cost (\$M)	TO Zone	2018 TEAC Review	Generator Deactivation	Short Circuit	TO Criteria Violation
1	b2838		Build a new 230/69 kV substation by tapping the Montour-Susquehanna 230 kV double circuits and Berwick-Hunlock and Berwick-Colombia 69 kV circuits	6/1/2017	\$57	PPL	1/24/2017			X
2	b2979		Replace Martins Creek 230 kV circuit breakers with 80 kA rating	6/1/2018	\$14.3	PPL	12/14/2017		X	
3	b3006		Replace four Yukon 500/138 kV transformers with three transformers with higher rating and reconfigure 500 kV bus	6/1/2021	\$55.56	APS	6/7/2018	X		
4	b3011	.1	Construct new Route 51 substation and connect 10 138 kV lines to new substation	6/1/2021	\$27.62	APS	6/7/2018	X		
		.2	Upgrade terminal equipment at Yukon to increase rating on Yukon-Charleroi No. 2 138 kV line (Yukon to Route 51 No. 4 138 kV line)	6/1/2021		APS	6/7/2018	X		
		.3	Upgrade terminal equipment at Yukon to increase rating on Yukon-Route 51 No. 1 138 kV line	6/1/2021		APS	6/7/2018	X		
		.4	Upgrade terminal equipment at Yukon to increase rating on Yukon-Route 51 No. 2 138 kV line	6/1/2021		APS	6/7/2018	X		
		.5	Upgrade terminal equipment at Yukon to increase rating on Yukon-Route 51 No. 3 138 kV line	6/1/2021		APS	6/7/2018	X		
		.6	Upgrade remote end relays for Yukon-Allenport-Iron Bridge 138 kV line	6/1/2021		APS	6/7/2018	X		
5	b3015	.1	Construct new Elrama 138 kV substation and connect seven 138 kV lines to new substation	6/1/2021	\$35.5	DLCO	6/7/2018	X		
		.2	Reconductor 4.8 miles of Elrama to Wilson 138 kV line.	6/1/2021		DLCO	6/7/2018	X		
		.3	Reconductor 3 miles of Dravosburg to West Mifflin 138 kV line	6/1/2021		DLCO	6/7/2018	X		
		.4	Run new conductor on existing tower to establish the new 10 miles Dravosburg-Elrama circuit	6/1/2021		DLCO	6/7/2018	X		
		.5	Reconductor DLCO portion of Elrama-Mitchell 138 kV line	6/1/2021		DLCO	6/7/2018	X		
		.6	Reconductor AP portion of Elrama-Mitchell 138 kV line	6/1/2021		APS	6/7/2018	X		
		.7	Reconductor 2 miles of Wilson-West Mifflin 138 kV line	6/1/2021		DLCO	6/7/2018	X		



Pennsylvania - RTEP Baseline Projects (cont.)

(Greater than \$5 million)

Map ID	Project	Sub ID	Description	Required In-Service Date	Project Cost (\$M)	TO Zone	2018 TEAC Review	Generator Deactivation	Short Circuit
6	b3017	.1	Rebuild 11.53 miles of Glade-Warren 230 kV line with new conductor and substation terminal upgrades.	6/1/2021	\$33.4	PENELEC	6/7/2018	X	
		.2	Glade 230 kV substation terminal upgrades. Replace bus conductor, wave trap, and relaying	6/1/2021		PENELEC	6/7/2018	X	
		.3	Warren 230 kV substation terminal upgrades; replace bus conductor, wave traps, and relaying	6/1/2021		PENELEC	6/7/2018	X	
	b3005		Reconductor 3.1 mile 556 ACSR portion of Cabot to Butler 138 kV with 556 ACSS and upgrade terminal equipment. 3.1 miles of line will be reconducted for this project. The total length of the line is 7.75 miles.	6/1/2021	\$5.88	APS	6/7/2018		X
	b3013		Reconductor Vasco Tap to Edgewater Tap 138 kV line. 4.4 miles. The new conductor will be 336 ACSS replacing the existing 336 ACSR conductor.	6/1/2021	\$5.88	APS	6/7/2018		X
	b3014		Replace the existing Shelocta 230/115 kV transformer and construct a 230 kV ring bus	6/1/2021	\$7.35	PENELEC	6/7/2018		X
	b3061		Reconductor the West Mifflin-Dravosburg (Z-73) and Dravosburg-Elrama (Z-75) 138 kV lines	6/1/2021	\$5.7	DL	11/8/2018		X
	b3064		Expand Elrama 138 kV substation to loop in the existing USS Steel Clariton - Piney Fork 138 kV line	6/1/2021	\$8.75	DL	11/8/2018		X
	b3067		Reconductor the Jackson-Maple 138 kV line (4.7 miles), replace line switches at Jackson 138 kV and replace the line traps and relays at Maple 138 kV	6/1/2022	\$7.86	ATSI	11/8/2018		X
	b3069		Reconductor the Westraver-Route 51 138 kV line (5.63 miles) and replace line switches at Westraver 138 kV	6/1/2022	\$7.5	APS	11/8/2018		X
	b3082		Construct four-breaker 115 kV ring bus at Geneva	6/1/2022	\$7	PENELEC	11/8/2018		X



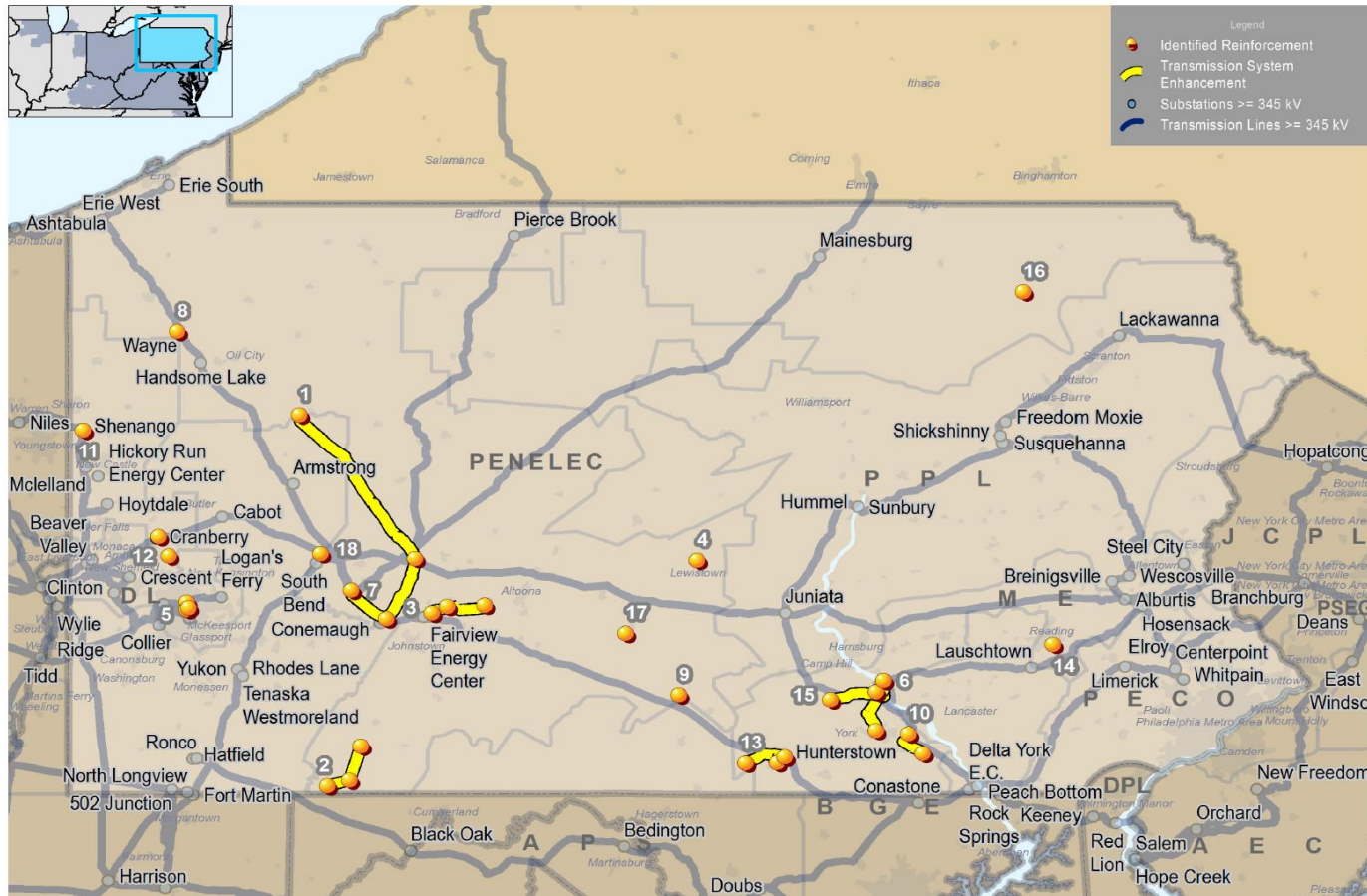
Note: Network upgrades are new or upgraded facilities required primarily to eliminate reliability criteria violations caused by proposed generation, merchant transmission or long term firm transmission service requests.



Pennsylvania – RTEP Network Projects

(Greater than \$5 million)

Map ID	Project	Description	Project Driver	Queue	Required In-Service Date	Project Cost (\$M)	TO Zone	2018 TEAC Review
1	n5740	Install one 345/230 kV transformer between the proposed AA1-111 switchyard and the NYSEG Q496 switchyard	Generation	AA1-111 (Natural Gas)	3/30/2021	\$12.57	PENELEC	9/13/2018
2	n5741	Install one 230 kV phase angle regulator on the Dunkirk-S. Ripley 230 kV line.	Merchant Transmission	Y3-092	3/30/2021	\$15	PENELEC	9/13/2018
3	n5900	Construct one new standard four-bay breaker-and-a-half 230 kV switchyard along the Lackawana-Paupack 230 kV line.	Generation	AC1-071 (Wind)	12/14/2018	\$14.92	PPL	9/13/2018



Note: Supplemental projects are transmission expansions or enhancements that are not required for compliance with the following PJM criteria: system reliability, operational performance or economic criteria, pursuant to a determination by the Office of the Interconnection and is not a state public policy project.



Pennsylvania – TO Supplemental Projects

(Greater than \$5 million)

Map ID	Project	Description	Projected In-Service Date	Project Cost (\$M)	TO Zone	2018 TEAC Review
1	s1672	Rebuild approximately 66 miles of Seward-Glory-Piney 115 kV line using double-circuit 230 kV construction.	12/1/2023	\$200	PENELEC	5/25/2018
2	s1770	Rebuild/reconductor approximately 14.8 miles of wood pole construction Penn Mar-High Point-Rockwood 115 kV line	6/1/2020	\$29.3	PENELEC	10/29/2018
		Adjust current transformer ratios and replace substation conductor and breaker disconnect on the line.	6/1/2020		PENELEC	10/29/2018
		Adjust relaying and replace current transformers, substation conductor, line drops, circuit breaker and disconnect switches on Penn Mar-High Point-Rockwood 115 kV line	6/1/2020		PENELEC	10/29/2018
3	s1775	Construct a five-breaker 115 kV ring bus at Summit	12/31/2020	\$26.3	PENELEC	10/29/2018
		Construct a 46 kV breaker-and-a-half station with eight breakers	12/31/2020		PENELEC	10/29/2018
		Replace the Summit No. 1 and No. 2 115/46 kV transformers with 45/60/75 MVA transformers of same voltage	12/31/2020		PENELEC	10/29/2018
		Adjust relay settings at remote ends of Summit	12/31/2020		PENELEC	10/29/2018
		Replace current transformers, substation conductor, circuit breaker and transformer switches at Eldorado 46 kV substation.	12/31/2020		PENELEC	10/29/2018
		Replace line relaying, substation transformer, arresters, line and bus transformer switches and circuit breaker at Jackson Road 46 kV substation	12/31/2020		PENELEC	10/29/2018



Pennsylvania – TO Supplemental Projects (cont.)

(Greater than \$5 million)

Map ID	Project	Description	Projected In-Service Date	Project Cost (\$M)	TO Zone	2018 TEAC Review
4	s1773	Construct a new five-breaker 230 kV ring bus at Yeagertown	12/31/2020	\$20.4	PENELEC	10/29/2018
		Construct a new five-breaker 46 kV ring bus at Yeagertown	12/31/2020		PENELEC	10/29/2018
		Loop Lewistown-Logan line into the Yeagertown 46 kV ring bus	12/31/2020		PENELEC	10/29/2018
		Tap the existing Yeagertown-Logan line and connect to the new Yeagertown 46 kV ring bus	12/31/2020		PENELEC	10/29/2018
		Install a new Yeagertown 230/46 kV transformer	12/31/2020		PENELEC	10/29/2018
		Install a 46 kV bus tie breaker between the existing and the new ring bus to be operated as normally open	12/31/2020		PENELEC	10/29/2018
		Operate the Yeagertown 46-34.5 kV transformer high-side circuit breaker as normally open	12/31/2020		PENELEC	10/29/2018
5	s1588	Establish a new 138-23 kV substation, Panther Hollow, using the existing Arsenal-Oakland 138 kV circuit as a source	5/31/2020	\$16.8	DLCO	3/27/2018
6	s1640	At Middletown Junction, install 11 230 kV circuit breakers to complete the double bus configuration including replacement of the No. 2 and No. 5 230/115 kV transformers and remove the No. 1 230/115 kV transformer	6/1/2023	\$16.3	METED	3/23/2018
		Install 11 230 kV circuit breakers to complete the double bus configuration	6/1/2023		METED	3/23/2018
		Replace Middletown Junction No. 2 and No. 5 230/115 kV transformers with 180/240/300 MVA units	6/1/2023		METED	3/23/2018
7	s1774	Expand 230 kV ring bus to a six-breaker ring bus at Seward 230 kV substation	12/31/2020	\$15.7	PENELEC	10/29/2018
		Relocate the Homer City-Seward 230 kV and Johnstown-Seward 230 kV line terminals	12/31/2020		PENELEC	10/29/2018
		Replace the Seward No. 9 230/115 kV with a 230/115 kV 180/240/300 MVA transformer	12/31/2020		PENELEC	10/29/2018
		Install a 115 kV reactor on the low side of the Seward No. 11 230/115 kV transformer	12/31/2020		PENELEC	10/29/2018



Pennsylvania – TO Supplemental Projects (cont.)

(Greater than \$5 million)

Map ID	Project	Description	Projected In-Service Date	Project Cost (\$M)	TO Zone	2018 TEAC Review
8	s1646	Install a second 345/115 kV 168/224 MVA transformer. Convert the 115 kV yard to a four-breaker ring bus	6/1/2019	\$12.5	PENELEC	3/23/2018
		Install a second Wayne 345/115 kV 168/224 MVA transformer	6/1/2019		PENELEC	3/23/2018
		Convert the Wayne 115 kV yard to a four-breaker ring bus	6/1/2019		PENELEC	3/23/2018
9	s1643	Replace the existing Roxbury 138/115 kV transformer with a 224 MVA unit; Convert Roxbury 115 kV substation into a four-breaker ring bus	12/31/2019	\$10.1	PENELEC	3/23/2018
10	s1763	Replace line relaying, line drops, capacitor voltage transformer, line trap, line tuner, arresters, breaker, and breaker disconnect switches on Windsor-Yorkana 115 kV line	6/1/2020	\$10	METED	10/29/2018
		Replace line relaying, capacitor voltage transformer, line trap, line tuner, arresters, breaker, and breaker disconnect switch on Windsor-Yorkana 115 kV line	6/1/2020		METED	10/29/2018
11	s1712	Build new Shenango 69 kV switching station	12/31/2021	\$16.3	ATSI	9/28/2018
12	s1713	Build new Pine-Cranberry No. 3 138 kV line	5/23/2021	\$27	ATSI	9/28/2018
13	s1726	Expand the existing South Reading 69 kV yard to a breaker-and-a-half configuration	12/31/2020	\$19.4	METED	8/24/2018
14	s1727	Construct a five breaker 115 kV ring bus at Cly. Upgrade of the Cly substation and loop the existing Middletown Jct-Round Top and Middletown Jct-Smith Street 115 kV line into the ring bus.	12/31/2020	\$12.2	METED	8/24/2018
15	s1729	Expand the existing North Meshoppen 115 kV yard to a breaker-and-a-half configuration	12/31/2020	\$17.6	PENELEC	8/24/2018
16	s1733	Reconductor/Rebuild the Hill Valley-Mount Union 46 kV Line and upgrade terminal equipment	12/31/2020	\$37.2	PENELEC	8/24/2018



Pennsylvania – TO Supplemental Projects (cont.)

(Greater than \$5 million)

Map ID	Project	Description	Projected In-Service Date	Project Cost (\$M)	TO Zone	2018 TEAC Review
17	s1736	Replace the existing Keystone 351 MVA 500/230 kV transformer and install a 500 kV high-side breaker	12/31/2019	\$21.7	PENELEC	8/24/2018
18	s1725	Construct a five breaker 115 kV ring bus at Orrtanna substation	12/31/2021	\$40.1	METED	8/24/2018
		Loop the Hunterstown-Lincoln (963) 115 kV line ~9 miles into Orrtanna substation	12/31/2021		METED	8/24/2018
	s1642	Install a 115 kV breaker on the high side of each Jackson Road transformer and replace 115/46 kV transformers	1/29/2019	\$5.8	PENELEC	3/23/2018
	s1644	Expand the existing Hilltop 115 kV substation to a six-breaker ring bus.	7/31/2019	\$9.3	PENELEC	3/23/2018
	s1645	Expand the existing Cambria Slope 115 kV substation to a six-breaker ring bus.	6/1/2019	\$8.7	PENELEC	3/23/2018
	s1648	Construct 0.6 mile double circuit 66kV transmission line serving Looms 69/13.8 kV new substation with two-transformer (Type II) and six overhead feeders.	9/30/2019	\$9	UGI	3/23/2018
	s1717	Expand 69 kV Bus at Chippewa substation	12/31/2021	\$9.1	ATSI	8/31/2018
	s1730	Convert the Blairsville East 115 kV substation into a six-breaker ring bus	12/31/2019	\$9	PENELEC	7/20/2018
	s1732	Reconfigure Raystown substation and install second 230/46 kV transformer	6/1/2019	\$8	PENELEC	7/20/2018
	s1735	Replace the existing Forest 150 MVA 230/115 kV transformer	6/1/2020	\$9.1	PENELEC	7/20/2018
	s1769	Dubois-Harvey Run-Whetstone 115 kV Line, Rehab approximately 14.25 miles of wood pole construction	12/31/2021	\$5.3	PENELEC	10/29/2018
	s1780	Construct a new 46 kV line between Westfall and 20 th Street (~0.82 miles) and reconductor the 20 th Street-Collinsville 46 kV line (~1.46 miles)	6/1/2020	\$5.3	PENELEC	10/29/2018



Legend

Merchant Projects

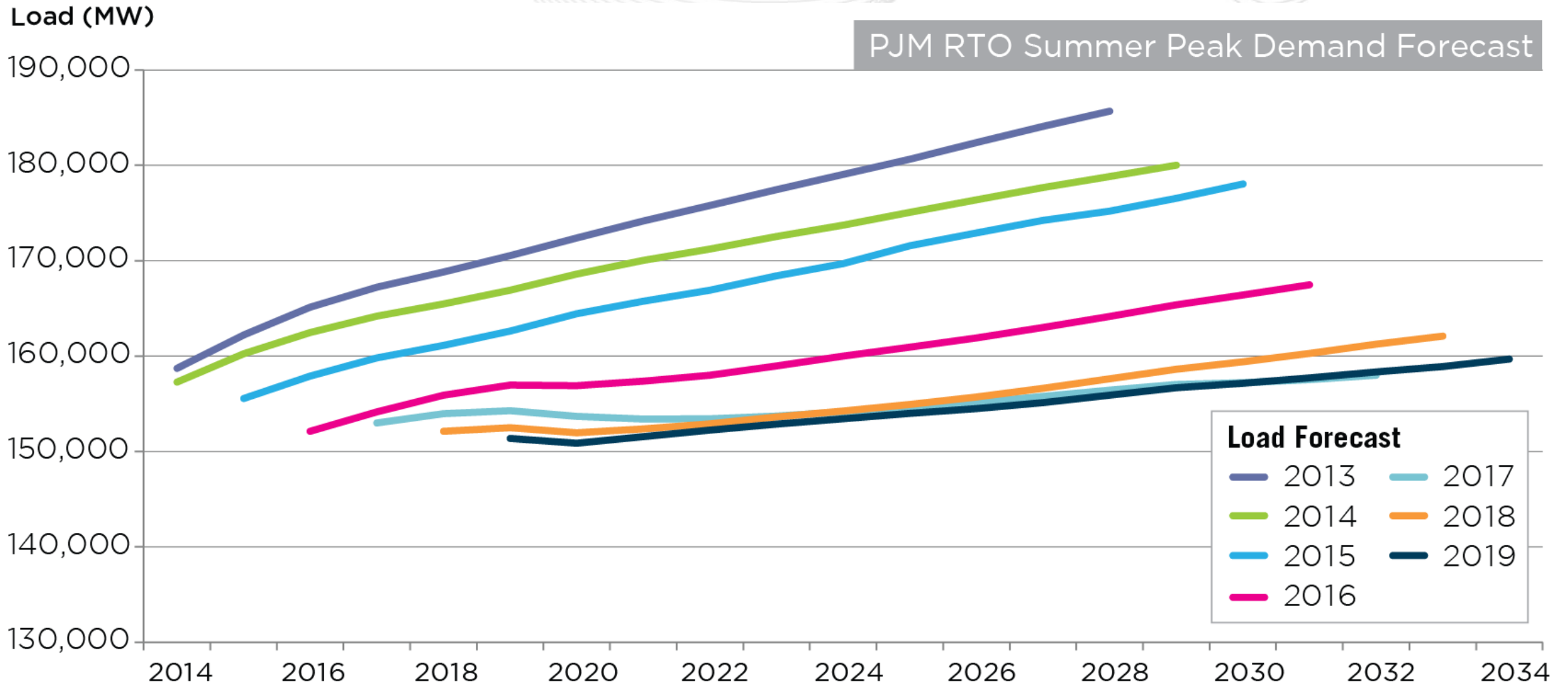
- Under Study
- Substations >= 345 kV
- Transmission Lines >= 345 kV

Queue	Project Name	Maximum Output (MW)	Status	Projected In-Service Date	TO Zone
Y3-092	Erie West 345 kV	1,000	Active	3/31/2023	PENELEC
AB2-019	Erie West 345 kV	28	Active	12/31/2021	PENELEC
AE2-009	Nottingham-Peach Bottom Tap 230 kV	11	Active	6/1/2020	PECO

Planning

Load Forecast

PJM RTO Summer Peak Demand Forecast





Pennsylvania – 2019 Load Forecast Report

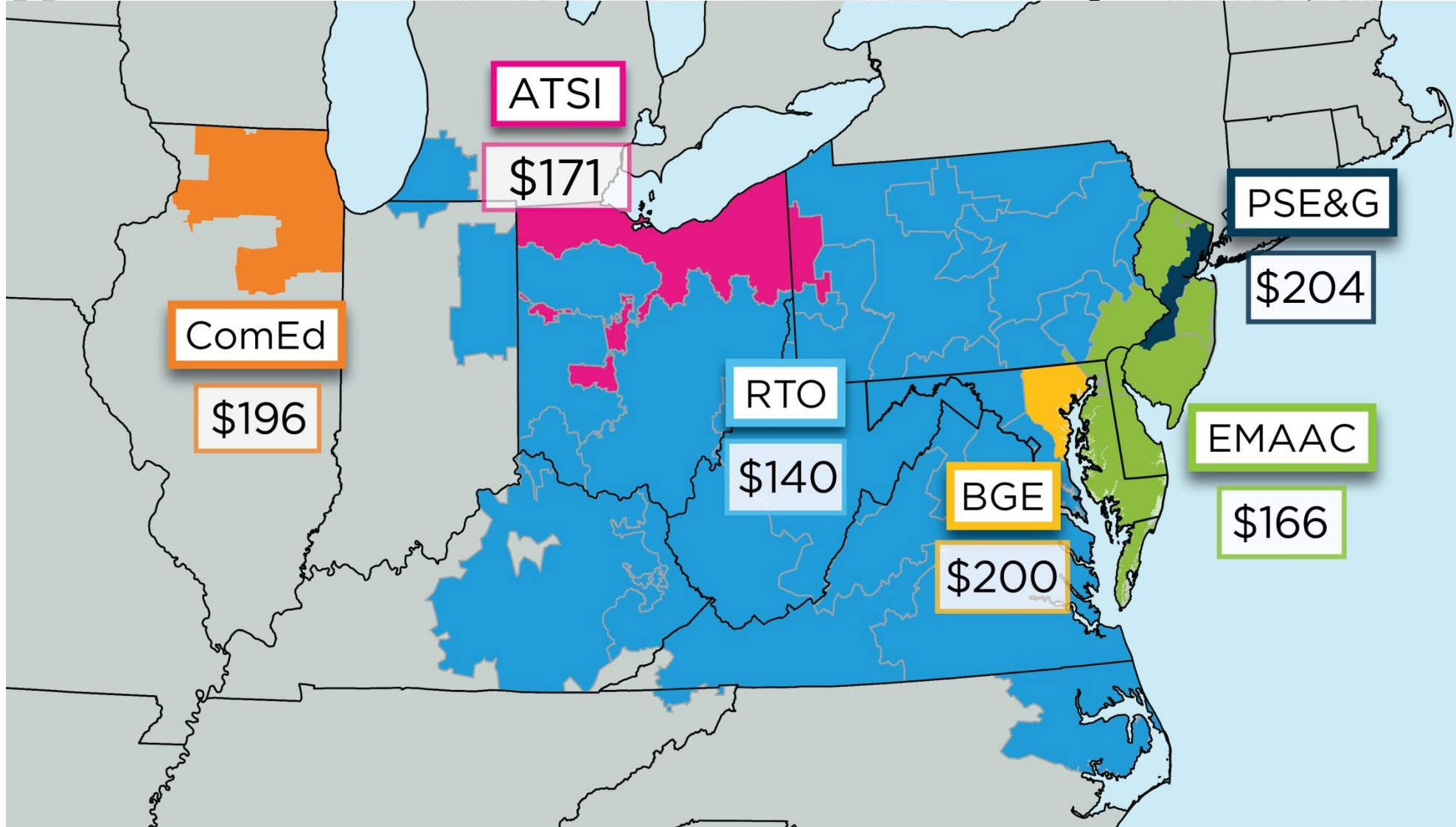
Transmission Owner	Summer Peak (MW)			Winter Peak (MW)		
	2019	2029	Growth Rate (%)	2018/19	2028/29	Growth Rate (%)
Allegheny Power *	3,877	4,143	0.7%	3,653	3,943	0.8%
American Transmission Systems, Inc. *	951	970	0.2%	899	910	0.1%
Duquesne Light Company	2,862	2,887	0.1%	2,144	2,150	0.0%
Metropolitan Edison Company	2,986	3,157	0.6%	2,615	2,726	0.4%
PECO Energy Company	8,711	9,082	0.4%	6,753	6,936	0.3%
Pennsylvania Electric Company	2,897	2,908	0.0%	2,866	2,863	0.0%
PPL Electric Utilities Corporation	7,148	7,347	0.3%	7,259	7,371	0.2%
UGI	189	188	-0.1%	193	189	-0.2%
PJM RTO	151,358	156,689	0.3%	131,082	136,178	0.4%

* 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.

Markets

Capacity Market Results

2021/22 Base Residual Auction Clearing Prices (\$/MW-Day)





Pennsylvania – Cleared Resources in 2021/22 Auction

(May 23, 2018)

	Cleared MW (Unforced Capacity)	Change from 2020/21 Auction
Generation	41,535	(853)
Demand Response	2,531	280
Energy Efficiency	281	48
Total	44,348	(525)

RTO Clearing Prices
\$140

EMAAC Clearing Prices
\$166

ATSI Clearing Prices
\$171

NOTE: Demand Response and Energy Efficiency are reported to PJM by Transmission Zone. The numbers above reflect the state's pro-rata share of cross-state zones for illustrative purposes.



PJM – 2021/2022 Cleared MW (UCAP) by Resource Type

	Annual	Summer	Winter	Total
Generation	149,616 MW	54 MW	716 MW	150,385 MW
DR	10,674 MW	452 MW	- MW	11,126 MW
EE	2,623 MW	209 MW	- MW	2,832 MW
Total	162,912 MW	716 MW	716 MW	164,343 MW



Pennsylvania – Offered and Cleared Resources in 2021/22 Auction

(May 23, 2018)

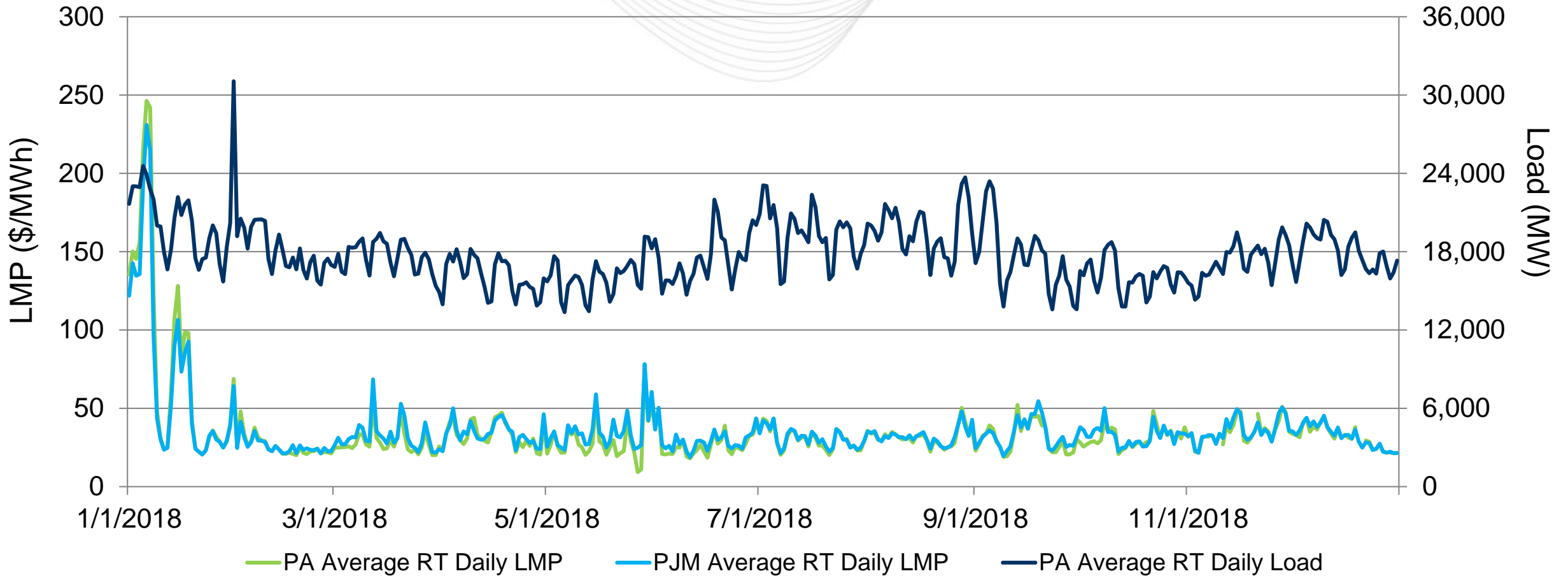
		Unforced Capacity
Generation	Offered MW	47,067
	Cleared MW	41,535
Demand Response	Offered MW	2,637
	Cleared MW	2,531
Energy Efficiency	Offered MW	306
	Cleared MW	281
Total Offered MW		50,010
Total Cleared MW		44,348

NOTE: Demand Response and Energy Efficiency are reported to PJM by Transmission Zone. The numbers above reflect the state's pro-rata share of cross-state zones for illustrative purposes.

Markets

Market Analysis

Pennsylvania's average daily LMPs generally aligned with the PJM average daily LMP

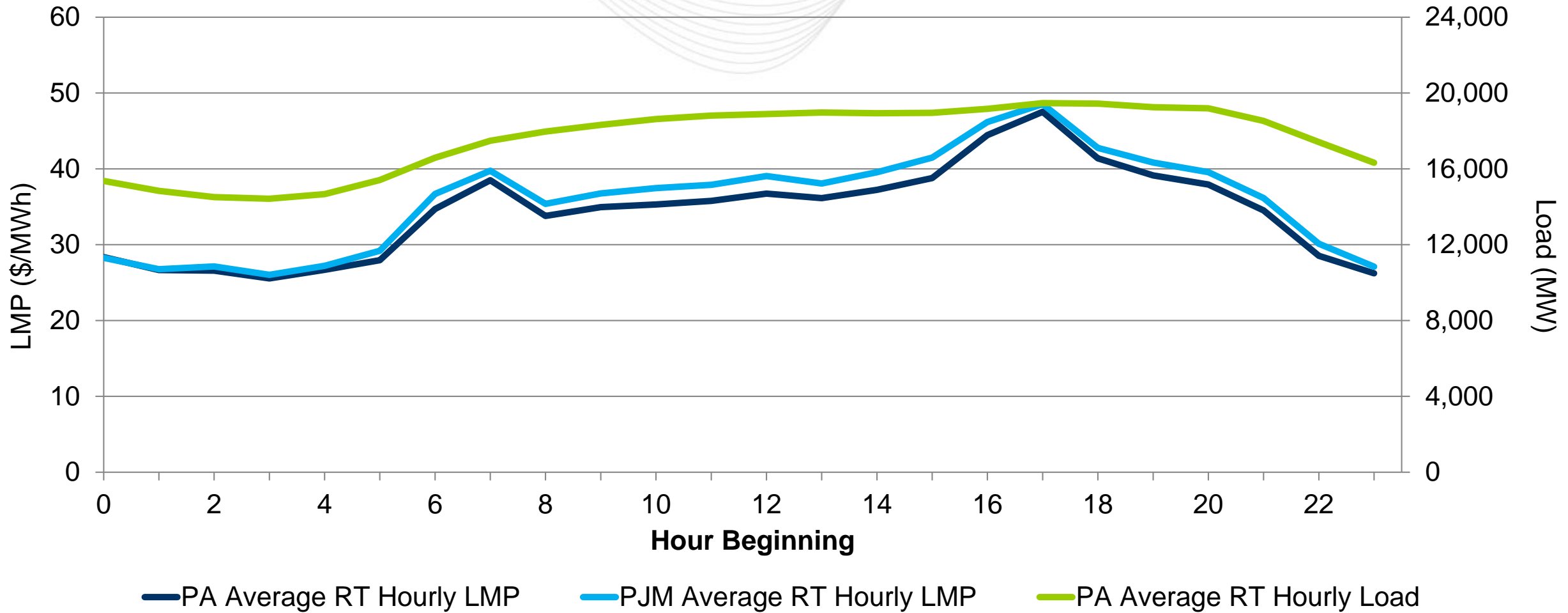


Note: The price spike in January reflects the Cold Snap that lasted from 12/28/17 to 1/7/2018.

Pennsylvania – Average Hourly LMP and Load

(January 1, 2018 – December 31, 2018)

Pennsylvania's average hourly LMPs were generally lower than the PJM average

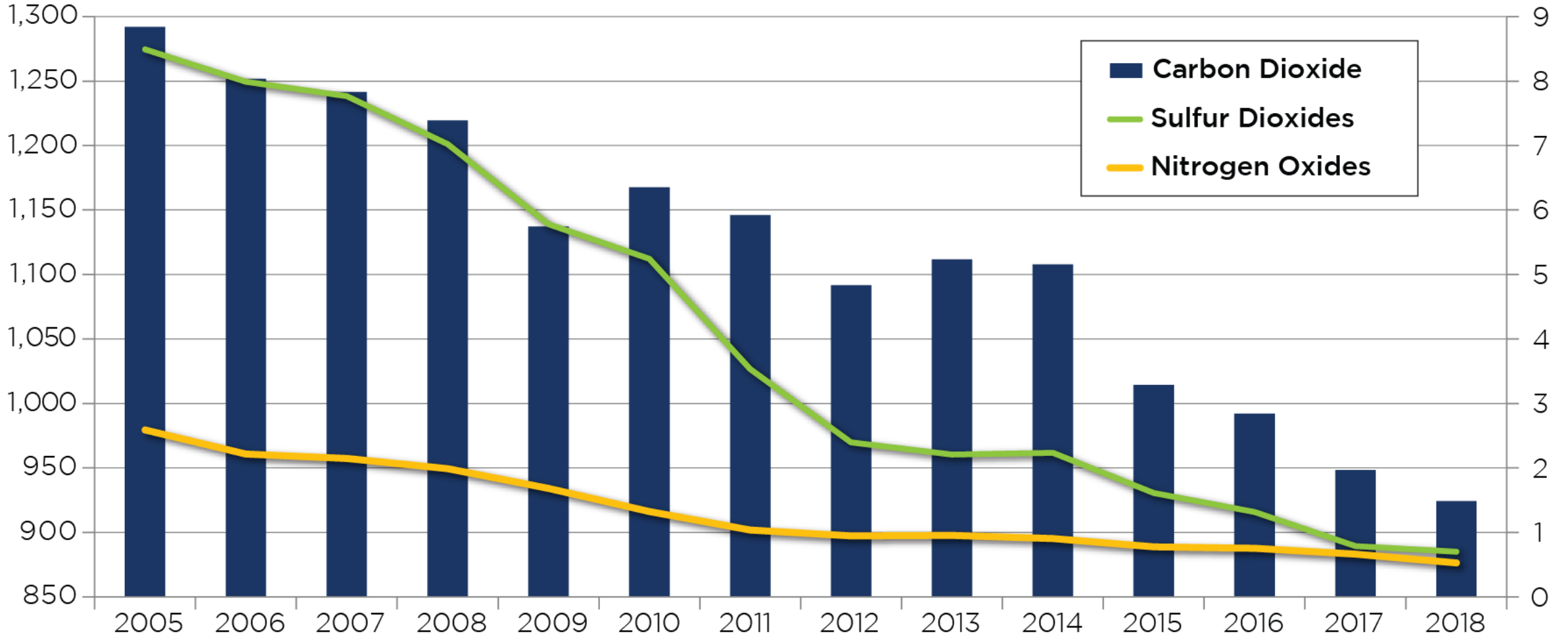


Operations Emissions Data

2005-2018 PJM Average Emissions

CO₂
lbs/MWh

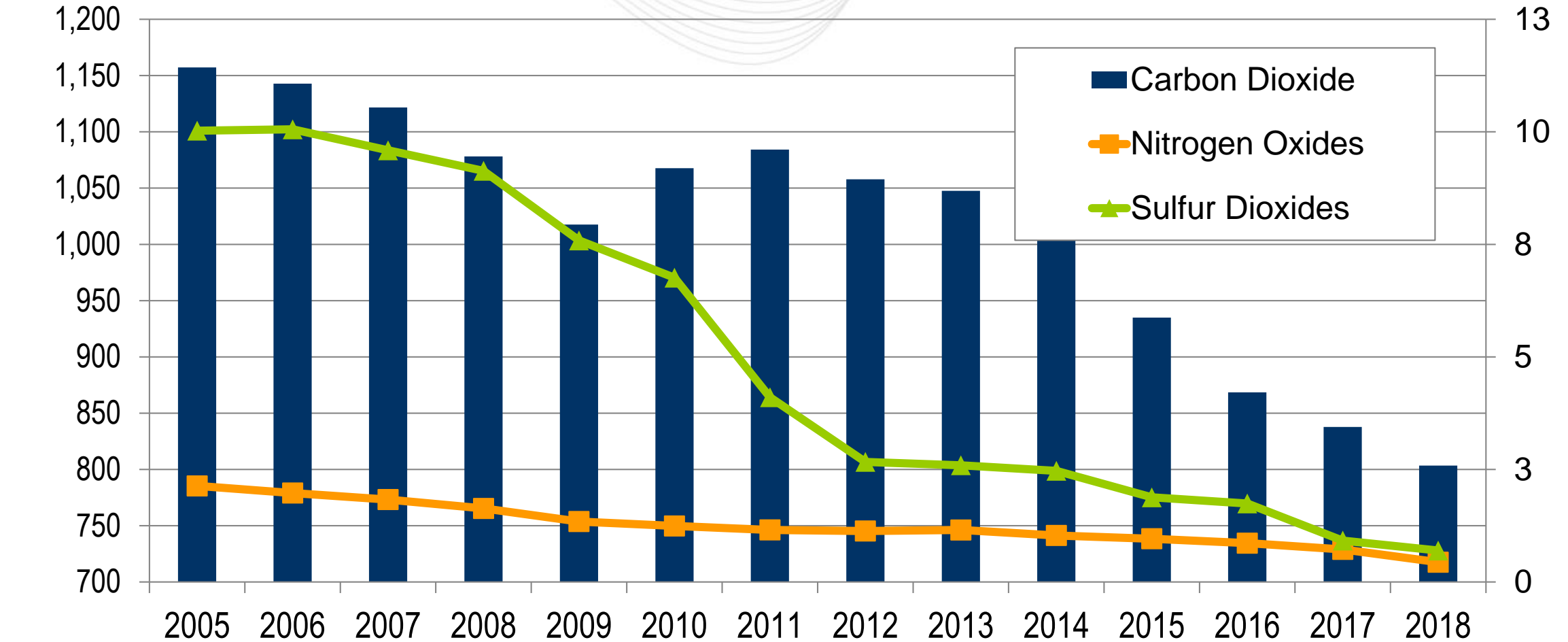
SO₂ and NO_x
lbs/MWh



CO₂
(lbs/MWh)

Pennsylvania Average Emissions (lbs/MWh)

SO₂ and No_x
(lbs/MWh)



Please note that PJM has historically used \$5 million as the threshold for listing projects in the RTEP report. Beginning in 2018, it was decided to increase this cutoff to \$10 million. All RTEP projects with costs totaling at least \$5 million are still included in this state report.

For a complete list of all RTEP projects, including those below the RTEP threshold of \$10 million, please visit the “RTEP Upgrades & Status – Transmission Construction Status” page on [pjm.com](https://www.pjm.com).

<https://www.pjm.com/planning/rtep-upgrades-status/construct-status.aspx>