



2022 Pennsylvania State Infrastructure Report

(January 1, 2022 – December 31, 2022)

May 2023

1. Planning

- Generation Portfolio Analysis
- Transmission Analysis
- Load Forecast

2. Markets

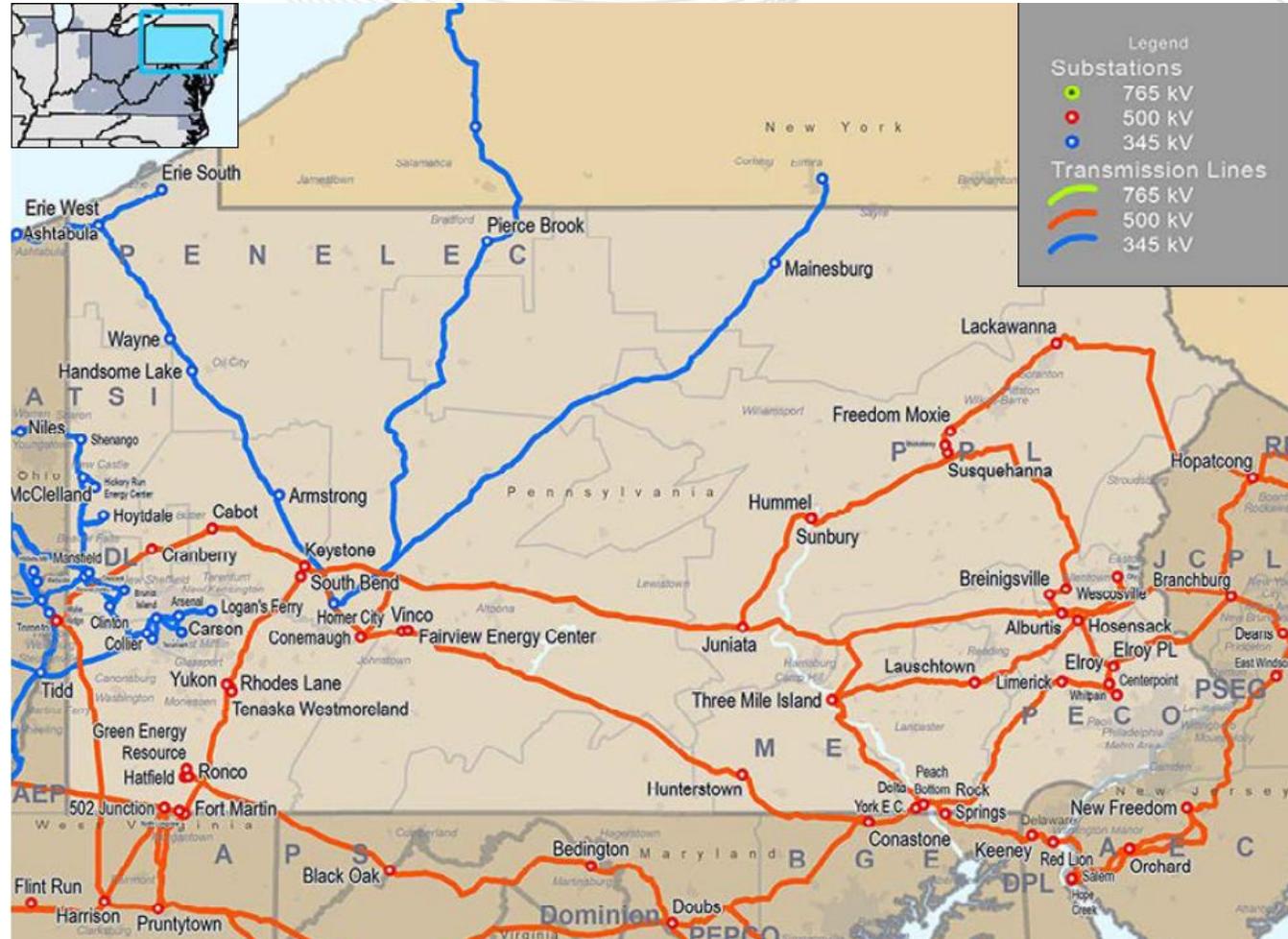
- Capacity Market Results
- Market Analysis
- Net Energy Import/Export Trend

3. Operations

- Generator Production
- Emissions Data

- **Existing Capacity:** Natural gas represents approximately 49.2 percent of the total installed capacity in the Pennsylvania service territory while coal represents approximately 20.1 percent and nuclear 19.3 percent. In PJM natural gas and coal are 46.6 and 24.0 percent of total installed capacity, while nuclear represents 17.7 percent.
- **Interconnection Requests:** Solar represents 68.3 percent of new interconnection requests in Pennsylvania, while storage represents approximately 24.2 percent of new requests.
- **Deactivations:** 832 MW of generation in Pennsylvania deactivated in 2022.
- **RTEP 2022:** Pennsylvania's 2022 RTEP project total represents approximately \$664.35 million in investment. A portion of the projects associated with New Jersey's State Agreement Approach (SAA) are located in Pennsylvania and have an estimated cost total of \$114.11 million. SAA-affiliated projects are cost allocated to New Jersey ratepayers and are not included in Pennsylvania's 2022 RTEP project cost totals.

- **Load Forecast:** Pennsylvania's summer peak load growth is projected to range between -0.3 and 0.8 percent annually over the next ten years, depending on the service territory. The overall PJM RTO projected summer load growth rate is 0.8 percent.
- **2023/24 Capacity Market:** Pennsylvania's service territory cleared at the RTO price of \$34.13/MW-day and the MAAC price of \$49.49/MW-day for the 2023/2024 Base Residual Auction.
- **2024/25 Capacity Market:** Pennsylvania's service territory cleared at the RTO price of \$28.92/MW-day, the MAAC price of \$49.49/MW-day, and the Eastern MAAC price of \$54.95/MW-day for the 2024/2025 Base Residual Auction.
- **1/1/22 – 12/31/22 Market Performance:** Pennsylvania's average hourly LMPs were generally lower than the PJM average hourly LMP.
- **Emissions:** Pennsylvania's average CO₂ emissions decreased in 2022 compared to 2021 levels

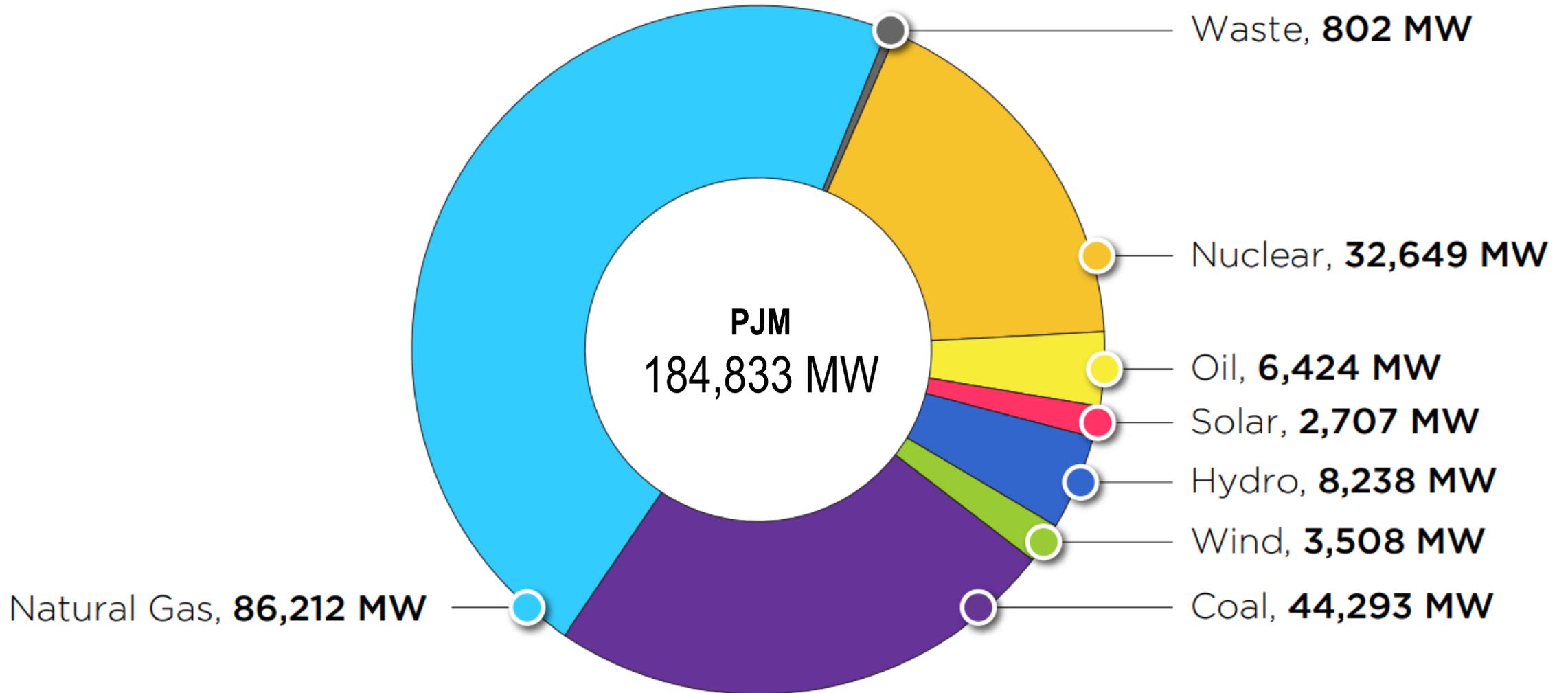


Planning

Generation Portfolio Analysis

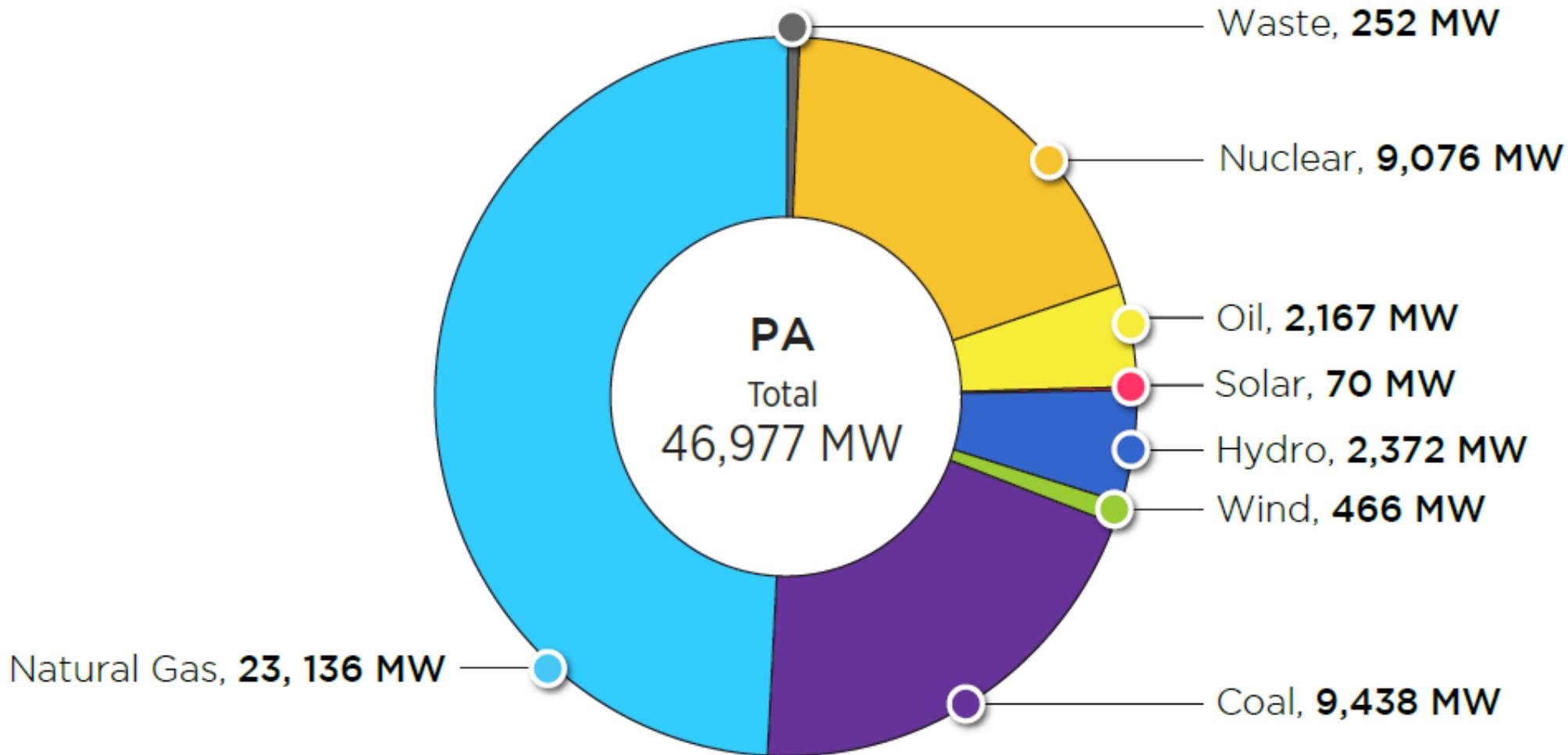
PJM – Existing Installed Capacity

(CIRs – as of Dec. 31, 2022)



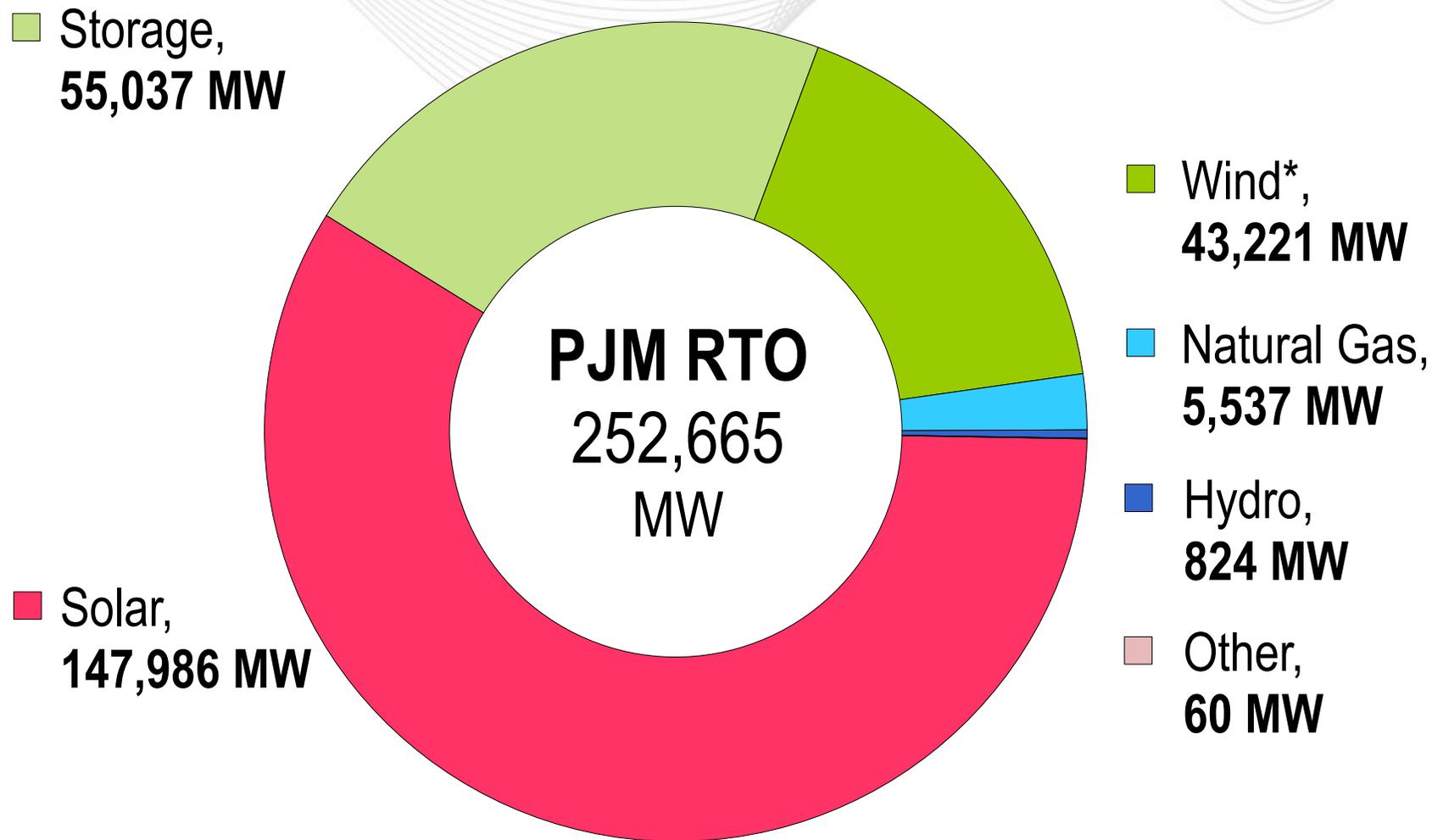
Pennsylvania – Existing Installed Capacity

(CIRs – as of Dec. 31, 2022)



PJM Queued Capacity (Nameplate) by Fuel Type

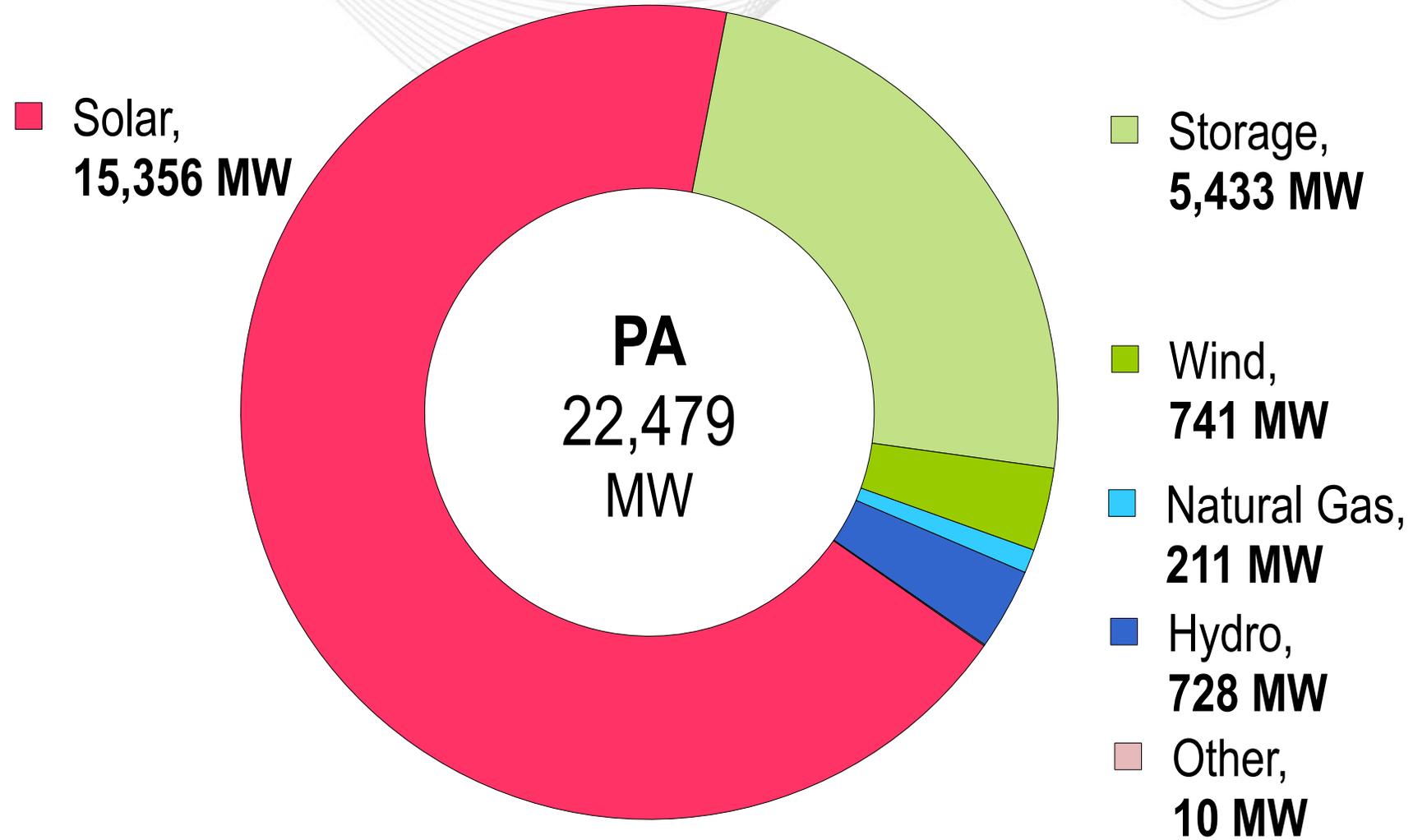
("Active" in the PJM Queue as of April 1, 2023)



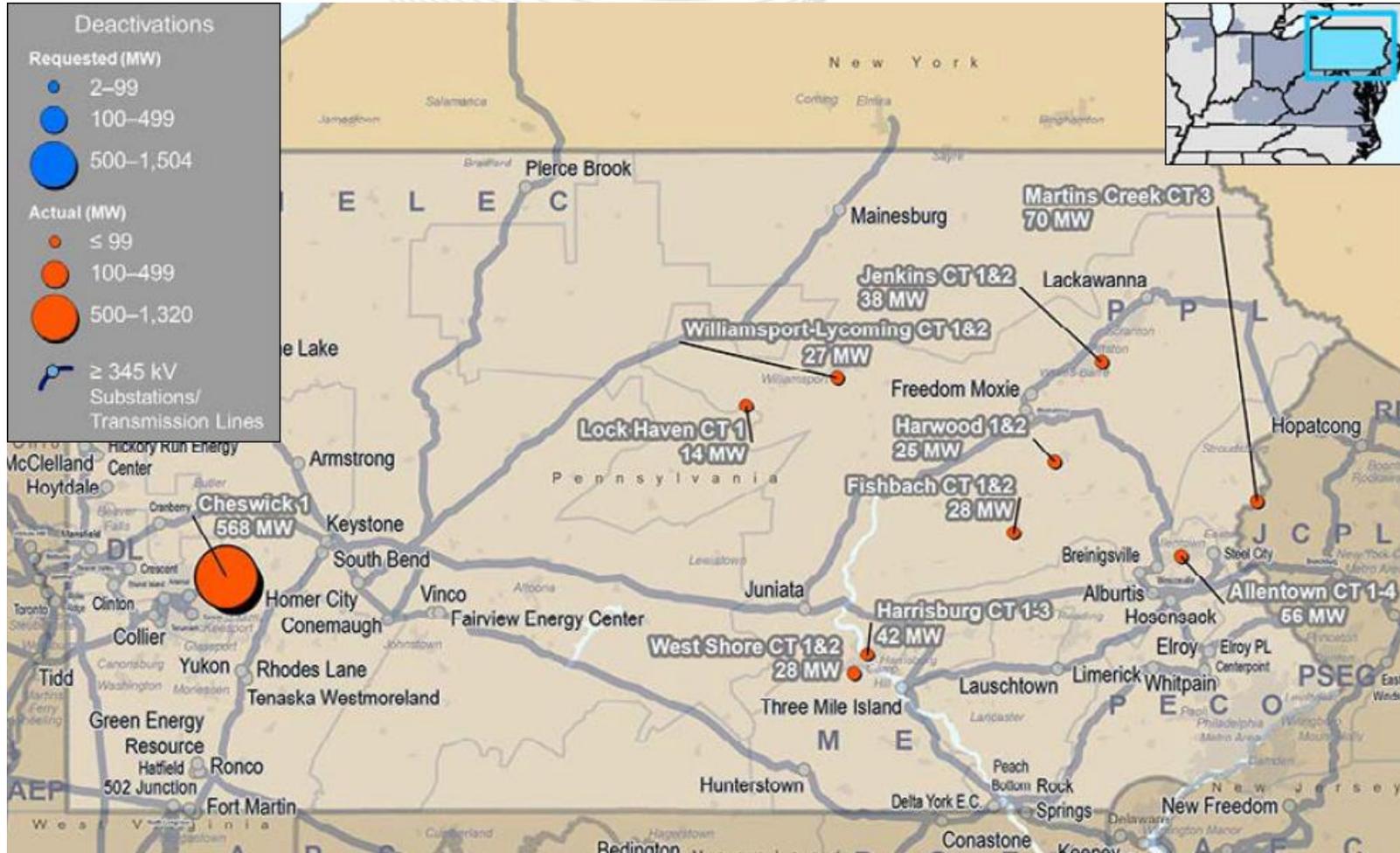
*Wind includes both onshore and offshore wind

Pennsylvania Queued Capacity (Nameplate) by Fuel Type

("Active" in the PJM Queue as of April 1, 2023)



Pennsylvania – 2022 Generator Deactivations





Pennsylvania – 2022 Generator Deactivations

Unit	TO Zone	Fuel Type	Request Received to Deactivate	Actual or Projected Deactivation Date	Age (Years)	Capacity (MW)
Williamsport-Lycoming CT 2	PPL	Oil	9/30/2021	4/1/2022	54	13.4
Williamsport-Lycoming CT 1						13.2
West Shore CT 2					52	14.0
West Shore CT 1						14.0
Martins Creek CT 3				6/1/2022	50	18.0
Lock Haven CT 1				6/1/2022	52	14.0
Jenkins CT 2						13.8
Jenkins CT 1						13.8
Harrisburg CT 3	PPL	Oil	9/30/2021			6/1/2022
Harrisburg CT 2				13.9		
Harrisburg CT 1				52	13.4	
Fishbach CT 2					14.0	
Fishbach CT 1				6/1/2022	52	14.0
Allentown CT 4				54	14.0	
Allentown CT 3					14.0	
Allentown CT 2					14.0	
Allentown CT 1	PPL	14.0				
Cheswick 1	DLCO	Coal	7/14/2021	3/31/2022	51	567.5
Harwood 2	PPL	Oil	4/27/2021	5/31/2022	53	12.3
Harwood 1			10/29/2020			12.9

Planning

Transmission Infrastructure Analysis

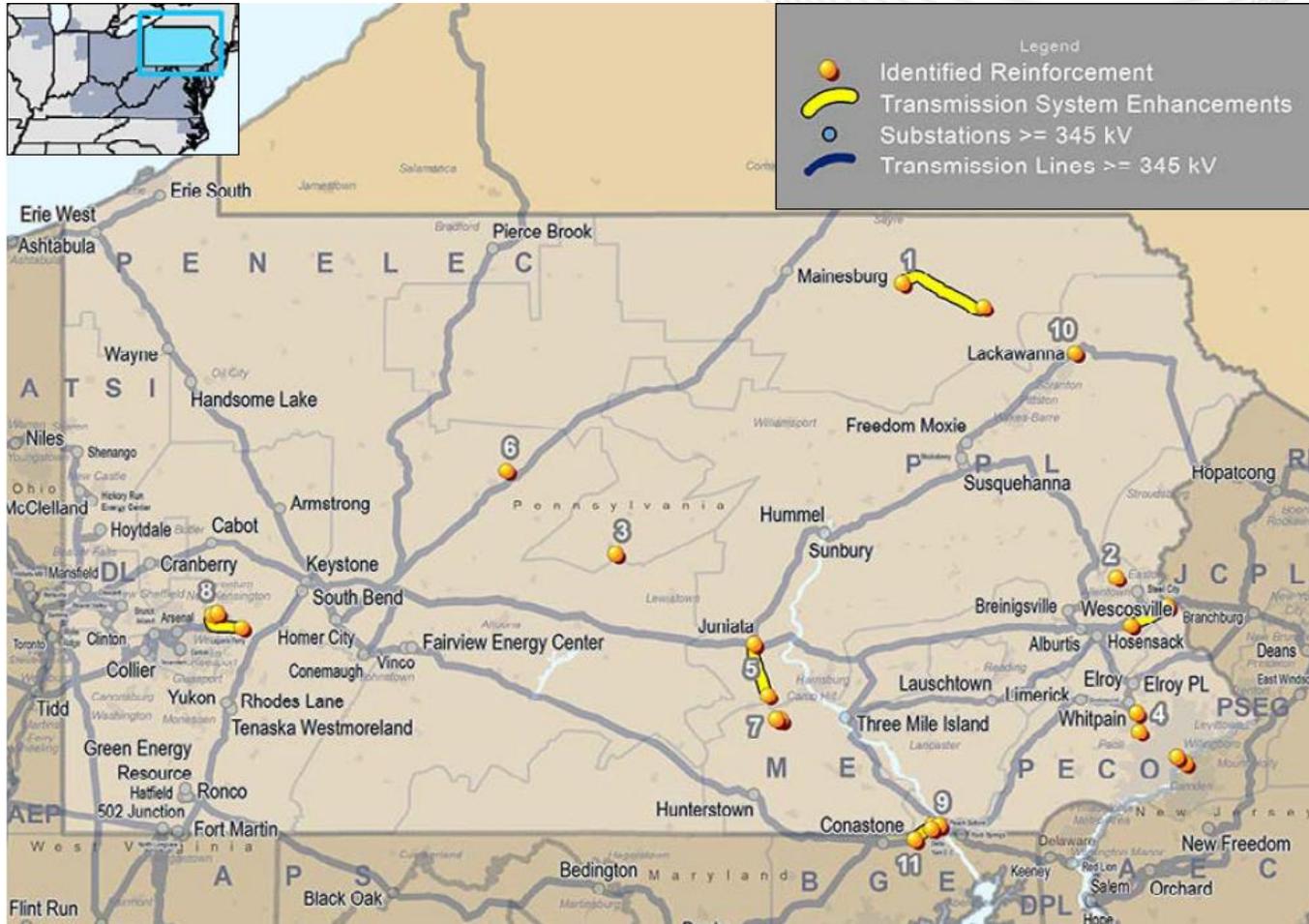


For reporting purposes, the 2022 state infrastructure reports provide maps displaying all baseline, network, and supplemental projects for the respective state. The reports also include aggregated project cost tables of these projects by Transmission Owner zone. For a detailed list of each project shown on a state's project map, please see that state's section in the **2022 Annual RTEP Report** on pjm.com:

<https://www.pjm.com/-/media/library/reports-notices/2022-rtep/2022-rtep-report.ashx>

The complete list of all RTEP projects in PJM, including those from prior years, can be found at the **RTEP Upgrades & Status – Transmission Construction Status** page on pjm.com:

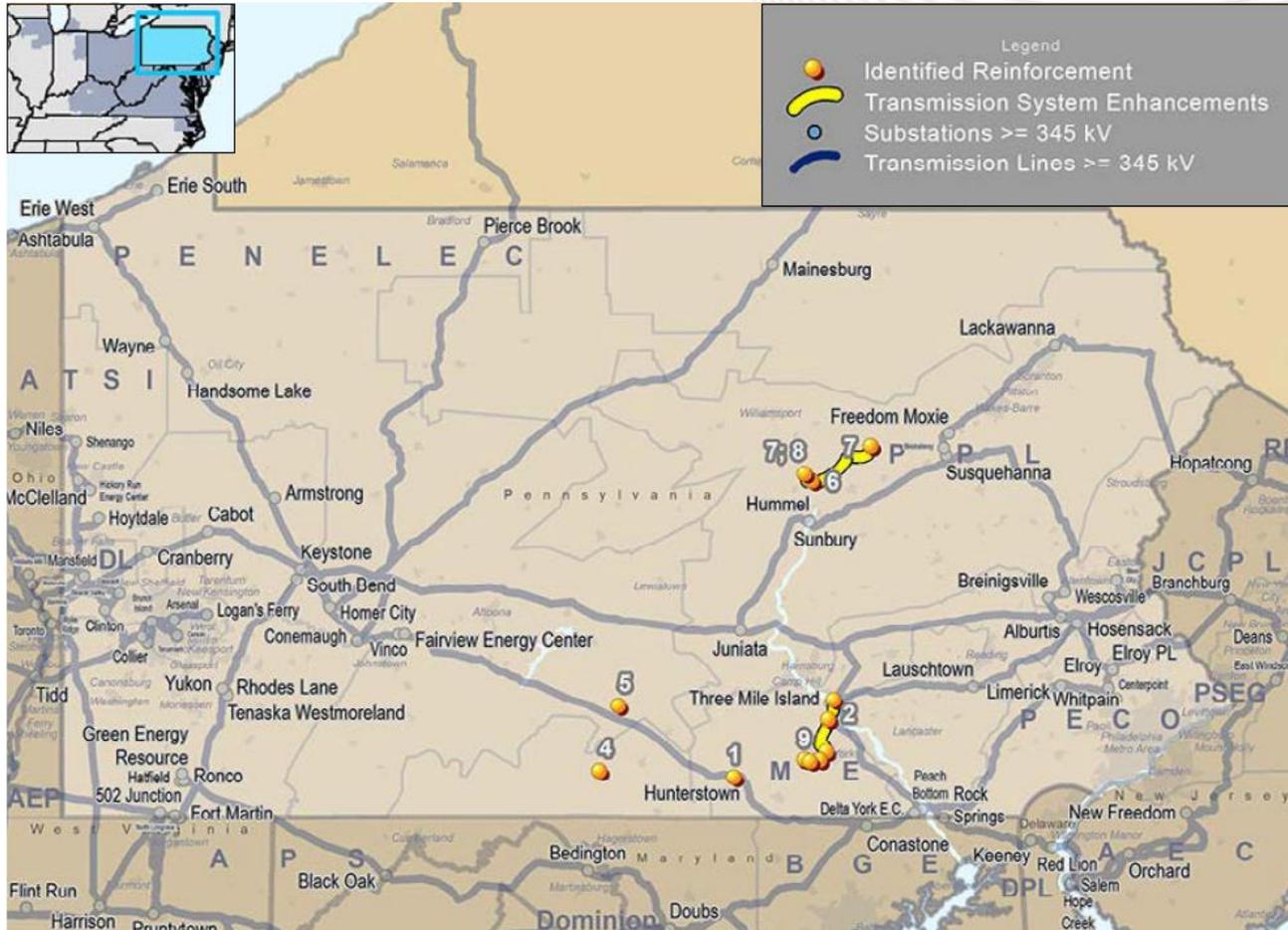
<https://www.pjm.com/planning/project-construction>



PA Baseline Projects	
TO Zone	Cost (\$M)
AP	\$1.66
DLCO	\$33.00
METED	\$8.91
PECO	\$4.42
PENELEC	\$15.74
PPL	\$28.61

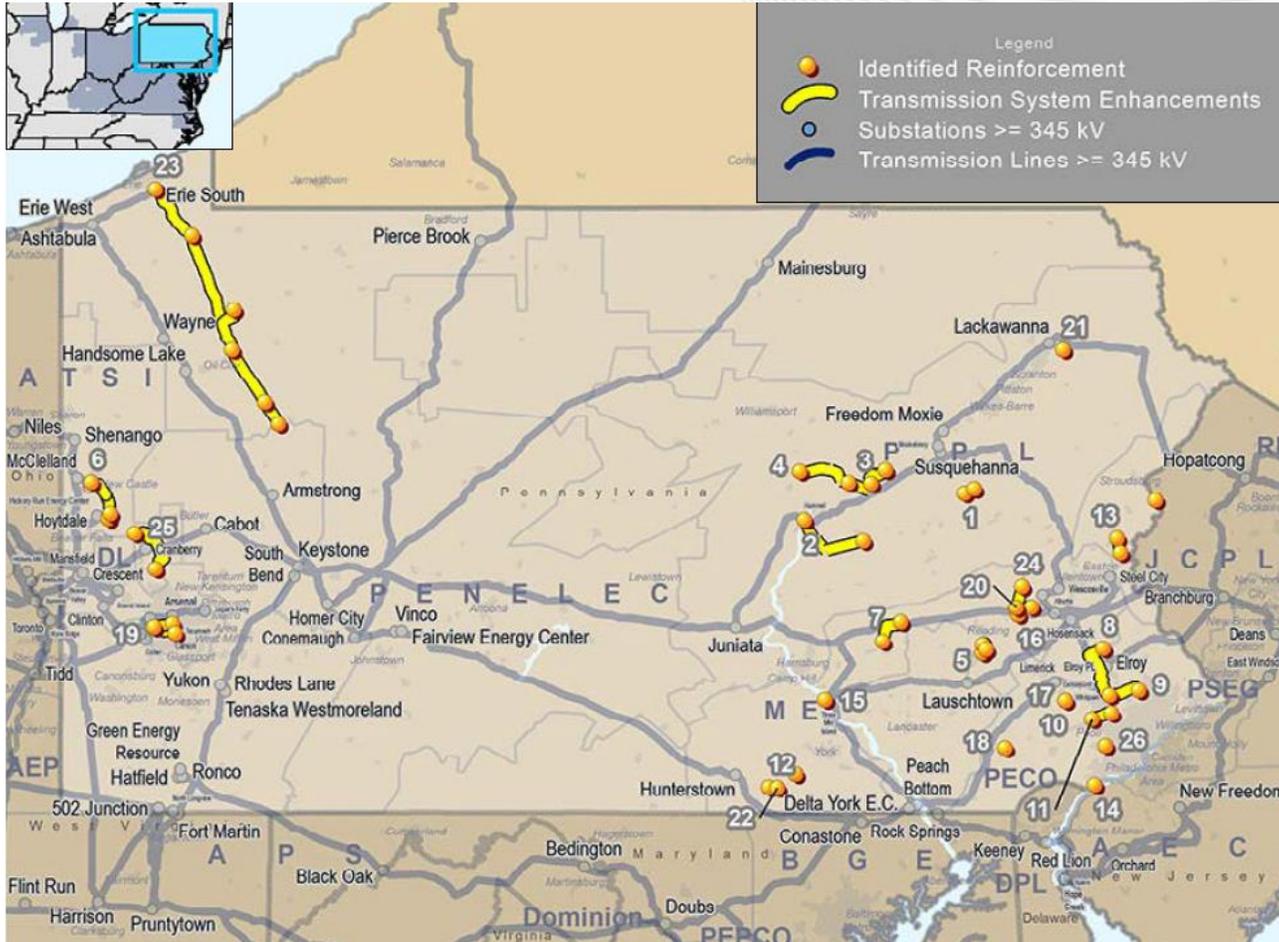
The project shown as #11 on the map is a portion of the baseline project b3737. RTEP project b3737, including all associated sub-projects, by multiple designated entities, represents the State Agreement Approach projects selected by the New Jersey Board of Public Utilities. The Pennsylvania portion of b3737 totals \$114.11(\$M), and its cost is allocated 100% to New Jersey ratepayers. This project's cost is not included in the table shown above.

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



PA Network Projects	
TO Zone	Cost (\$M)
AP	\$6.12
MAIT	\$15.15
METED	\$4.30
PPL	\$1.27

Note: Network projects 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, as well as certain direct connection facilities required to interconnect proposed generation projects. The costs of network projects are borne by the interconnection customer.



PA Supplemental Projects	
TO Zone	Cost (\$M)
ATSI	\$2.20
DLCO	\$34.00
METED	\$53.40
PECO	\$8.62
PENELEC	\$443
PPL	\$3.95

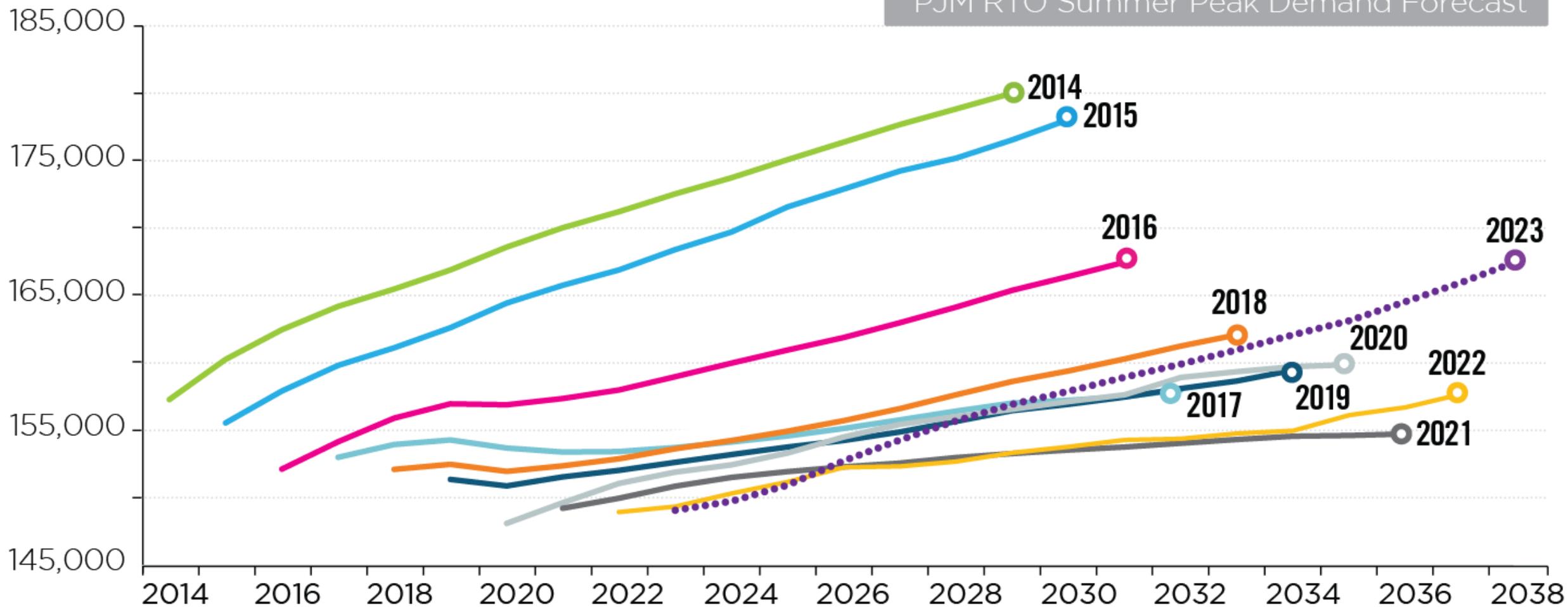
Note: Supplemental projects are transmission expansions or enhancements that are not required for compliance with PJM criteria and are not state public policy projects according to the PJM Operating Agreement. These projects are used as inputs to RTEP models, but are not required for reliability, economic efficiency or operational performance criteria, as determined by PJM.

Planning

Load Forecast

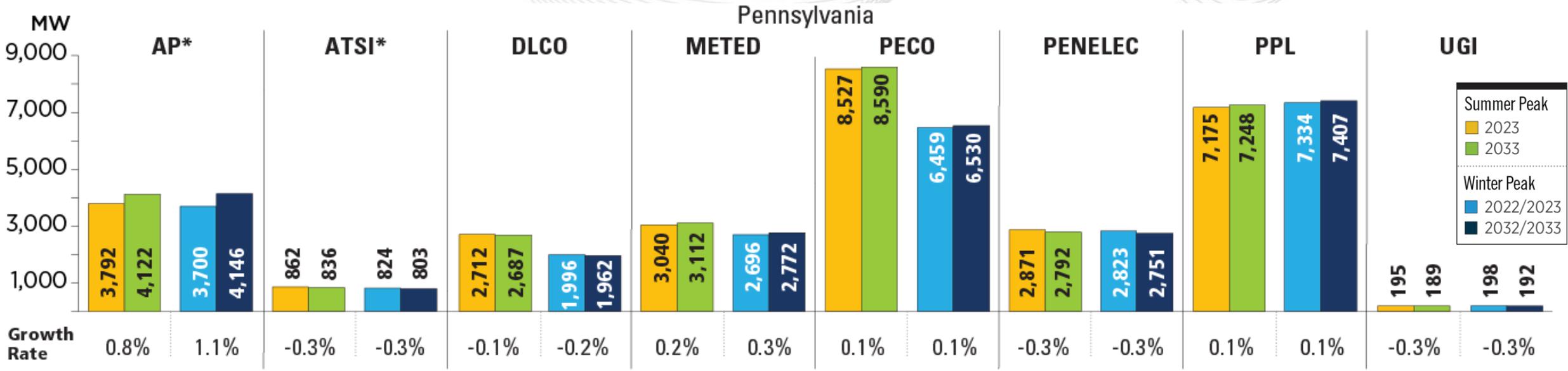
Load (MW)

PJM RTO Summer Peak Demand Forecast





Pennsylvania – 2023 Load Forecast Report



*Serves load outside PA

The summer and winter peak megawatt values reflect the estimated amount of forecast load to be served by each transmission owner in the noted state/district. Estimated amounts were calculated based on the average share of each transmission owner's real-time summer and winter peak load in those areas over the past five years.

PJM RTO Summer Peak		PJM RTO Winter Peak	
2023	2033	2022/2023	2032/2033
149,059 MW	160,971 MW	130,811 MW	144,992 MW
Growth Rate 0.8%		Growth Rate 1.0%	

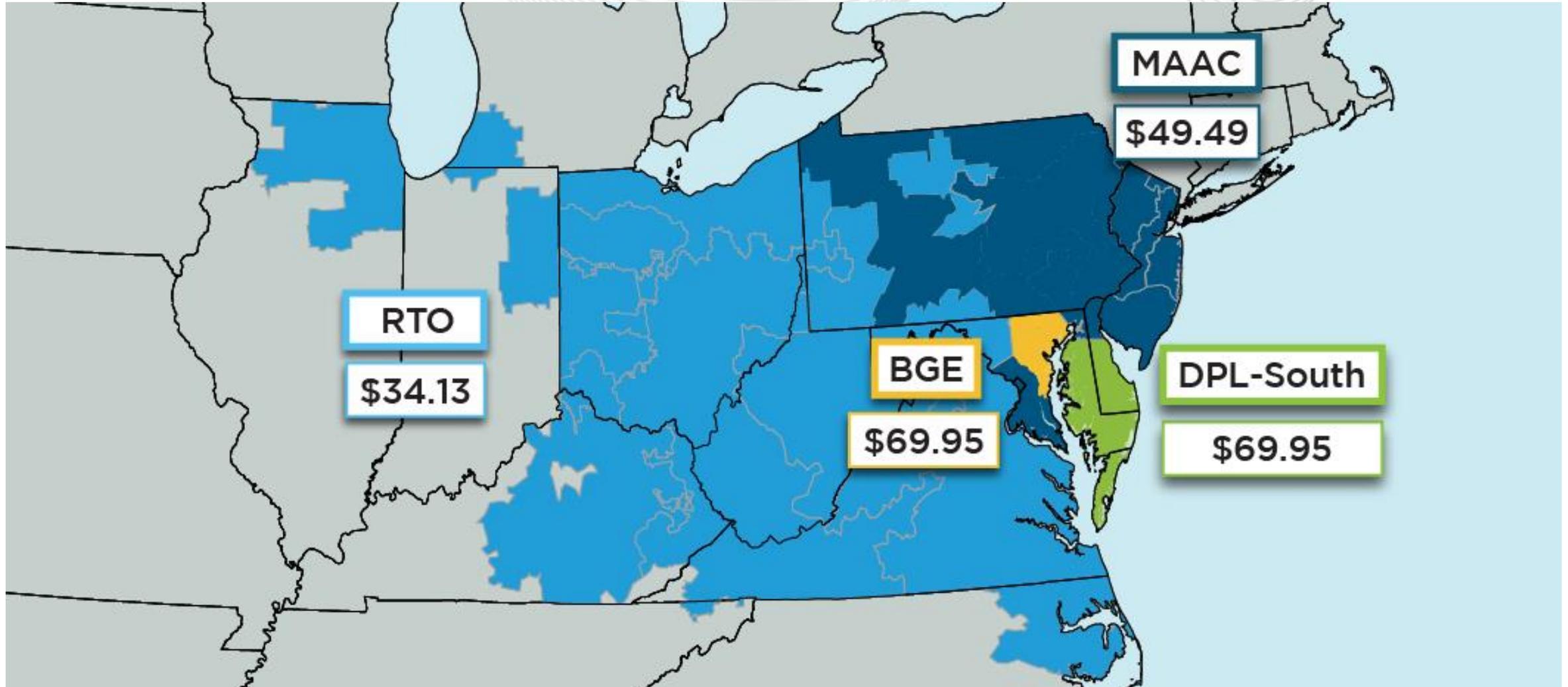


Markets

Capacity Market Results



2023/24 Base Residual Auction Clearing Prices (\$/MW-Day)



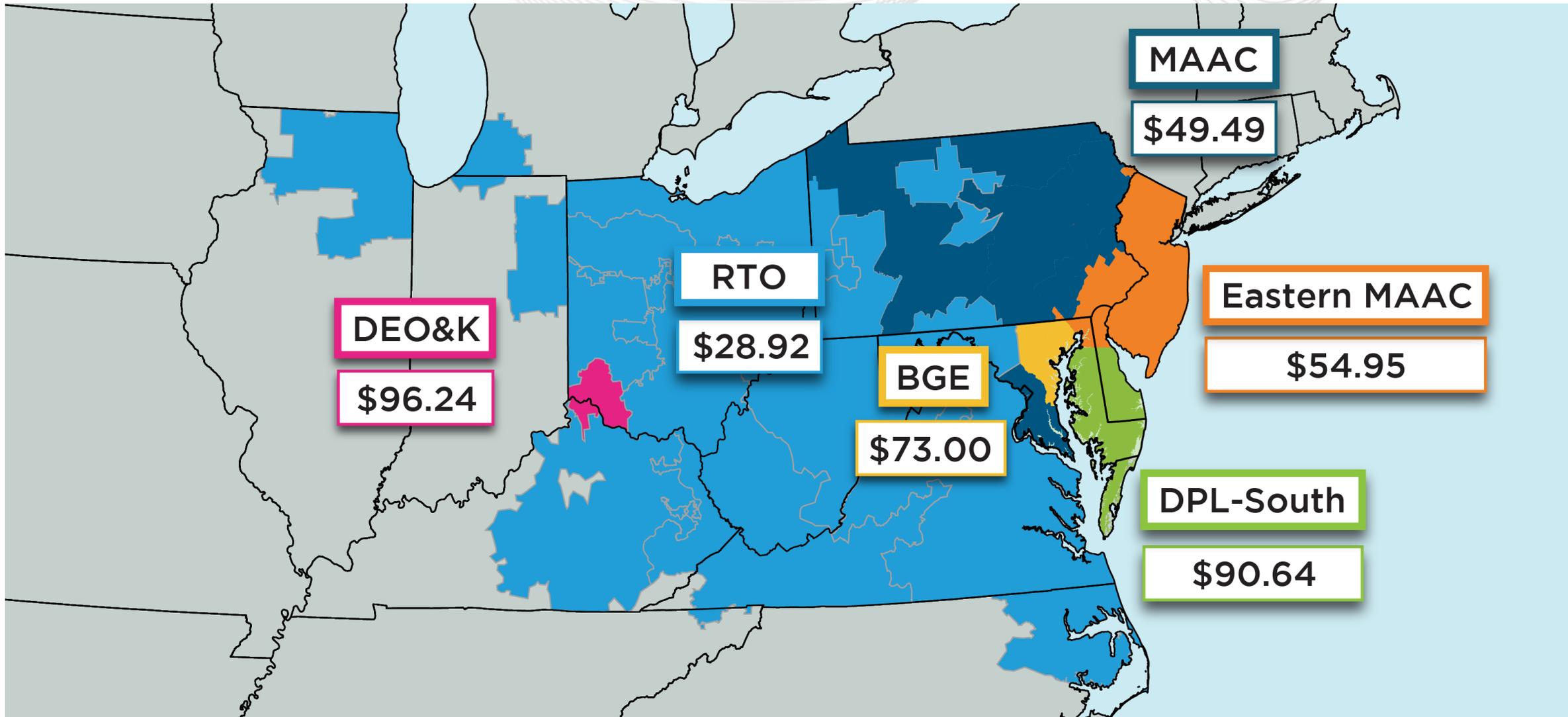


2023/24 Cleared MW (UCAP) by Resource Type

	ANNUAL	SUMMER	WINTER	Total (MW)
Generation	131,256.3	47.0	474.1	131,777.4
DR	7,919.1	177.1	0.0	8,096.2
EE	5,221.1	250.0	0.0	5,471.1
Total (MW)	144,396.5	474.1	474.1	



2024/25 Base Residual Auction Clearing Prices (\$/MW-Day)



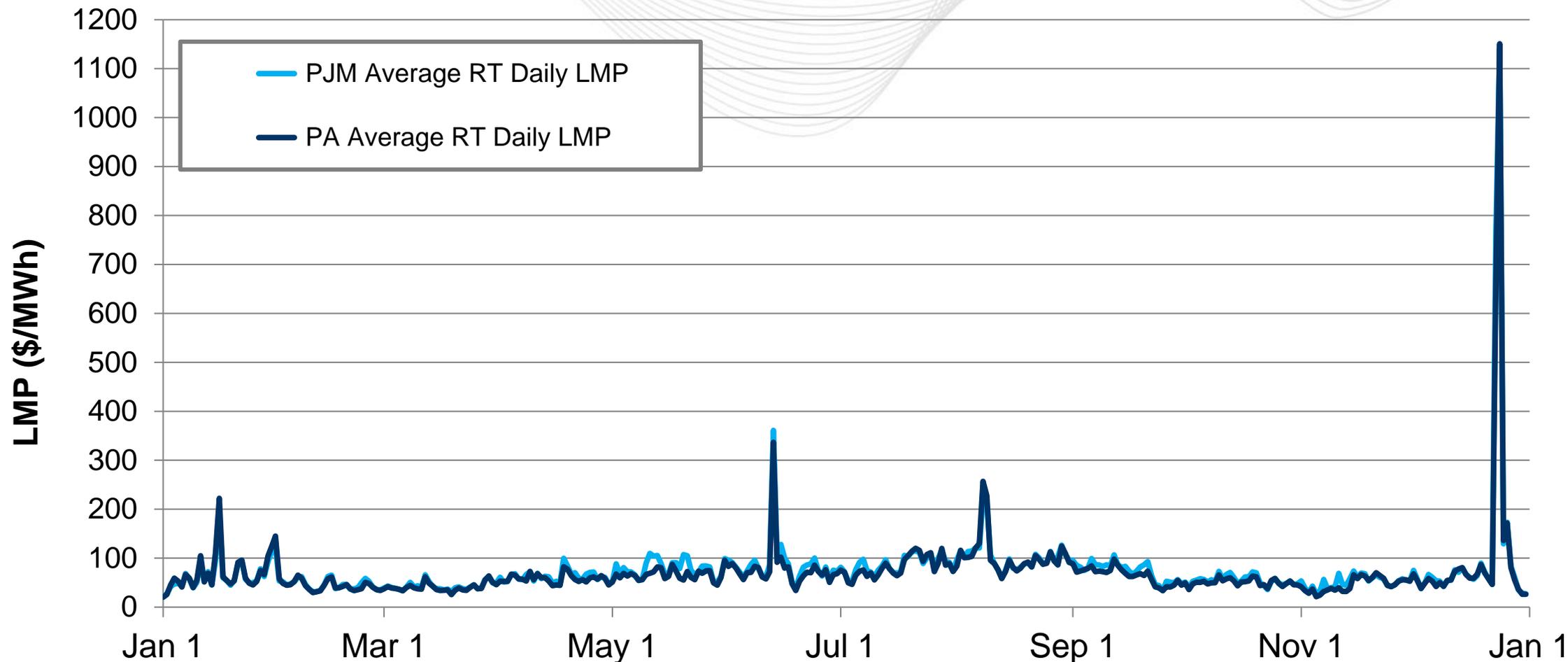


2024/2025 Cleared MW (UCAP) by Resource Type

	ANNUAL	SUMMER	WINTER	Total (MW)
Generation	131,779.3	38.2	605.6	132,423.1
DR	7,804.3	188.4	0	7,992.7
EE	7,289.7	379.0	0	7,668.7
Total (MW)	146,873.3	605.6	605.6	

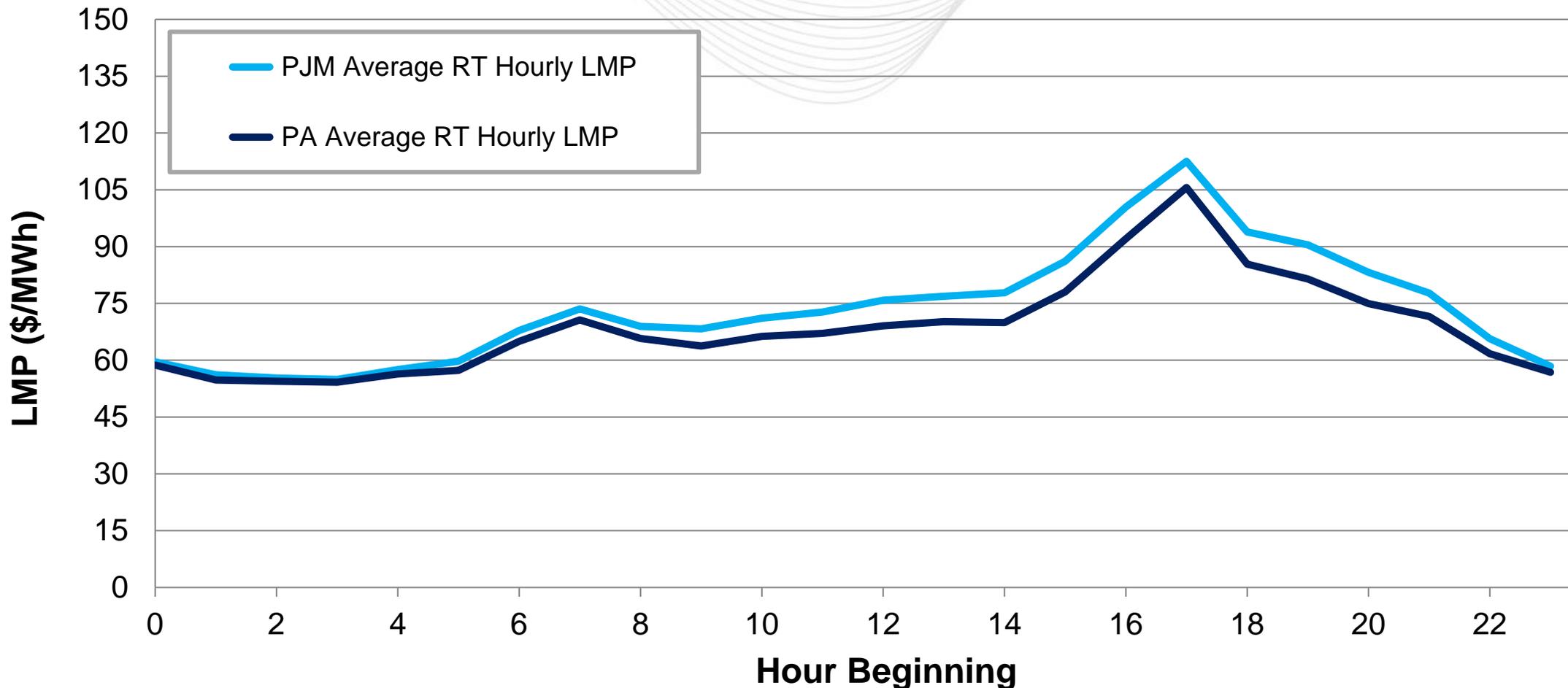
Markets

Market Analysis



Note: The significant price spike in late Dec. 2022 was a result of Winter Storm Elliott's impact on system conditions.

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

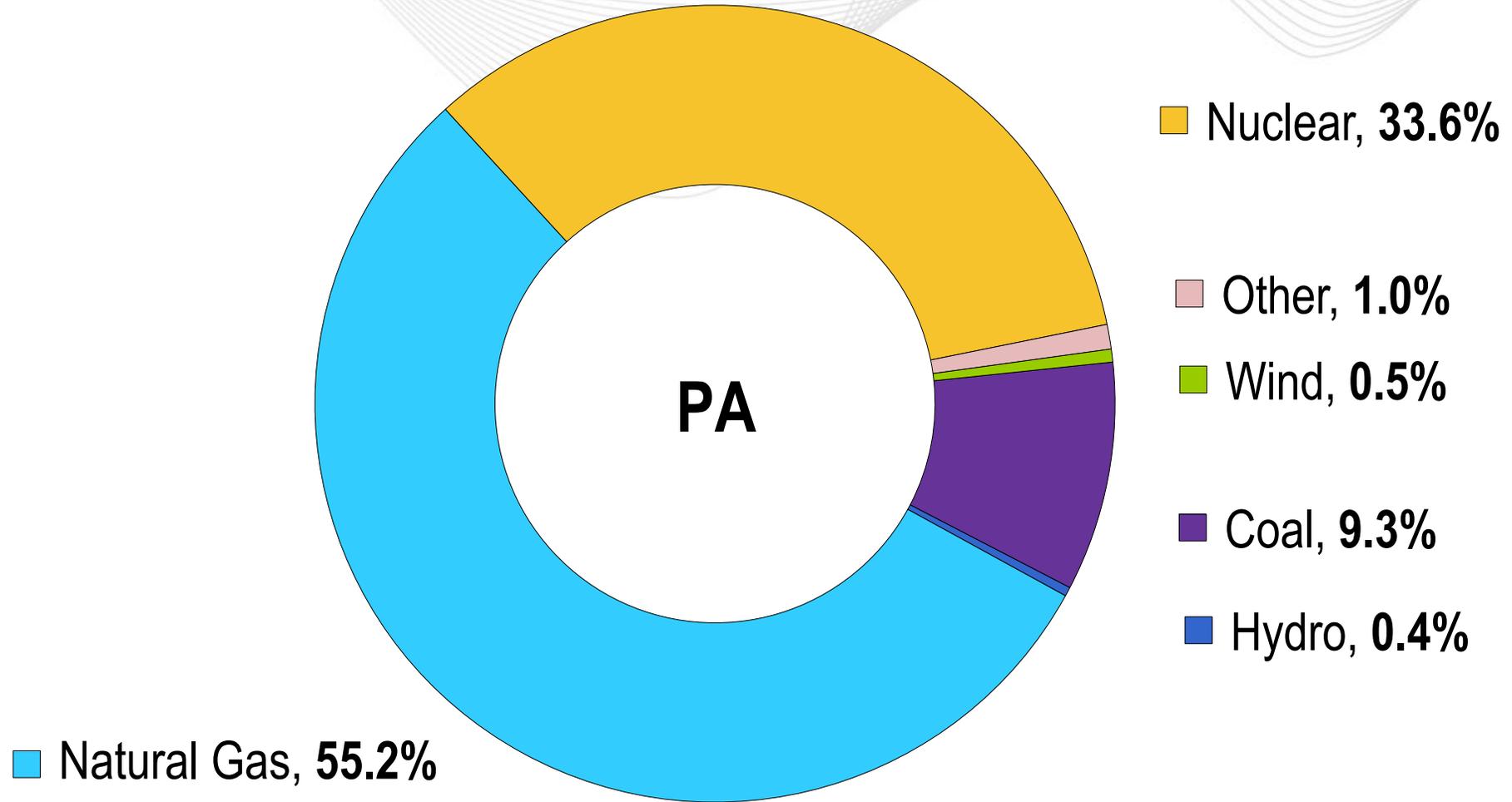




Positive values represent exports and negative values represent imports.

Operations

Pennsylvania – 2022 Generator Production



The data in this chart comes from EIA Form 923 (2022).

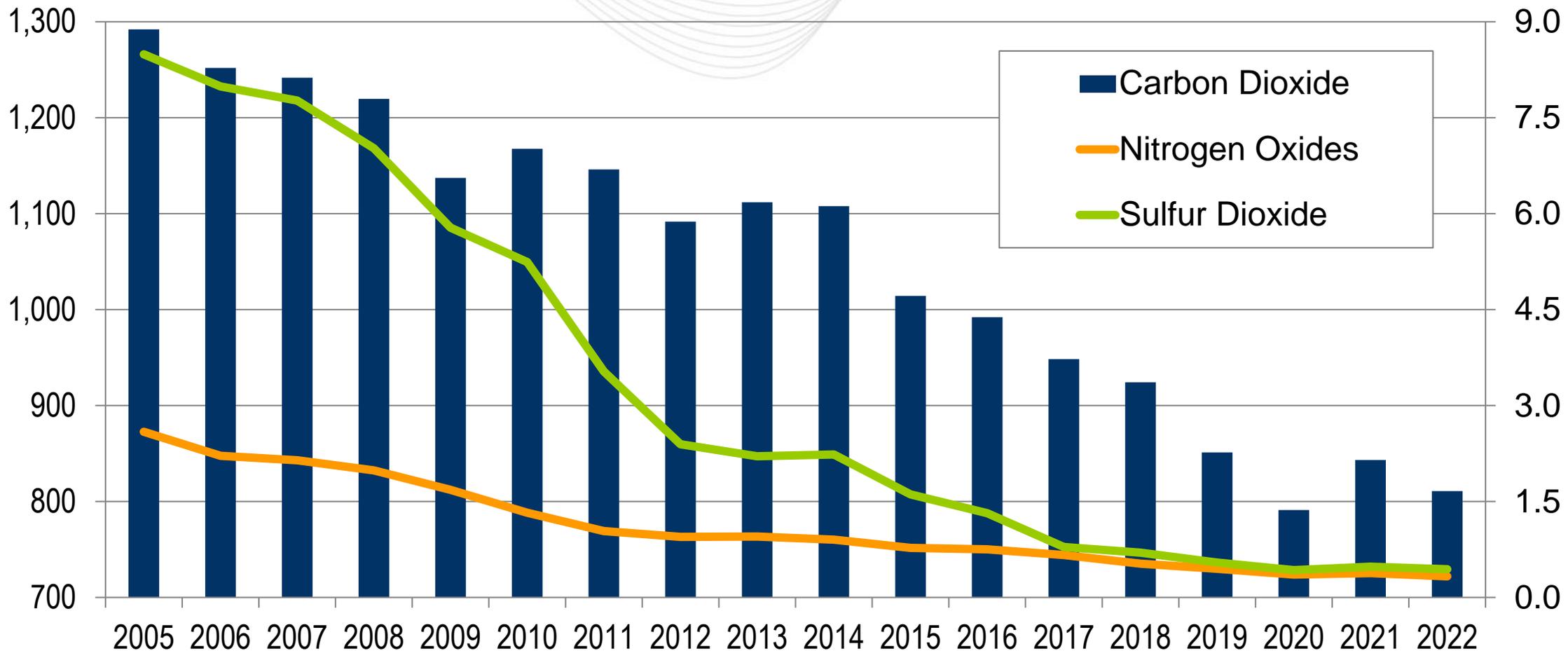


2005 – 2022 PJM Average Emissions

(March 2023)

CO₂
(lbs/MWh)

SO₂ and NO_x
(lbs/MWh)





Pennsylvania – Average Emissions (lbs/MWh)

(March 2023)

CO₂
(lbs/MWh)

SO₂ and NO_x
(lbs/MWh)

