2018 New Jersey State Infrastructure Report

(January 1, 2018 – December 31, 2018)

May 2019

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Executive Summary

(May 2019)

- **Existing Capacity:** Natural gas represents approximately 66.0 percent of the total installed capacity in New Jersey while coal represents approximately 4.1 percent. This differs from PJM where natural gas and coal are at 40.2 and 30.7 percent of total installed capacity.
- **Interconnection Requests:** Natural gas represents approximately 84.6 percent of new interconnection requests in New Jersey.
- **Deactivations**: 17 MW of generation in New Jersey gave a notification of deactivation in 2018.
- **RTEP 2018:** New Jersey RTEP 2018 projects total approximately $3.34 billion in investment. Approximately 50.1 percent of that represents supplemental projects. These investment figures only represent RTEP projects that cost at least $5 million.
- **Load Forecast:** New Jersey load growth is nearly flat, averaging between -0.3 and 0.0 percent per year over the next 10 years. PJM RTO projected load growth rate is 0.4 percent.

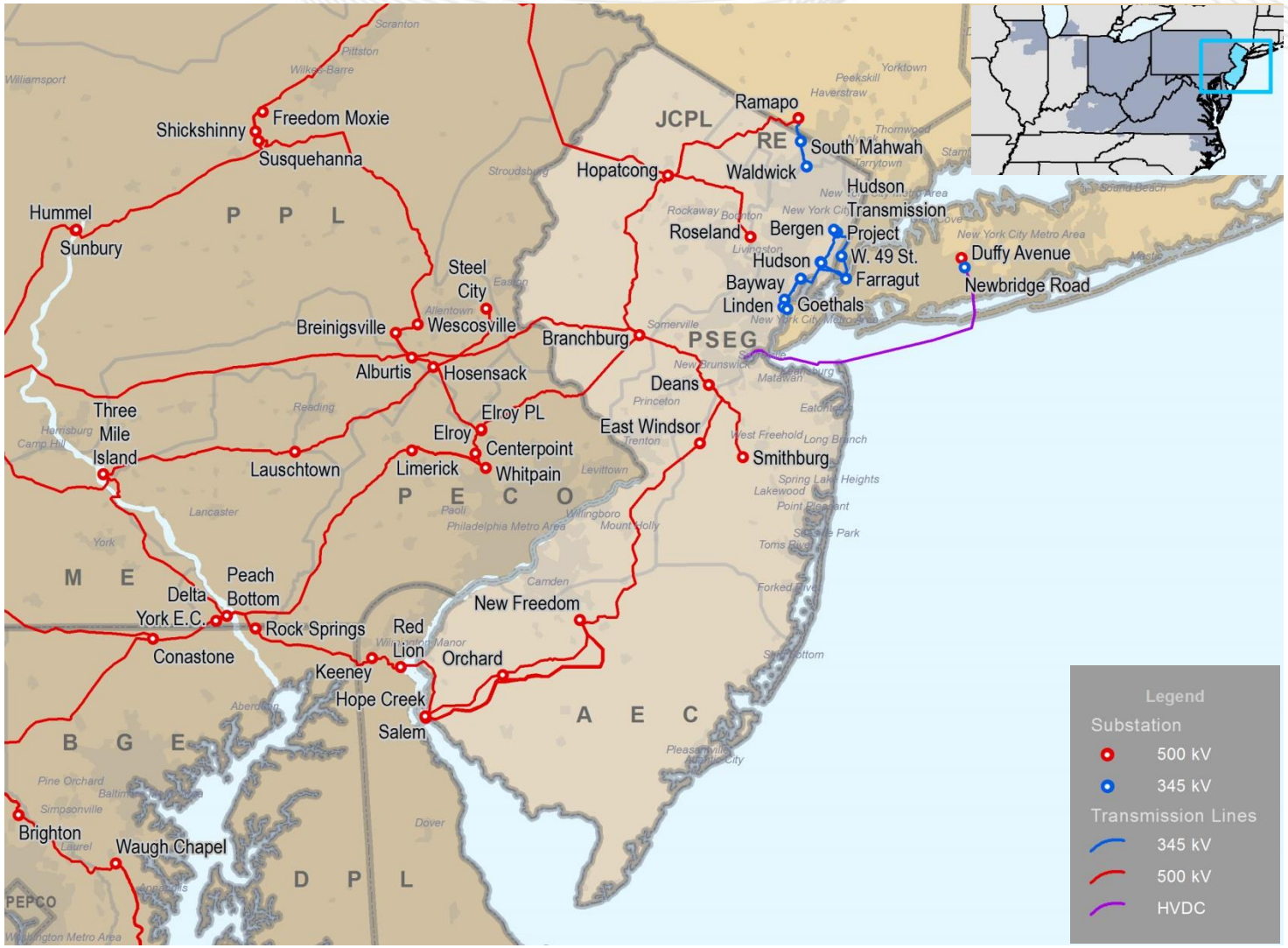
Executive Summary

(May 2019)

- **2021/22 Capacity Market:** New Jersey cleared 364 MW more Demand Response and Energy Efficiency resources than in the prior auction.
- **1/1/18 – 12/31/18 Performance:** New Jersey's average locational marginal prices were consistently at or below PJM average LMPs. Nuclear resources represented 40.3 percent of generation produced in New Jersey while natural gas averaged 24.1 percent.
- **Emissions:** 2018 carbon dioxide emissions are up from 2017; sulfur dioxide and nitrogen oxide emissions remain flat from 2017 levels.

PJM Service Area - New Jersey

(March 2019)



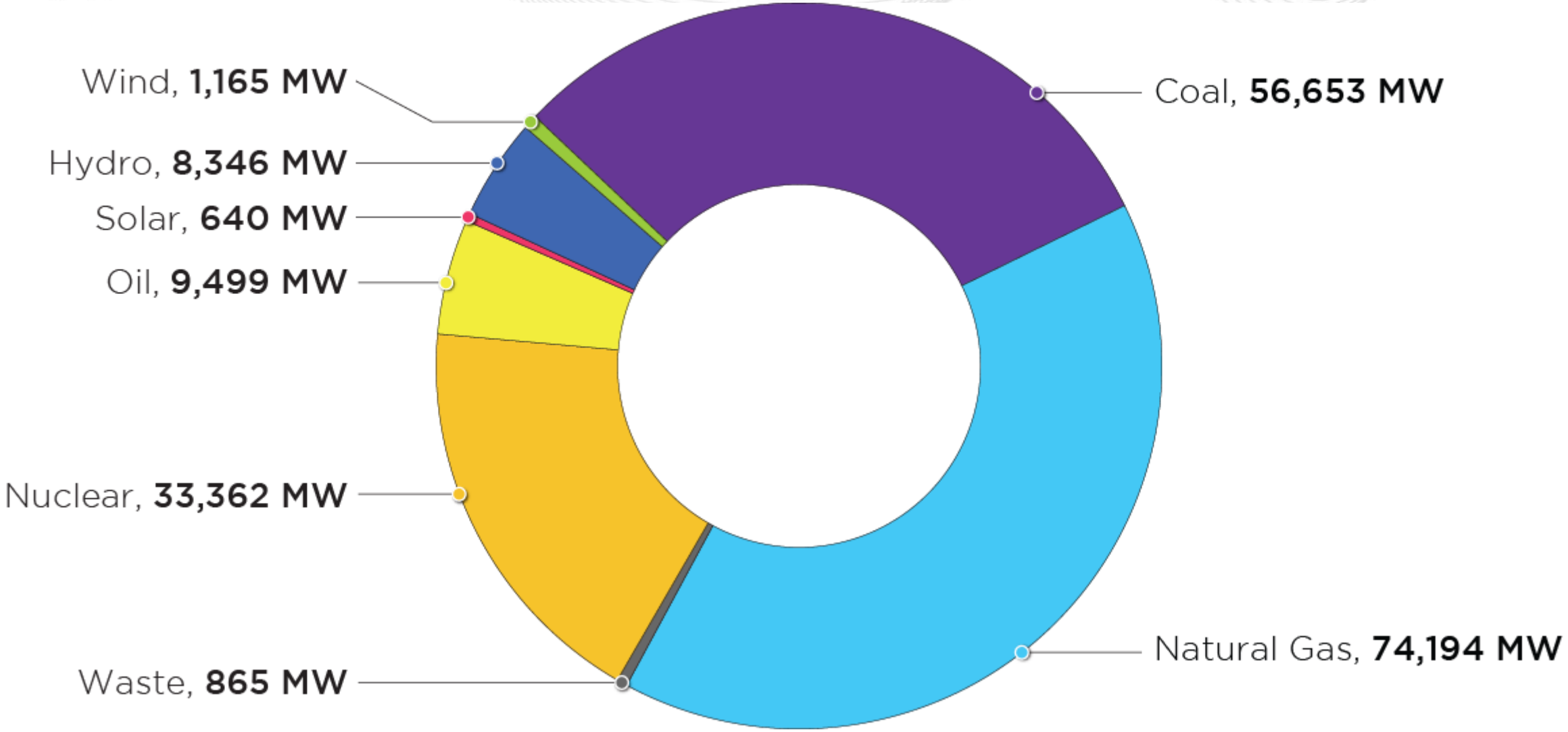
PJM operates and plans the bulk electric system in New Jersey, including facilities owned and operated by Atlantic City Electric Co., Jersey Central Power & Light, Linden Variable Frequency Transformer (VFT), Neptune Regional Transmission System, Public Service Electric & Gas Co.

Planning

Generation Portfolio Analysis

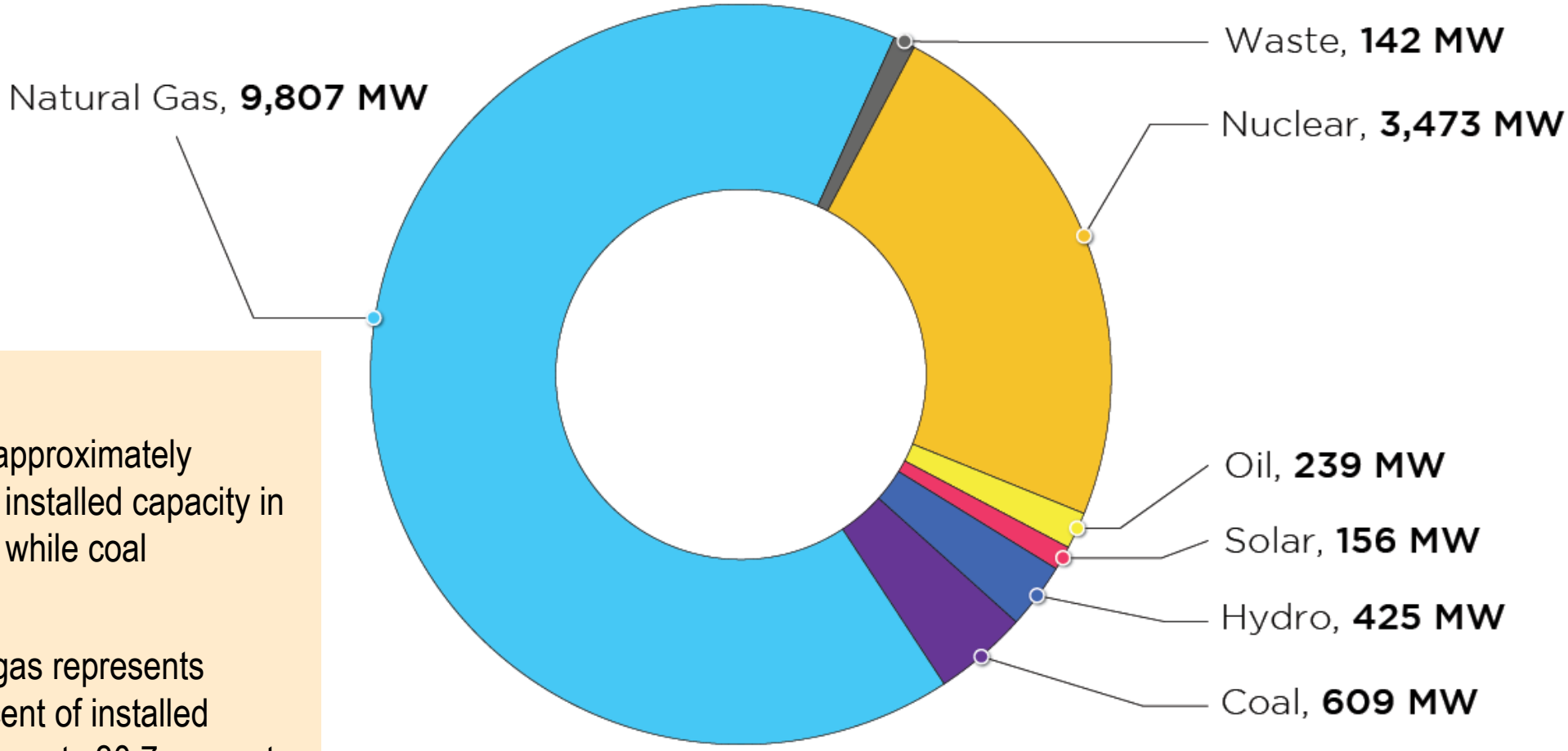
PJM Existing Installed Capacity

(CIRs, December 31, 2018)



New Jersey – Existing Installed Capacity

(MW submitted to PJM, December 31, 2018)



Summary:

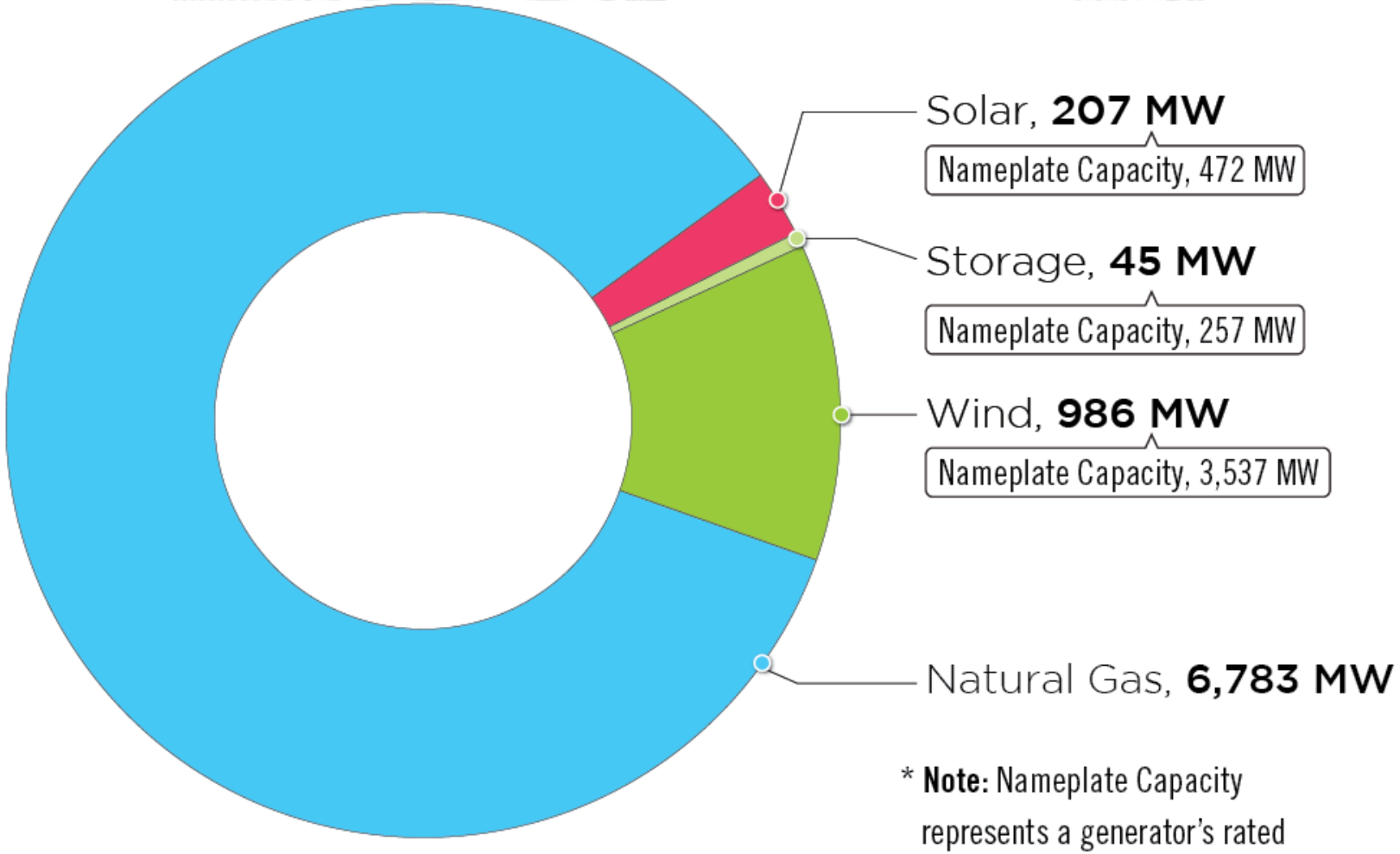
Natural gas represents approximately 66.0 percent of the total installed capacity in the New Jersey territory while coal represents 4.1 percent.

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

New Jersey – Queued Capacity (MW) by Fuel Type

(as of December 31, 2018)

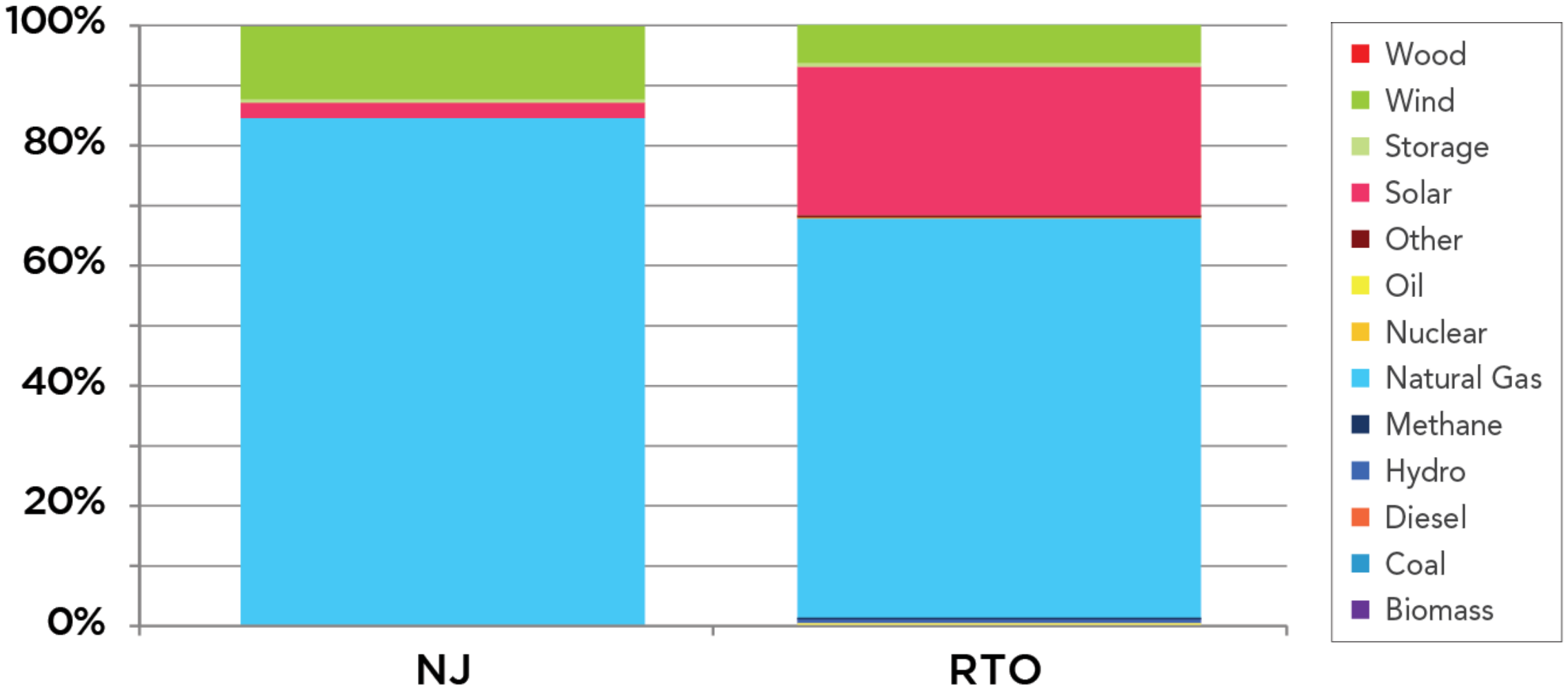
Natural gas represents approximately 84.6 percent of new interconnection requests in New Jersey.



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

New Jersey – Percentage of Projects in Queue by Fuel Type

(as of December 31, 2018)



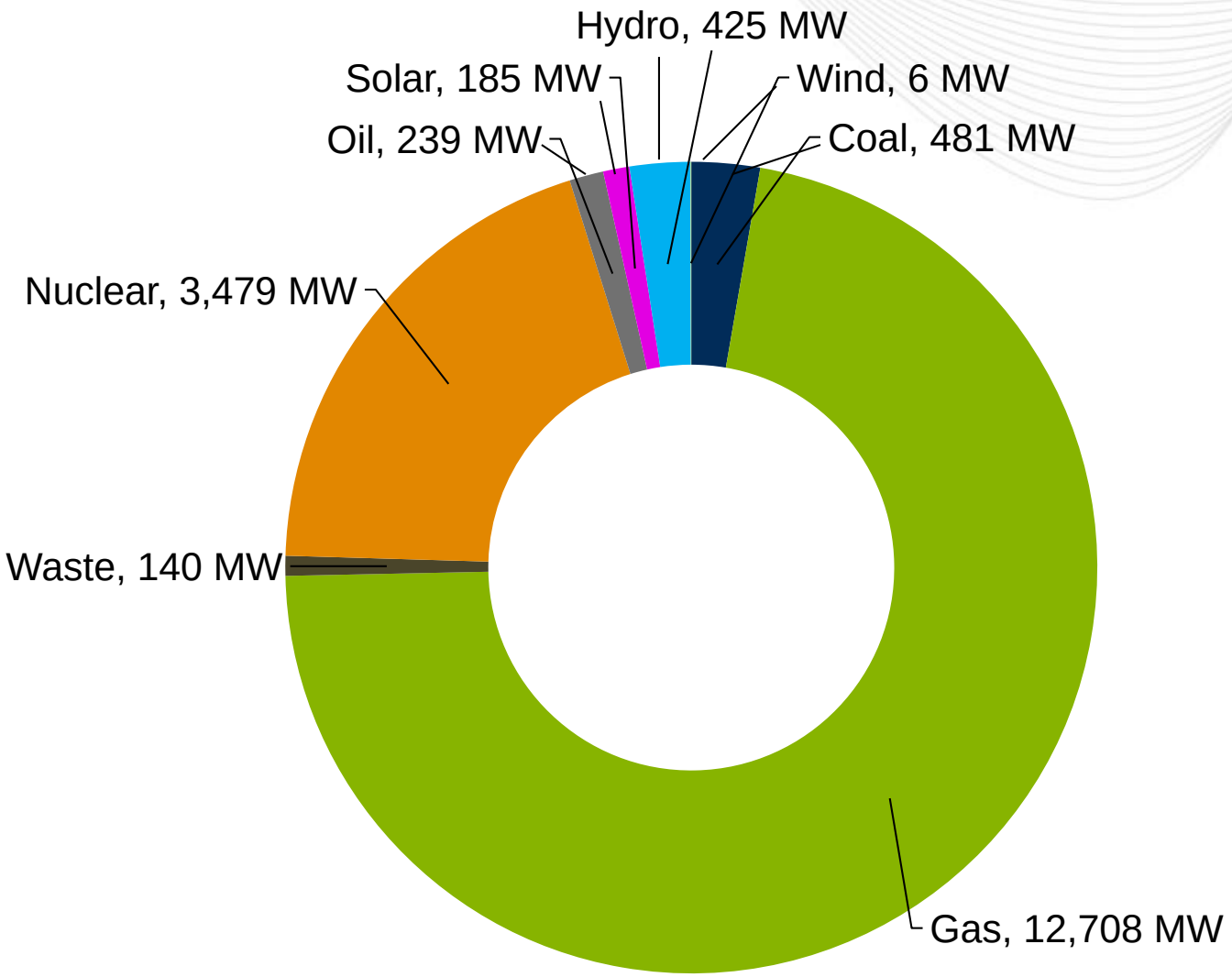
New Jersey – Interconnection Requests

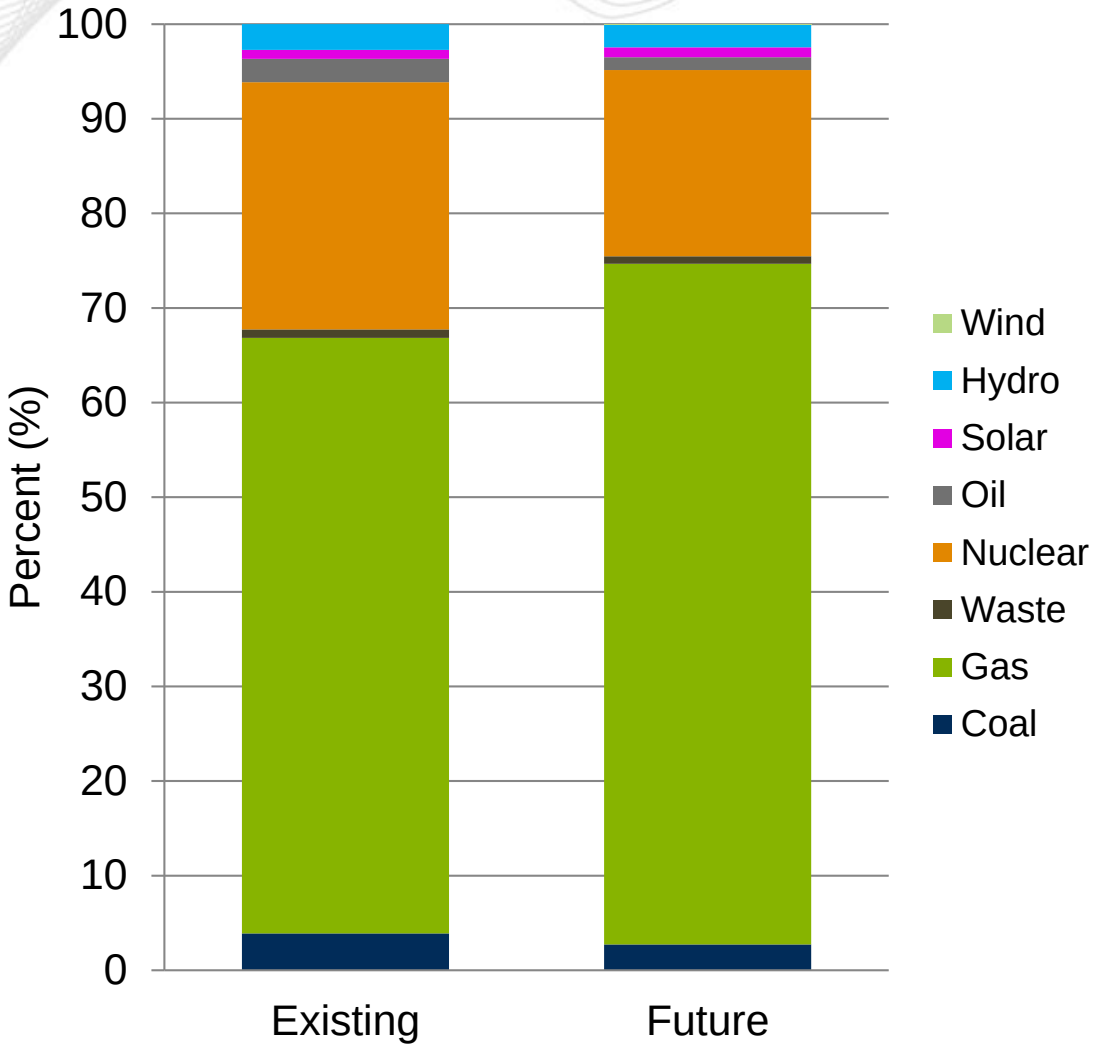
(Unforced Capacity, As of December 31, 2018)

	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	**85**	**7,649.0**	**217**	**47,771.4**	**23**	**4,618.5**	**10**	**660.0**	**10**	**1,549.0**	**345**	**62,247.9**
Coal	1	24.0	1	15.0	0	0.0	0	0.0	0	0.0	2	39.0
Diesel	1	8.0	0	0.0	0	0.0	0	0.0	0	0.0	1	8.0
Natural Gas	72	7,201.0	168	46,745.4	12	4,573.5	3	660.0	9	1,549.0	264	60,729.4
Nuclear	6	381.0	0	0.0	0	0.0	0	0.0	0	0.0	6	381.0
Oil	2	35.0	8	945.0	0	0.0	0	0.0	0	0.0	10	980.0
Other	0	0.0	7	45.5	0	0.0	0	0.0	0	0.0	7	45.5
Storage	3	0.0	33	20.0	11	45.0	7	0.0	1	0.0	55	65.0
Renewable	**113**	**265.8**	**433**	**2,461.8**	**31**	**1,136.0**	**6**	**6.0**	**18**	**50.0**	**601**	**4,419.4**
Biomass	0	0.0	2	17.3	0	0.0	0	0.0	0	0.0	2	17.3
Hydro	2	20.5	2	1,006.2	0	0.0	0	0.0	0	0.0	4	1,021.6
Methane	16	45.3	9	40.6	0	0.0	0	0.0	0	0.0	25	85.9
Solar	94	200.0	403	1,300.9	27	153.5	6	6.0	16	47.0	546	1,707.4
Wind	1	0.0	17	601.7	4	982.6	0	0.0	2	3.0	24	1,587.3
Grand Total	**198**	**7,914.8**	**650**	**50,733.0**	**54**	**5,754.5**	**16**	**666.0**	**28**	**1,599.0**	**946**	**66,667.4**

New Jersey – 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.



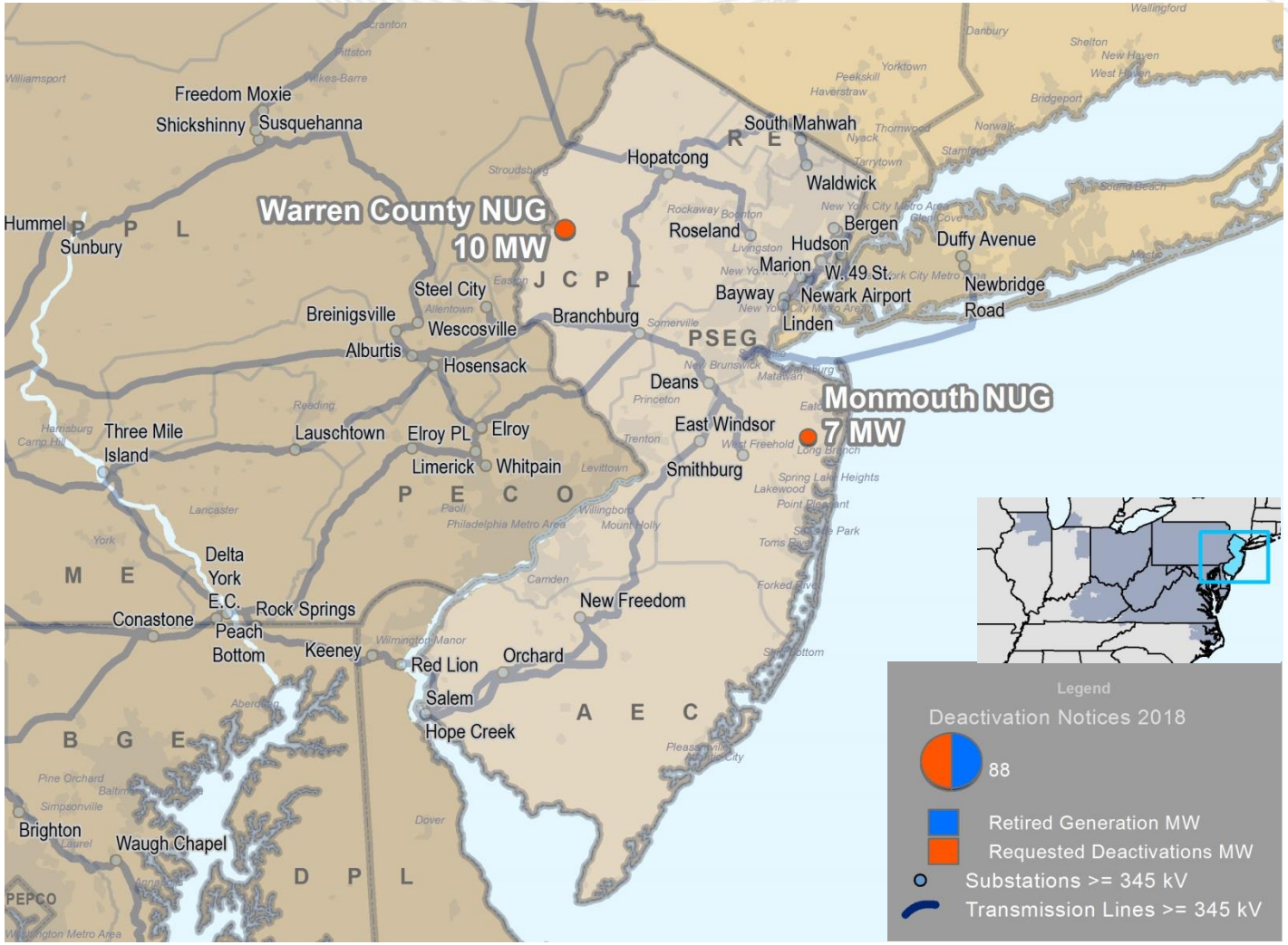


New Jersey – Progression History Interconnection Requests

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

- **Projects withdrawn after final agreement**
  - 10 Interconnection Service Agreements – 1,156 MW (Nameplate Capacity, 1,483 MW)
  - 141 Wholesale Market Participation Agreements – 363 MW (Nameplate Capacity, 1,035 MW)
- **Percentage of planned capacity and projects reached commercial operation**
  - 13.9 % requested capacity megawatt
  - 23.2 % requested projects

New Jersey – Actual Generation Deactivations and Deactivation Notifications Received in 2018



New Jersey – Actual Generation Deactivations and Deactivation Notifications Received in 2018

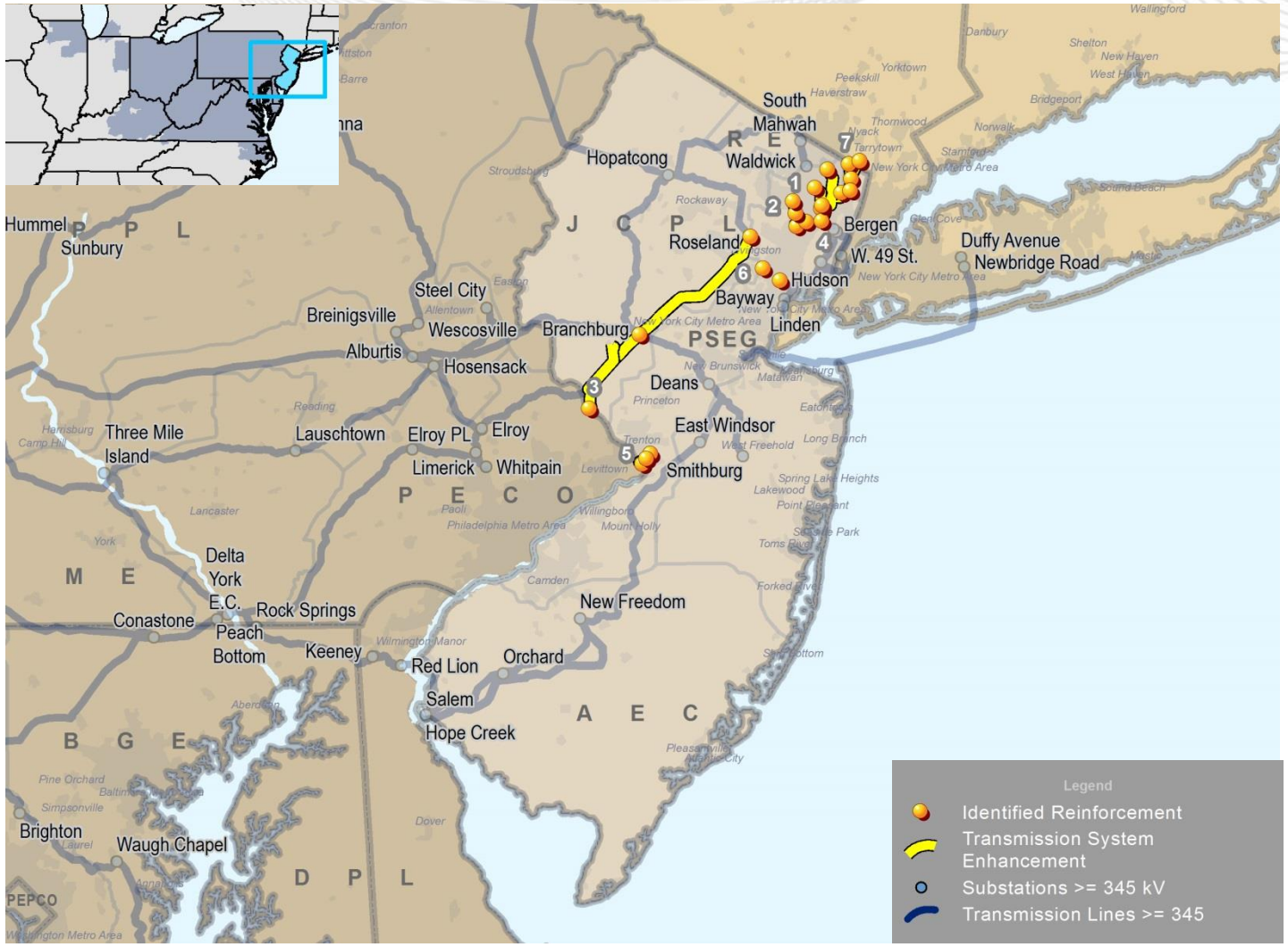
Unit	Capacity (MW)	TO Zone	Age (Years)	Projected/Actual Deactivation Date
Monmouth NUG	7	JCP&L	20	5/31/2019
Warren County NUG	10	JCP&L	30	6/1/2019

Planning

Transmission Infrastructure Analysis

New Jersey – RTEP Baseline Projects

(Greater than $10 million)



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

New Jersey – 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	TO Criteria Violation
1	b2982	.0	Construct a 230/69 kV station at Hillsdale Substation and tie to Paramus and Dumont at 69 kV	6/1/2018	$115	PSE&G	12/19/2017	X
		.1	Install a 69 kV ring bus and one 230/69 kV transformer at Hillsdale	6/1/2018		PSE&G	12/19/2017	X
		.2	Construct a 69 kV network between Paramus, Dumont and Hillsdale Substation using existing 69 kV circuits	6/1/2018		PSE&G	12/19/2017	X
2	b2983	.0	Convert Kuller Road to a 69/13 kV station	6/1/2018	$98.25	PSE&G	12/19/2017	X
		.1	Install 69 kV ring bus and two 69/13 kV transformers at Kuller Road	6/1/2018		PSE&G	12/19/2017	X
		.2	Construct a 69 kV network between Kuller Road, Passaic, Paterson, and Harvey (new Clifton-area switching station)	6/1/2018		PSE&G	12/19/2017	X
3	b2986	.0	Replace the existing Roseland-Branchburg-Pleasant Valley 230 kV corridor with new structures	6/1/2018	$1,092	PSE&G	1/11/2018	X
		.1	Roseland-Branchburg 230 kV corridor rebuild	6/1/2018		PSE&G	1/11/2018	X
		.2	Branchburg-Pleasant Valley 230 kV corridor rebuild	6/1/2018		PSE&G	1/11/2018	X
4	b3003	.0	Construct a 230/69 kV station at Maywood	6/1/2018	$87	PSE&G	3/23/2018	X
		.1	Purchase properties at Maywood to accommodate new construction	6/1/2018		PSE&G	3/23/2018	X
		.2	Extend Maywood 230 kV bus and install one 230 kV breaker	6/1/2018		PSE&G	3/23/2018	X
		.3	Install one 230/69 kV transformer at Maywood	6/1/2018		PSE&G	3/23/2018	X
		.4	Install Maywood 69 kV ring bus	6/1/2018		PSE&G	3/23/2018	X
		.5	Construct a 69 kV network between Spring Valley Road, Hasbrouck Heights, and Maywood	6/1/2018		PSE&G	3/23/2018	X

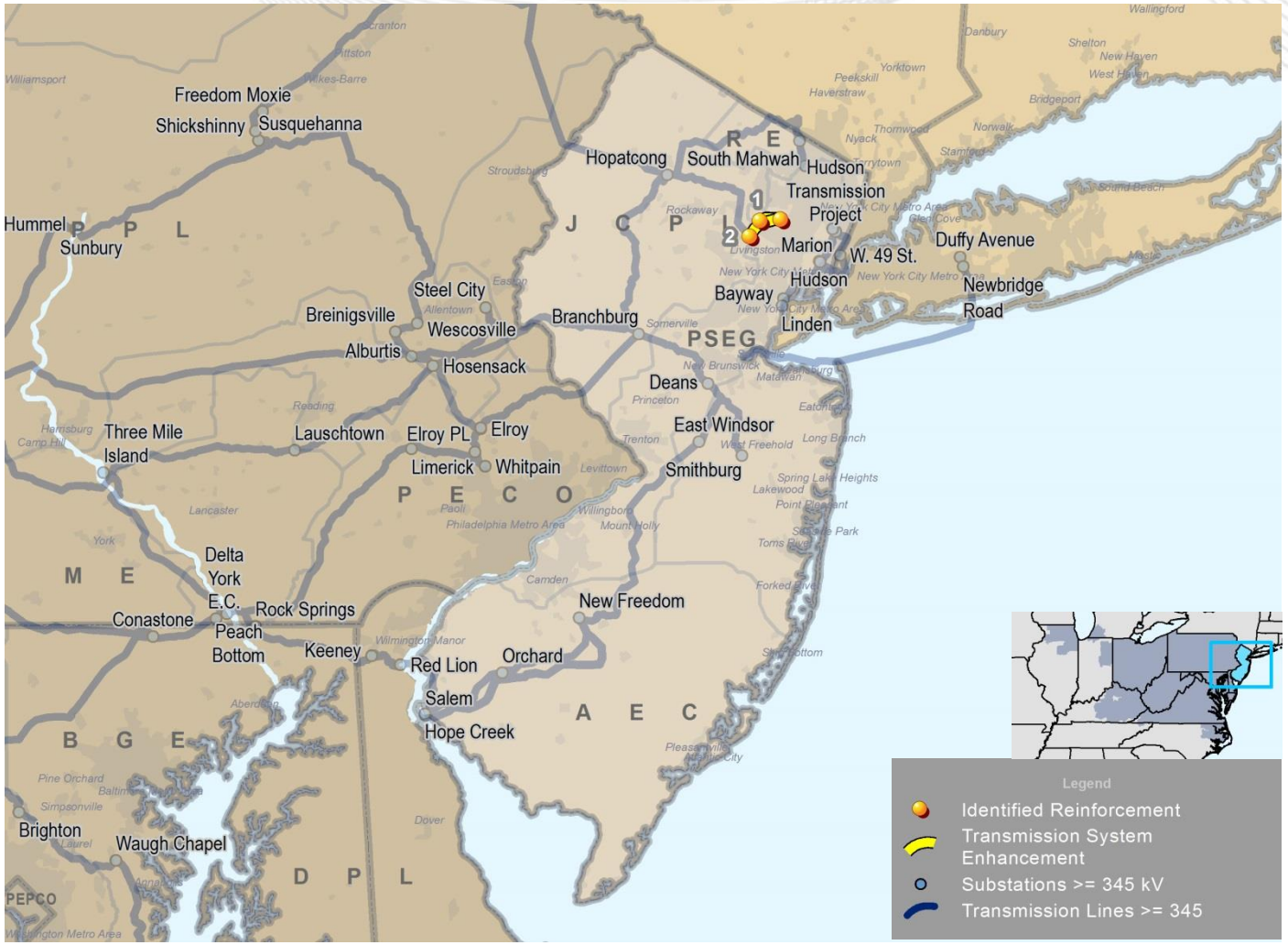
New Jersey – RTEP Baseline Projects (cont.)

(Greater than $5 million)

Map ID	Project	Sub ID	Description	Required In-Service Date	Project Cost ($M)	TO Zone	2018 TEAC Review	TO Criteria Violation
5	b3004	.0	Construct a 230/69/13 kV station by tapping the Mercer-Kuser Road 230 kV circuit	6/1/2018	$62	PSE&G	3/23/2018	X
		.1	Install a new Clinton 230 kV ring bus with one 230/69 kV transformer Mercer-Kuser Rd 230 kV circuit	6/1/2018		PSE&G	3/23/2018	X
		.2	Expand existing 69 kV ring bus at Clinton Ave with two additional 69 kV breakers	6/1/2018		PSE&G	3/23/2018	X
		.3	Install two 69/13 kV transformers at Clinton Avenue	6/1/2018		PSE&G	3/23/2018	X
		.4	Install 18 MVAR capacitor bank at Clinton Avenue 69 kV	6/1/2018		PSE&G	3/23/2018	X
6	b3025	.0	Construct two new 69/13 kV stations in the Doremus area and relocate the Doremus load to the new stations	6/1/2018	$155	PSE&G	5/25/2018	X
		.1	Install a new 69/13 kV Vauxhall station with a ring bus configuration	6/1/2018		PSE&G	5/25/2018	X
		.2	Install a new 69/13 kV station with a ring bus configuration	6/1/2018		PSE&G	5/25/2018	X
7	b3029	.0	Install 69 kV underground transmission line from Harings Corner-Station terminating at Closter-Station	5/31/2020	$22	RECO	7/20/2018	X
		.1	Reconfigure Closte-Station to accommodate the underground transmission line from Harings Corner-Station	5/31/2020		RECO	7/20/2018	X
		.2	Loop in the existing Sparkill-Cresskill 69 kV line into Hardings Closter 69 kV station	5/31/2020		RECO	7/20/2018	X

New Jersey – RTEP Network Projects

(Greater than $10 million)



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.

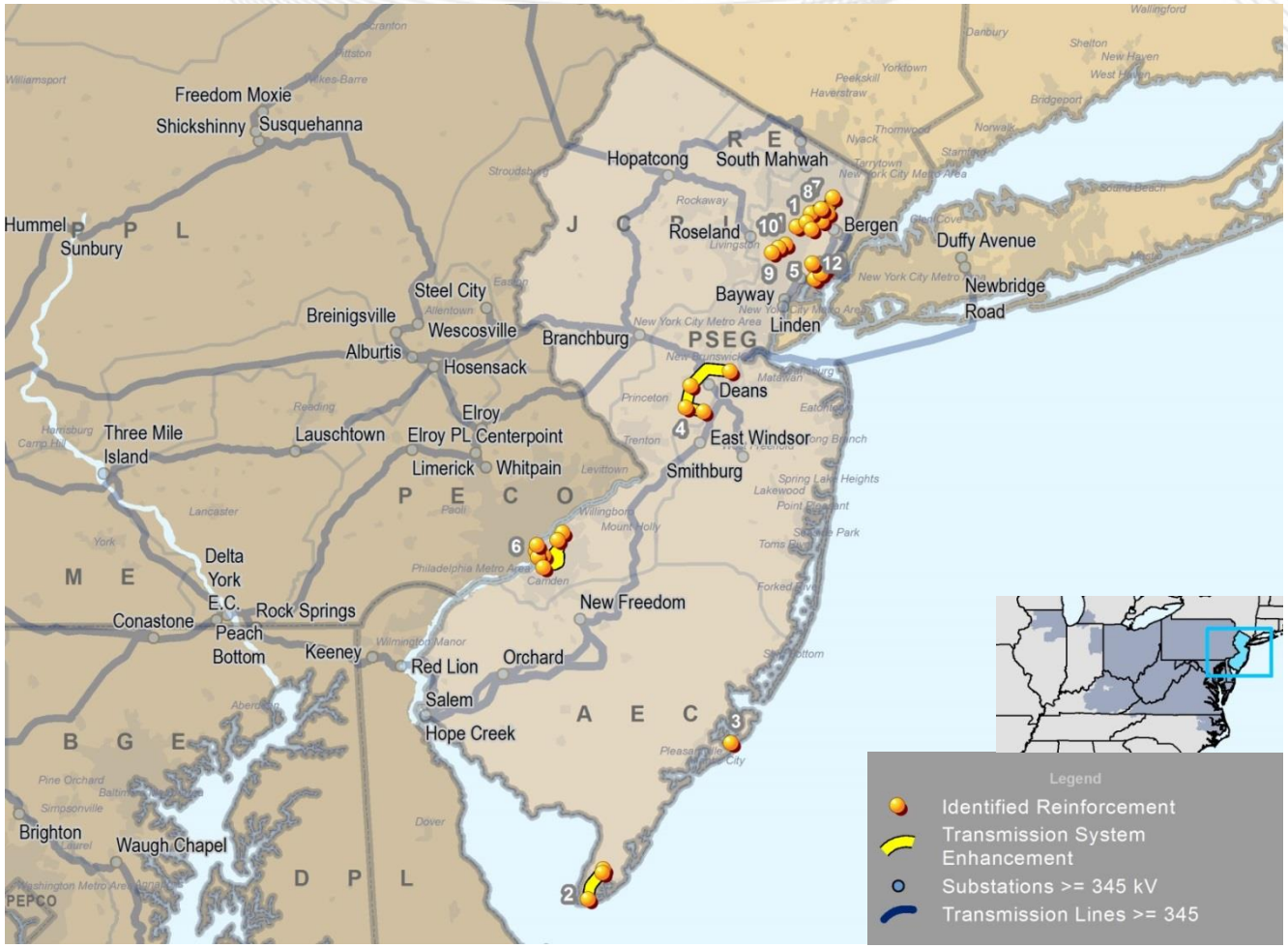
New Jersey – RTEP Network Projects

(Greater than $5 million)

Map ID	Project	Description	Project Driver	Queue	Required In-Service Date	Project Cost ($M)	TO Zone	2018 TEAC Review
1	n5564	Reconductor the Williams-Cedar Grove 230 kV line with aluminum conductor steel cable	Merchant Transmission	AD2-018	6/1/2019	$19.09	PSE&G	9/13/2018
2	n5565	Reconductor the Roseland-Cedar Grove 230 kV line with aluminum conductor steel cable	Merchant Transmission	AD2-019	6/1/2019	$18.7	PSE&G	9/13/2018

New Jersey – TO Supplemental Projects

(Greater than $10 million)



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.

New Jersey – TO Supplemental Projects

(Greater than $5 million)

Map ID	Project	Description	Projected In-Service Date	Project Cost ($M)	TO Zone	2018 TEAC Review
1	s1575	Construct a new 230/69 kV and a new 69/13 kV station in the Clifton area on the existing right-of-way	12/30/2022	$195	PSE&G	1/26/2018
		Construct a new 230/69 kV station (Harvey) in the Clifton area	12/30/2022		PSE&G	1/26/2018
		Install 230 kV ring bus with two 230/69 kV transformers and 69 kV ring bus at Harvey switching station	12/30/2022		PSE&G	1/26/2018
		Loop overhead line (230 kV Athenia to Cook Rd.) into the Harvey switching station	12/30/2022		PSE&G	1/26/2018
		Install two 69/13 kV transformers fed from (Harvey) 69 kV ring bus	12/30/2022		PSE&G	1/26/2018
		Provide a source for a third supply to Kuller Road from Harvey 69 kV	12/30/2022		PSE&G	1/26/2018
2	s1628	Rebuild line 0735 No. 1 between Middle, Rio Grande and Cape May substations. All structures, conductor and static wire will be replaced with new weathering steel poles, conductor, and Optical Ground Wire (OPGW).	5/31/2023	$11.40	AE	3/23/2018
3	s1629	Build a new six breaker 69 kV Gas Insulated Substation (GIS) ring bus at Harbor Beach. Install two new 69 kV sources from Huron and from Ontario. Retire the two existing Brigantine Island 23 kV substations and 23 kV lines.	5/31/2022	$70.3	AE	3/23/2018

New Jersey – 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	s1647	Construct a new 69/13 kV station in Cranbury, construct a 230/69 kV station at Plainsboro (Hunters Glen) and reconfigure 69 kV bus at Harts Lane and Sand Hills.	11/30/2021	$307	PSE&G	3/23/2018
		Reconfigure 230 kV bus, install a 69 kV ring bus, and install one 230/69 kV transformer at Plainsboro (Hunters Glen)	11/30/2021		PSE&G	3/23/2018
		Install a 69 kV ring bus, two 69/13 kV transformers, and an 18 MVAR capacitor bank at new Cranbury station.	11/30/2021		PSE&G	3/23/2018
		Convert 69 kV straight bus to 69 kV ring bus at Harts Lane to provide a new line position	11/30/2021		PSE&G	3/23/2018
		Convert 69 kV straight bus to 69 kV breaker-and-a-half bus at Sand Hills to resolve voltage issues and provide a line position	11/30/2021		PSE&G	3/23/2018
		Construct a 69 kV network between Cranbury, Harts Lane, Hunters Glen, Penns Neck, and Sand Hills	11/30/2021		PSE&G	3/23/2018
5	s1674	Eliminate Academy St and construct a new station at a nearby location	12/31/2022	$90	PSE&G	5/25/2018
		Purchase new property in Jersey City and install a 69 kV ring bus and two 69/13 kV transformers to feed Academy St. load	12/31/2022		PSE&G	5/25/2018
		Construct a 69 kV network between the following stations: Greenville, Kearny, Madison and the new station.	12/31/2022		PSE&G	5/25/2018

New Jersey – TO Supplemental Projects (cont.)

(Greater than $5 million)

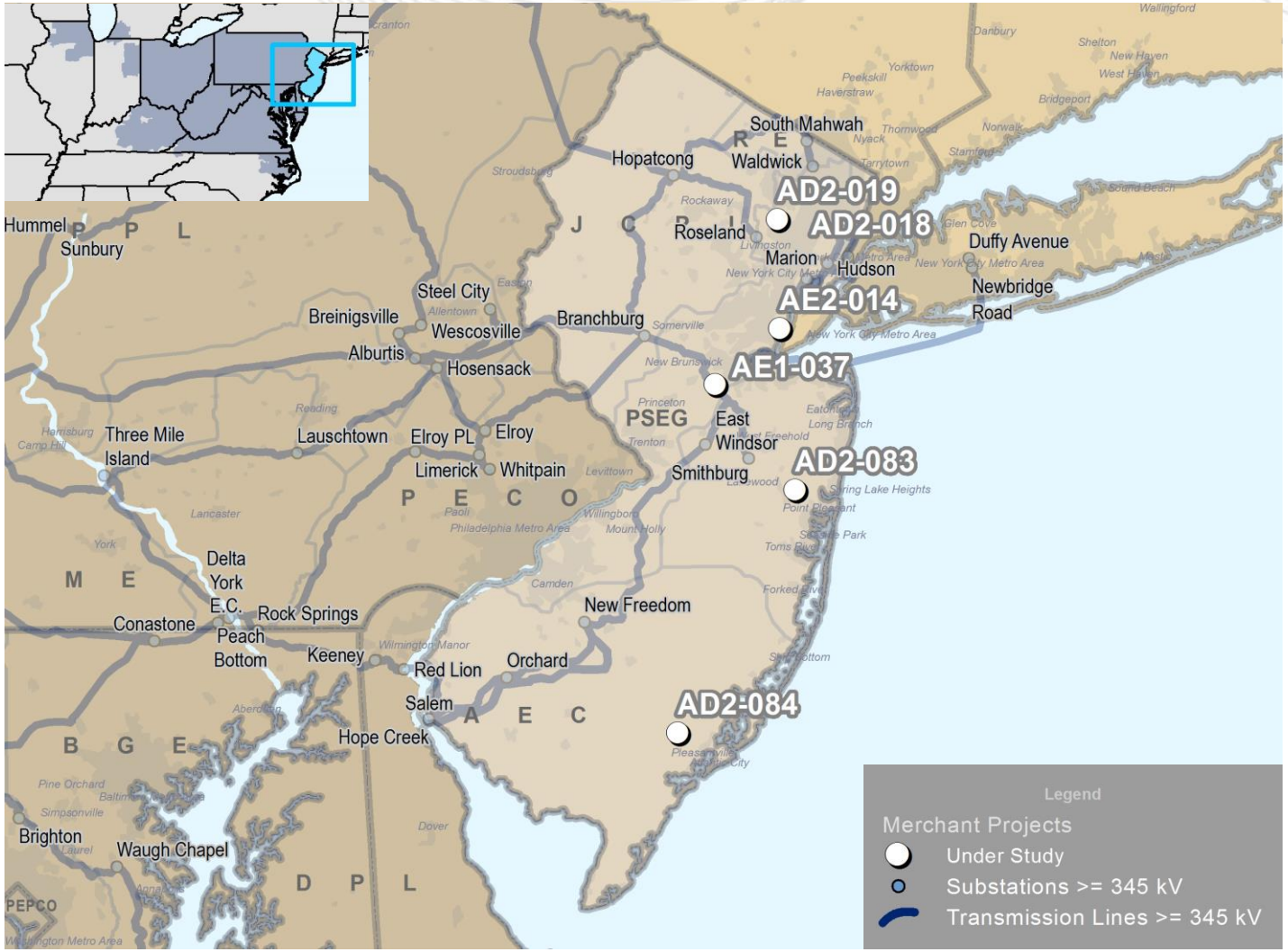
Map ID	Project	Description	Projected In-Service Date	Project Cost ($M)	TO Zone	2018 TEAC Review
6	s1675	Eliminate State St and construct a new station at a nearby location. Raise and rebuild Woodlynne above FEMA flood elevation	6/1/2022	$153	PSE&G	5/25/2018
		Install a 69 kV ring bus and three 69/4 kV transformers at a new location to feed State St load	6/1/2022		PSE&G	5/25/2018
		Relocate Woodlynne station by purchasing adjacent property and installing a 69 kV ring bus with two 69/13 kV transformers	6/1/2022		PSE&G	5/25/2018
		Construct a 69 kV network between the following stations: Camden, Gloucester, Delair, Locust St, Woodlynne, and the new station	6/1/2022		PSE&G	5/25/2018
7	s1752	Upgrade the Hackensack 26 kV station to 69 kV	5/31/2023	$83	PSE&G	10/29/2018
		Install a 69 kV ring bus with three 69/4 kV transformers at Hackensack station	5/31/2023		PSE&G	10/29/2018
		Construct a 69 kV network between Hackensack, Hasbrouck Heights, Maywood, and New Milford	5/31/2023		PSE&G	10/29/2018
8	s1753	Upgrade the Plauderville 26 kV Station to 69 kV	5/31/2023	$94	PSE&G	10/29/2018
		Purchase nearby property to accommodate new construction (Plauderville 69 kV)	5/31/2023		PSE&G	10/29/2018
		Install Plauderville 69 kV ring bus with two 69/13 kV transformers	5/31/2023		PSE&G	10/29/2018
		Construct a 69 kV network between East Rutherford, Maywood, Passaic and Plauderville	5/31/2023		PSE&G	10/29/2018

New Jersey – TO Supplemental Projects (cont.)

(Greater than $5 million)

Map ID	Project	Description	Projected In-Service Date	Project Cost ($M)	TO Zone	2018 TEAC Review
9	s1722	Construct a 230/69/4kV station near the location of Orange Valley	10/31/2022	$328	PSE&G	8/24/2018
10	s1723	Relocate Lakeside (69kV station) outside of the FEMA flood zone.	10/31/2022	$106	PSE&G	8/24/2018
11	s1724	Raise and rebuild Toney's Brook above FEMA flood elevation	10/31/2022	$98	PSE&G	8/24/2018
12	s1749	Re-configure the existing NJT Meadow 230 kV substation with 4-bay GIS breaker-and-half configuration	12/31/2021	$127	PSE&G	9/13/2018
	s1626	Convert the Washington 69 kV line bus to a ring bus to bring station up to AEC's current design standard while accommodating the additional transformer.	5/31/2021	$5.6	AEC	3/23/2018
	s1627	Rebuild line 0735 No. 2 between Middle, Rio Grande and Cape May substations. All structures, conductor and static wire will be replaced with new weathering steel poles, conductor and Optical Ground Wire (OPGW).	10/25/2023	$9.9	AEC	3/23/2018

New Jersey - Merchant Transmission Project Requests



New Jersey - Merchant Transmission Project Requests

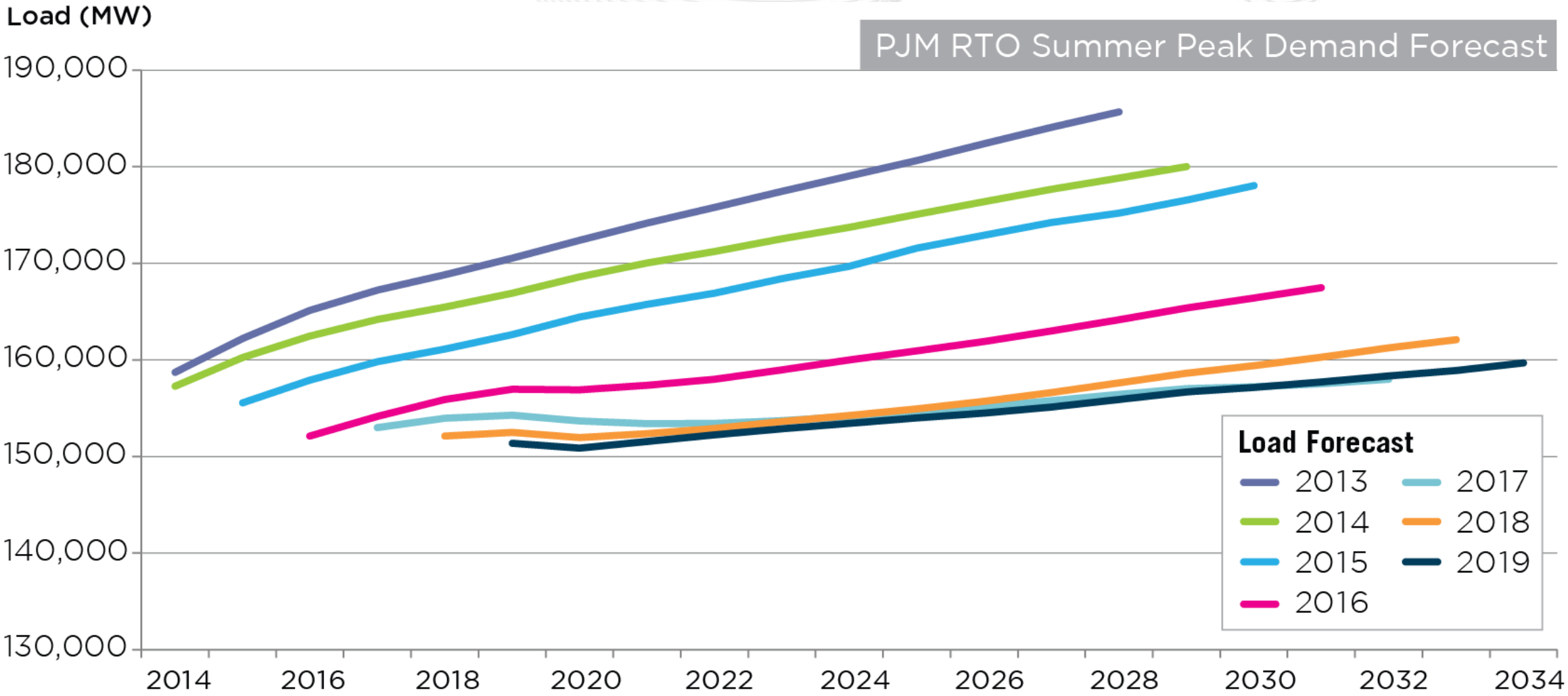
Queue	Project Name	Maximum Output (MW)	Status	Projected In-Service Date	TO Zone
AD2-083*	Larrabee 230 kV	1,100	Active	12/31/2025	JCP&L
AD2-084*	Cardiff 230 kV	1,100	Active	12/31/2025	AE
AD2-018	Roseland-Cedar Grove	63	Active	6/1/2019	PSE&G
AD2-019	Williams-Cedar Grove	63	Active	6/1/2019	PSE&G
AE1-037*	Deans 500 kV	1,200	Active	12/31/2025	PSE&G
AE2-014*	Sewaren 230 kV	1,263	Active	1/1/2024	PSE&G

* **NOTE:** Merchant projects to supportive future off-shore wind generation.

Planning
Load Forecast

PJM Annual Load Forecasts

(January 2019)



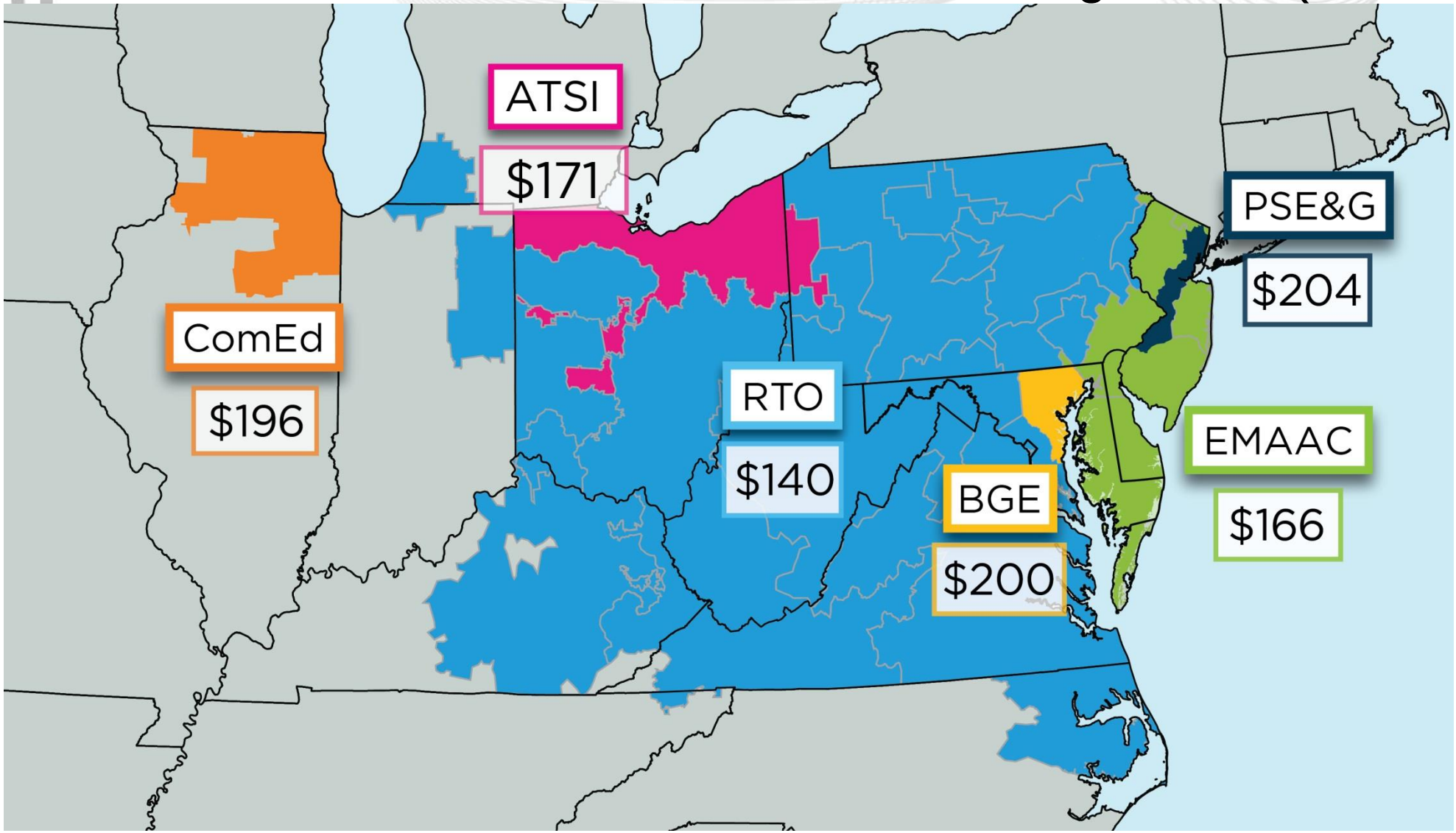
New Jersey – 2019 Load Forecast Report

Transmission Owner	Summer Peak (MW)			Winter Peak (MW)		
	2019	2029	Growth Rate (%)	2018/19	2028/29	Growth Rate (%)
Atlantic City Electric Company	2,450	2,388	-0.3%	1,590	1,550	-0.3%
Jersey Central Power and Light	5,914	5,912	0.0%	3,710	3,690	-0.1%
Public Service Electric and Gas Company	9,904	9,753	-0.2%	6,688	6,641	-0.1%
Rockland Electric Company	404	402	0.0%	193	189	-0.2%
PJM RTO	151,358	156,689	0.3%	131,082	136,178	0.4%

Markets

Capacity Market Results

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



New Jersey – Cleared Resources in 2021/22 Auction

(May 23, 2018)

	Cleared MW (Unforced Capacity)	Change from 2020/21 Auction
Generation	12,094	(537)
Demand Response	667	94
Energy Efficiency	468	270
Total	13,230	(174)

EMAAC Locational Clearing Price	PSE&G Locational Clearing Price
$166	$204

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

New Jersey – Offered and Cleared Resources in 2021/22 Auction

(May 23, 2018)

		Unforced Capacity
Generation	Offered MW	13,839
	Cleared MW	12,094
Demand Response	Offered MW	686
	Cleared MW	667
Energy Efficiency	Offered MW	493
	Cleared MW	468
Total Offered MW		15,018
Total Cleared MW		13,230

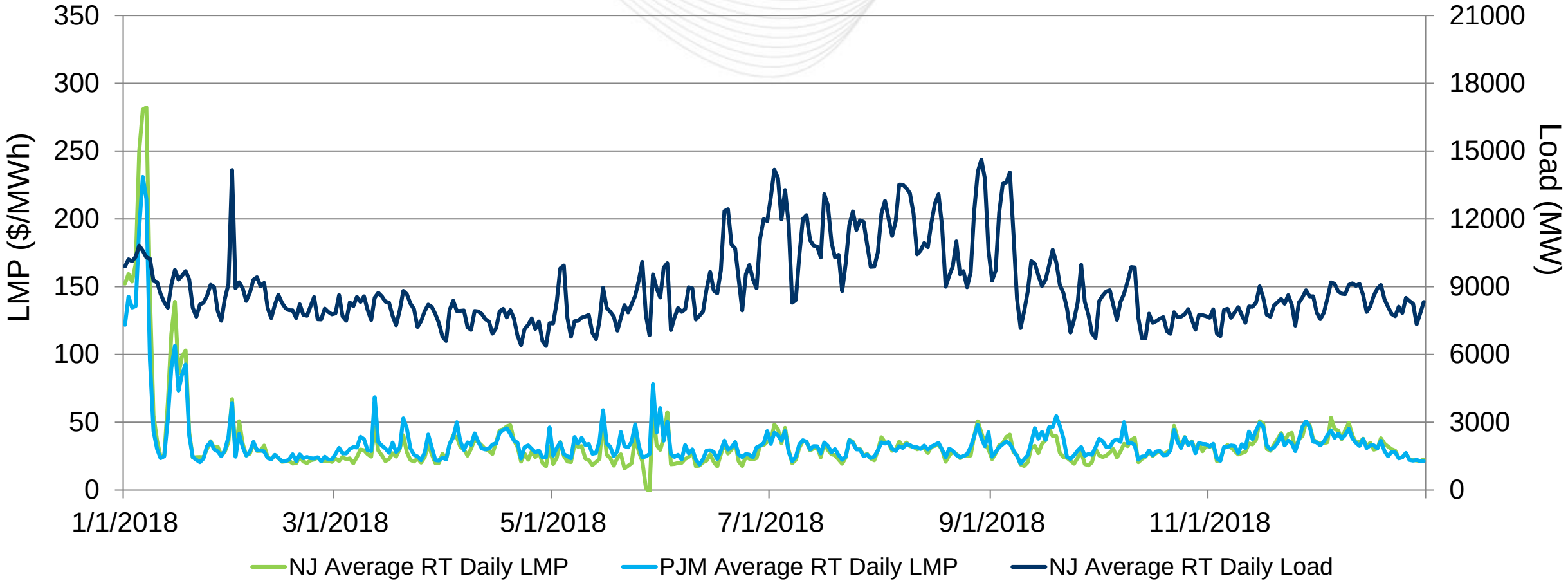
Markets

Market Analysis

New Jersey – Average Daily LMP and Load

(January 1, 2018 – December 31, 2018)

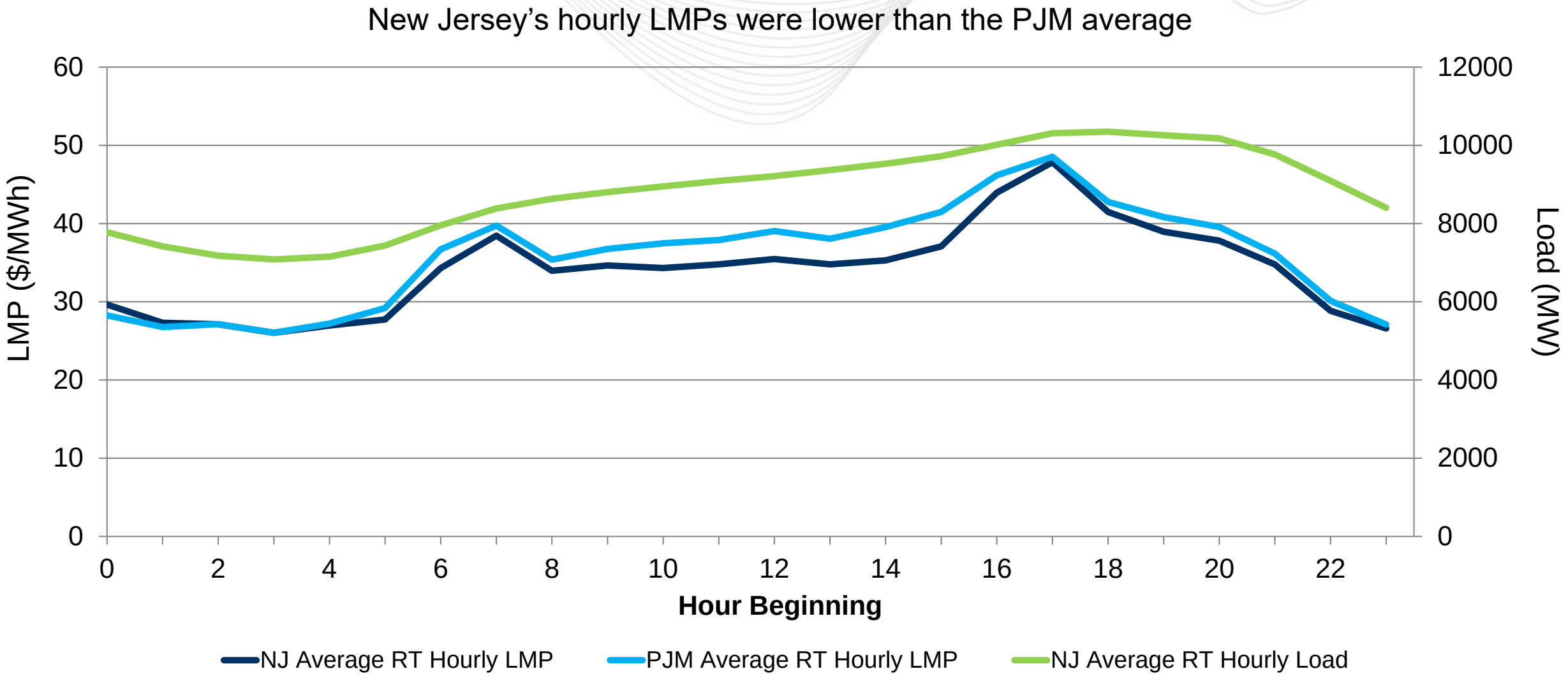
New Jersey's average daily LMPs generally aligned with the PJM average daily LMP



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

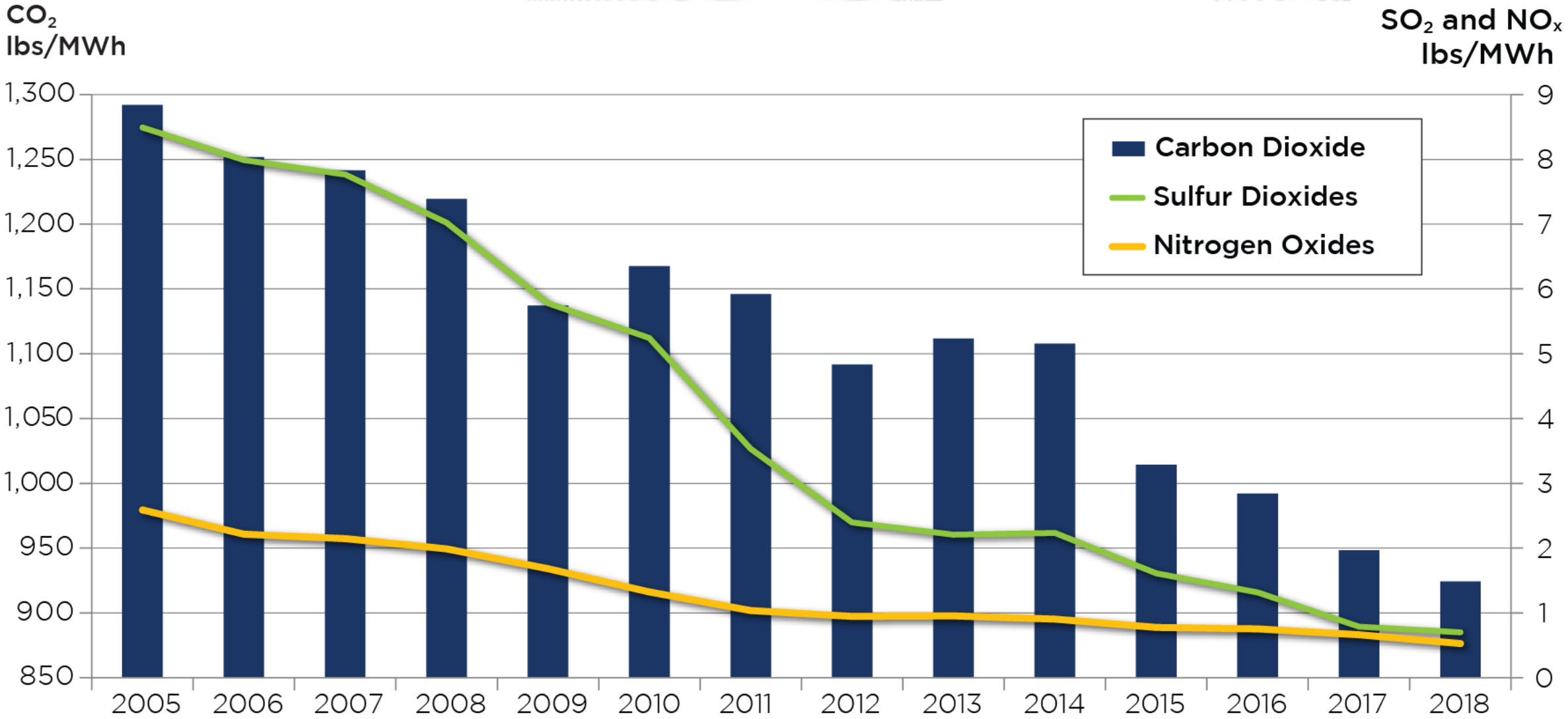
New Jersey – Average Hourly LMP and Load

(January 1, 2018 – December 31, 2018)



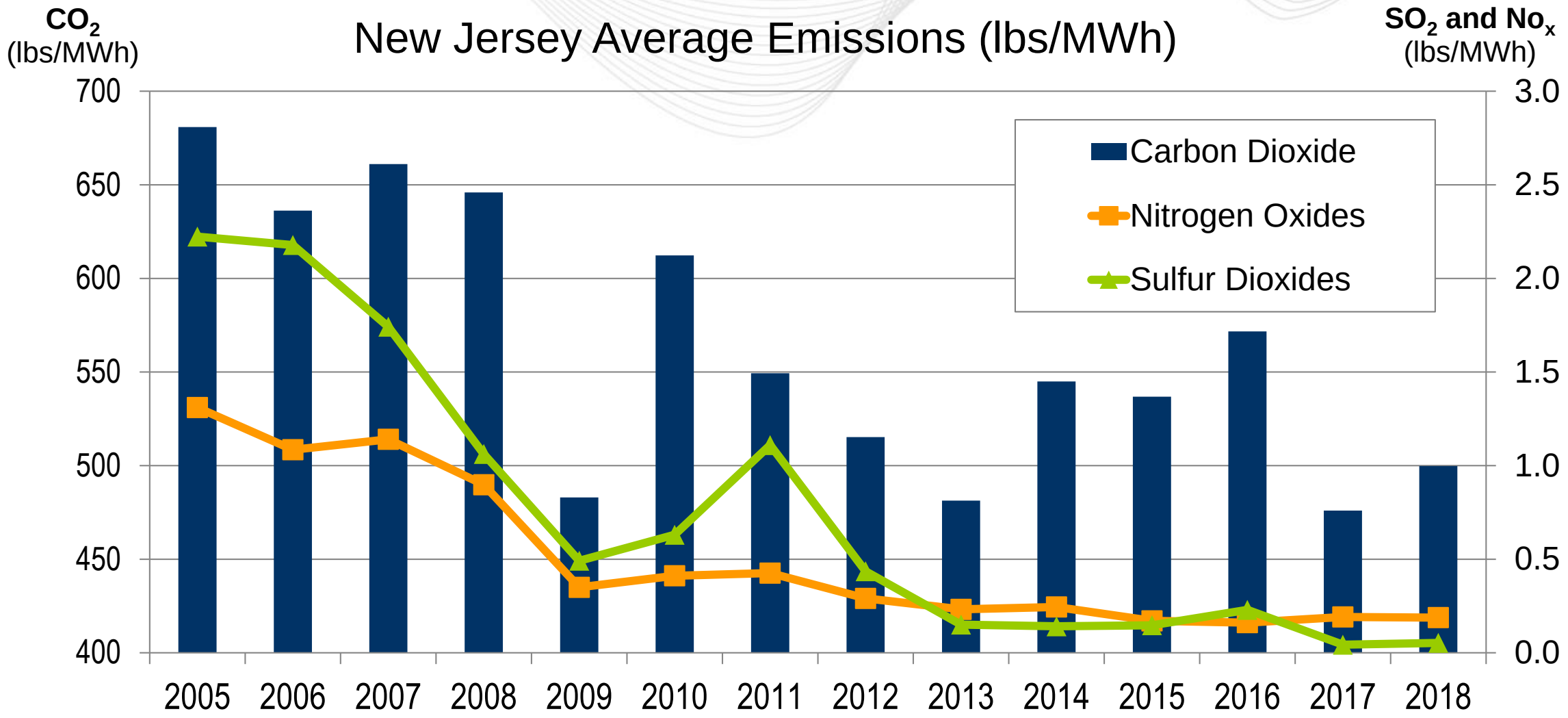
Operations
Emissions Data

2005-2018 PJM Average Emissions



New Jersey – Average Emissions (lbs/MWh)

(February 4, 2019)



Appendix

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/planning/rtep-upgrades-status/construct-status.aspx