



Virginia State Report

July 2017



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- **Existing Capacity:** Natural gas represents approximately 43 percent of the total installed capacity in Virginia while coal represents approximately 16 percent. This differs from PJM where natural gas and coal are relatively even at 35 and 34 percent respectively.
- **Interconnection Requests:** Natural gas represents nearly 72 percent of new interconnection requests in Virginia.
- **Deactivations:** Approximately 0 MW of capacity and 2MW of energy in Virginia retired in 2016, compared to 392 MW of capacity that retired RTO-wide in 2016.
- **RTEP 2016:** Virginia RTEP 2016 projects total more than \$88 million in investment, all of which represents baseline projects.
- **Load Forecast:** Virginia load growth is nearly flat, averaging between -.1 and .6 percent per year over the next 10 years. This aligns with PJM RTO load growth projections.

- **2020/21 Capacity Market:** Compared to the PJM footprint, Virginia's distribution of generation, demand response and energy efficiency is similar.
- **6/1/14 – 5/31/17 Performance:** Virginia's average daily locational marginal prices were consistently at or above PJM average daily LMPs. Imported resources represented 27 percent of generation produced in Virginia while natural gas averaged 26 percent.
- **Emissions:** 2016 carbon dioxide emissions are slightly down from 2015; sulfur dioxides and nitrogen oxides continue to hold flat from 2015.



Planning

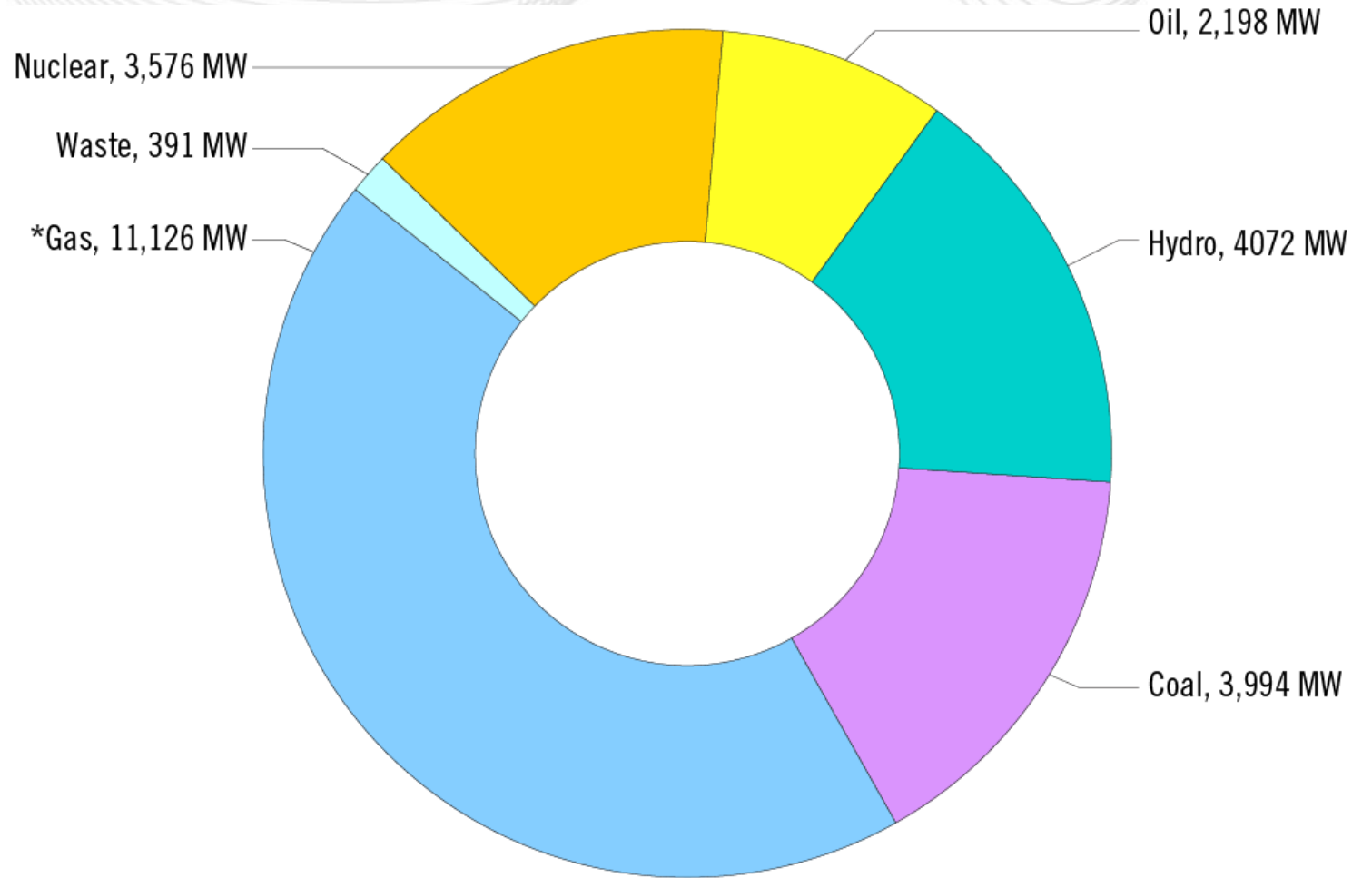
Generation Portfolio Analysis

Virginia – Existing Installed Capacity

(Capacity Rights, December 31, 2016)

In Virginia, natural gas and coal make up nearly 60 percent total installed capacity.

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



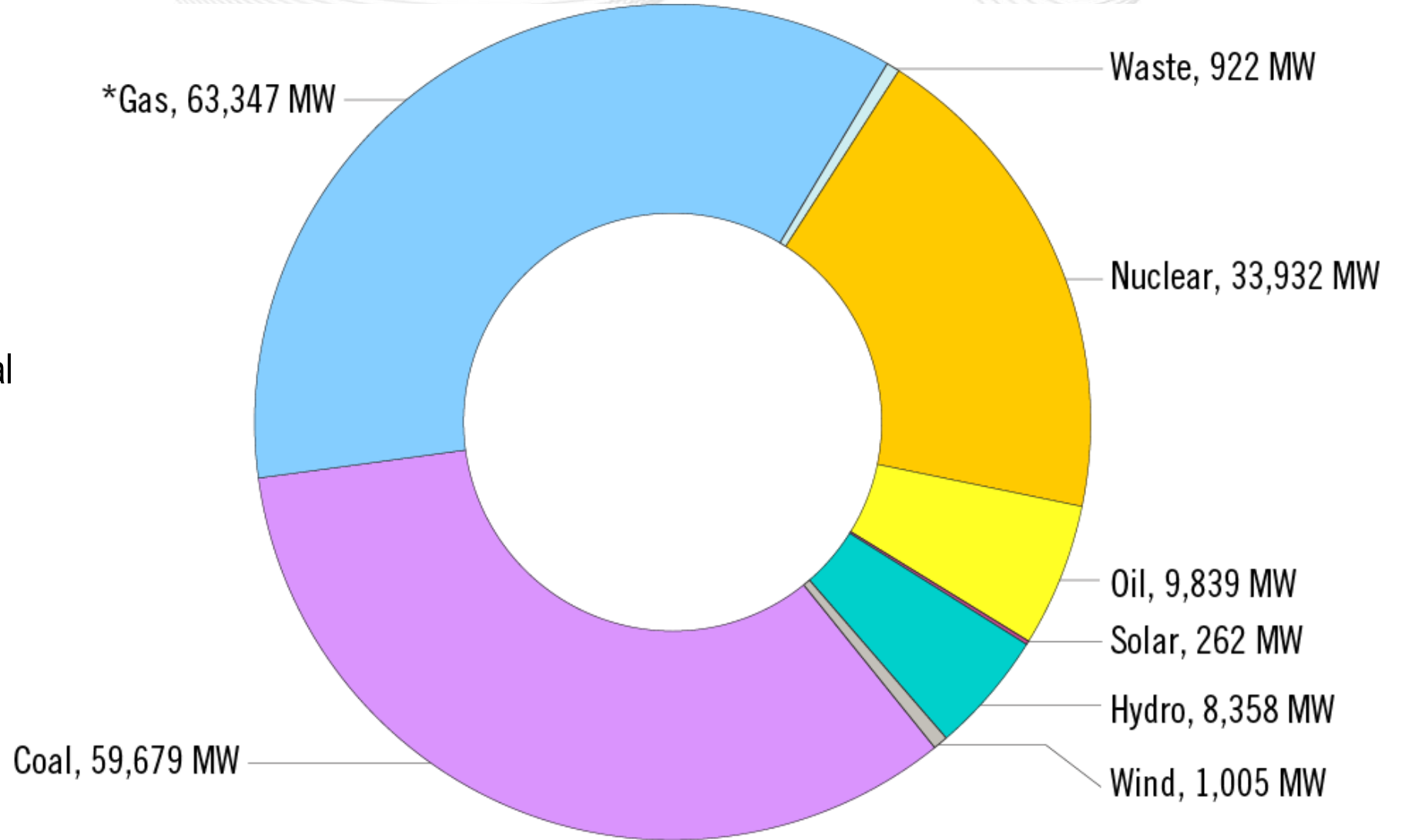
*** Gas Contains**

Natural Gas	11,008.4 MW
Other Gas	117.7 MW

Note: Capacity from generating units owned by Virginia jurisdictional utilities and included in regulated rates charged to Virginia customers, but physically located outside of Virginia, is not included in the above chart.

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

* Gas Contains	
Natural Gas	62,941 MW
Other Gas	405 MW



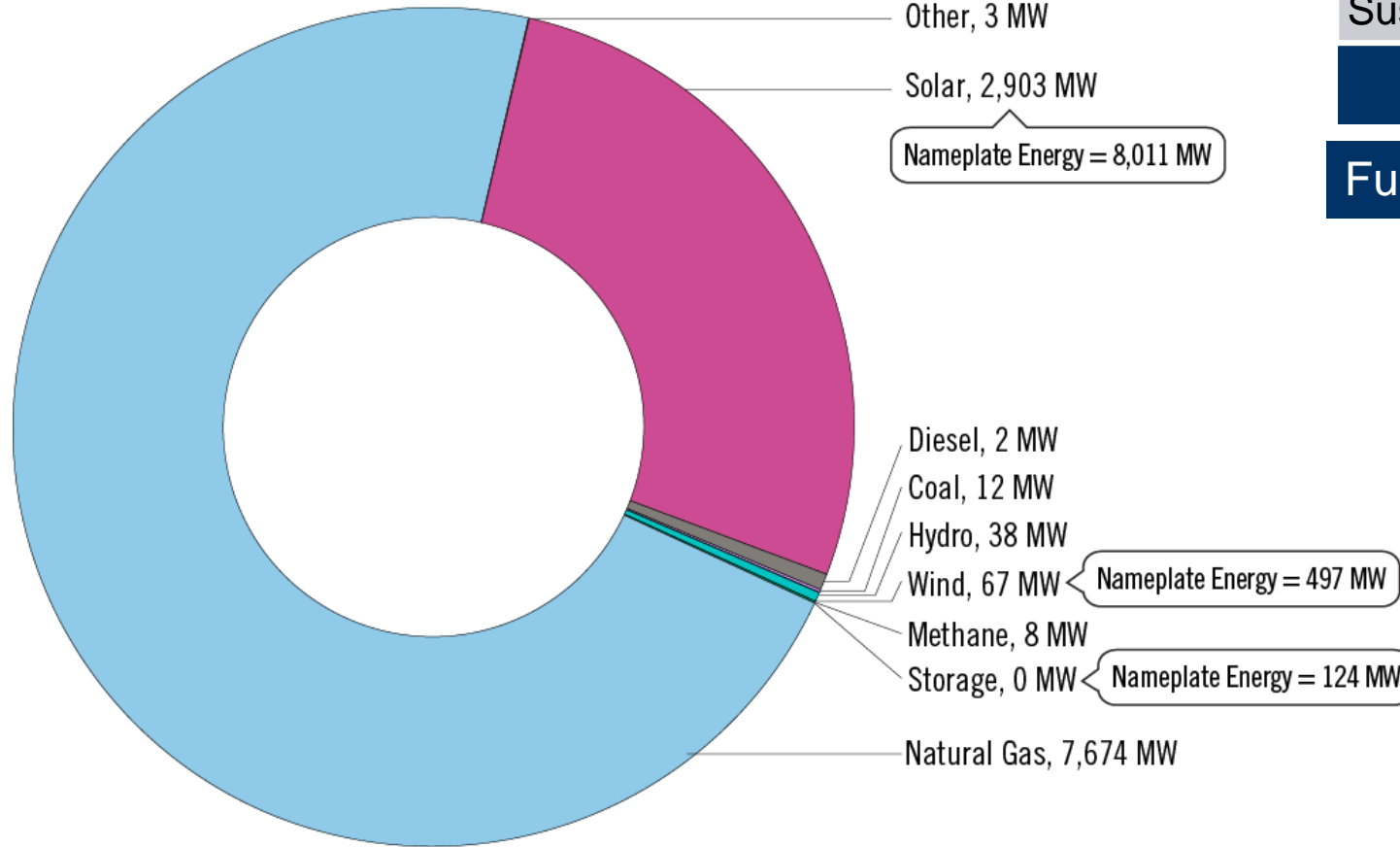


Virginia – Interconnection Requests

(Requested Capacity Rights, December 31, 2016)

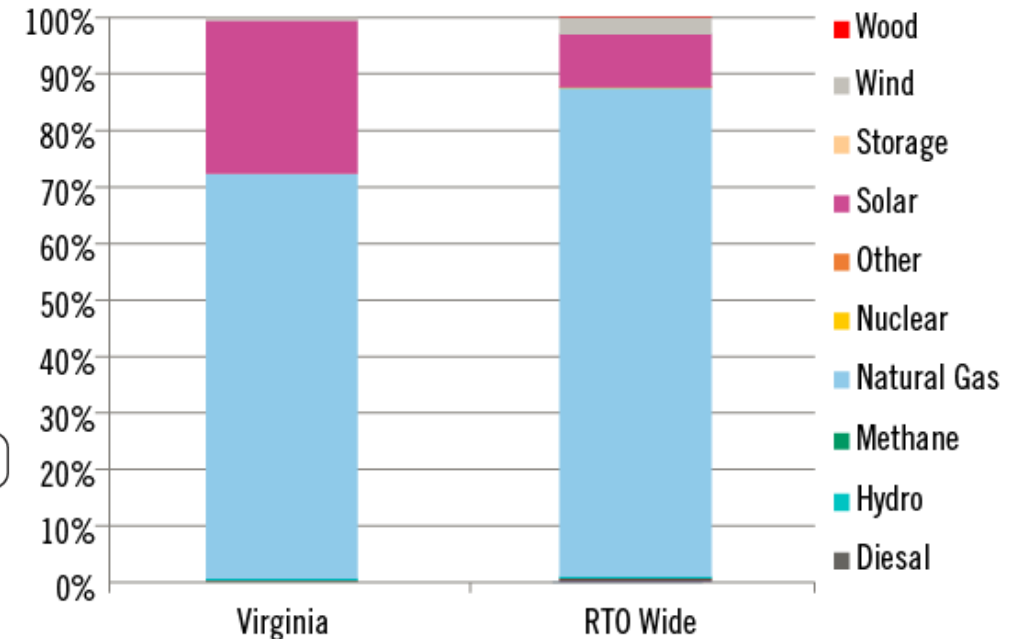
Natural gas represents nearly 72 percent of new interconnection requests in Virginia.

Total MW Capacity by Fuel Type



	MW	# of Projects
Active	7,683	94
Under Construction	3,022	26
Suspended	2	1
Total	10,708	121

Fuel as a Percentage of Projects in Queue





Virginia – Interconnection Requests

	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			147.4	5					70.0	4	217.4	9
Coal			693.7	7			12.0	1	35.0	2	740.7	10
Diesel	2.1	2							0.0	1	2.1	3
Hydro	34.0	1	377.5	5			4.0	1	254.0	2	669.5	9
Methane			94.1	13			8.0	1	81.8	11	183.9	25
Natural Gas	4,864.4	8	4,295.5	34			2,810.0	5	13,812.3	30	25,782.2	77
Nuclear			350.0	8					1,570.0	1	1,920.0	9
Oil			322.2	6					40.0	2	362.2	8
Solar	2,722.0	74	61.8	12	1.9	1	179.3	16	402.2	32	3,367.2	135
Storage	0.0	3							0.0	3	0.0	6
Other	3.4	2	0.0	1					136.3	2	139.7	5
Wind	57.5	4					9.1	2	368.6	24	435.1	30
Wood			4.0	1					57.0	2	61.0	3
Total	7,683.3	94	6,346.3	92	1.9	1	3,022.4	26	16,827.1	116	33,881.0	329

Virginia – Progression History Interconnection Requests

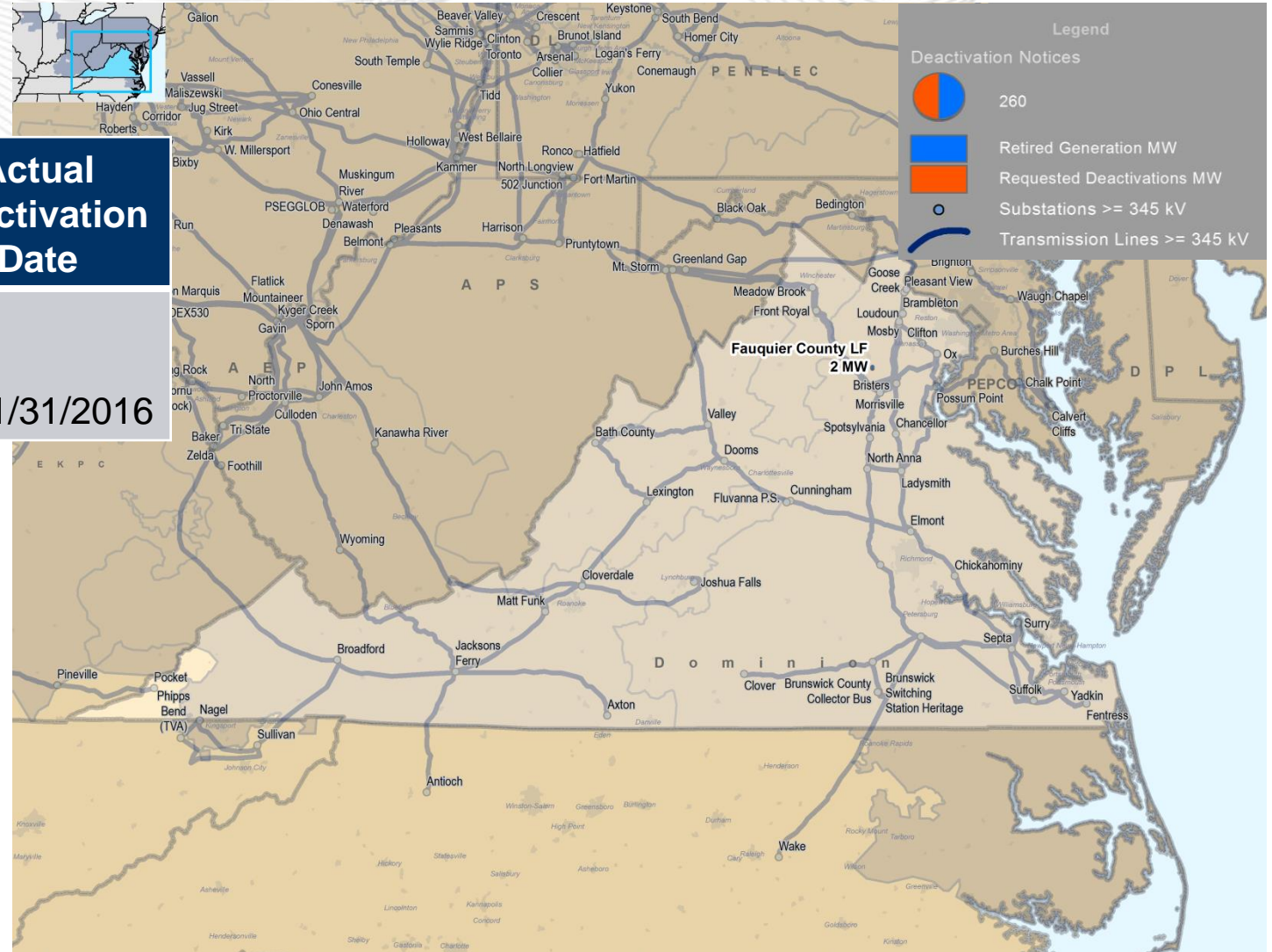
(Requested Capacity Rights, 1999 - 2016)



Following Final Agreement execution, 1,850 MW of capacity withdrew from PJM's interconnection process. Another 2,926 MW have executed agreements but were no in service as of December 31, 2016. Overall, 25% of requested capacity MW reaches commercial operation.

Virginia – 2016 Actual Generation Deactivations

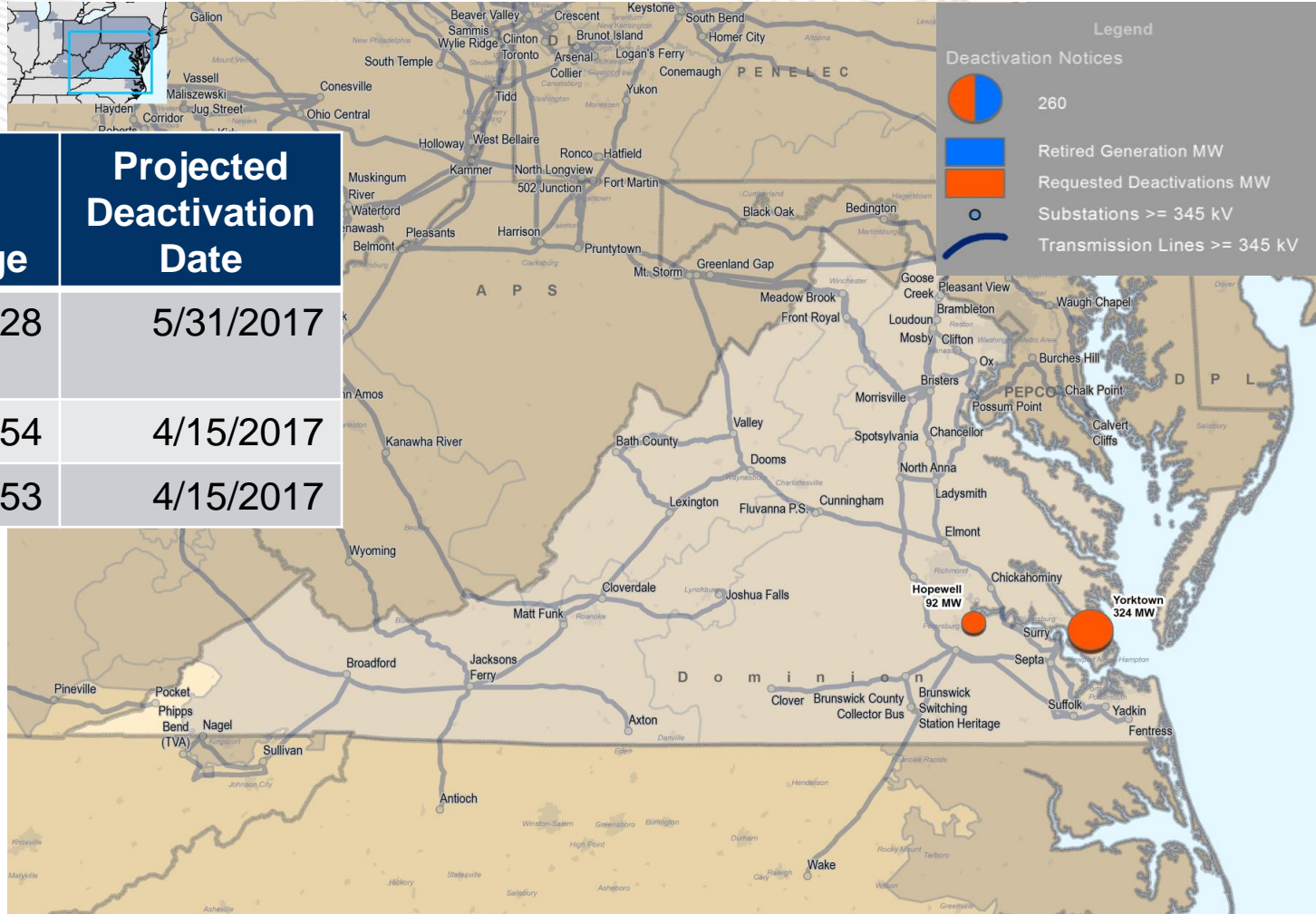
Unit	MW Capacity	TO Zone	Age	Actual Deactivation Date
Fauquier County Landfill	0	DOM	11	1/31/2016



Summary:

- 1 generating unit in VA deactivated. Fauquier County Landfill comprised 0 MW capacity and 2 MW energy
- 11 generating units totaling 392 MW of capacity deactivated in PJM

Virginia – 2016 Projected Generation Deactivations



Unit	MW Capacity	TO Zone	Age	Projected Deactivation Date
Hopewell James River Cogeneration	92	DOM	28	5/31/2017
Yorktown 1	159	DOM	54	4/15/2017
Yorktown 2	165	DOM	53	4/15/2017

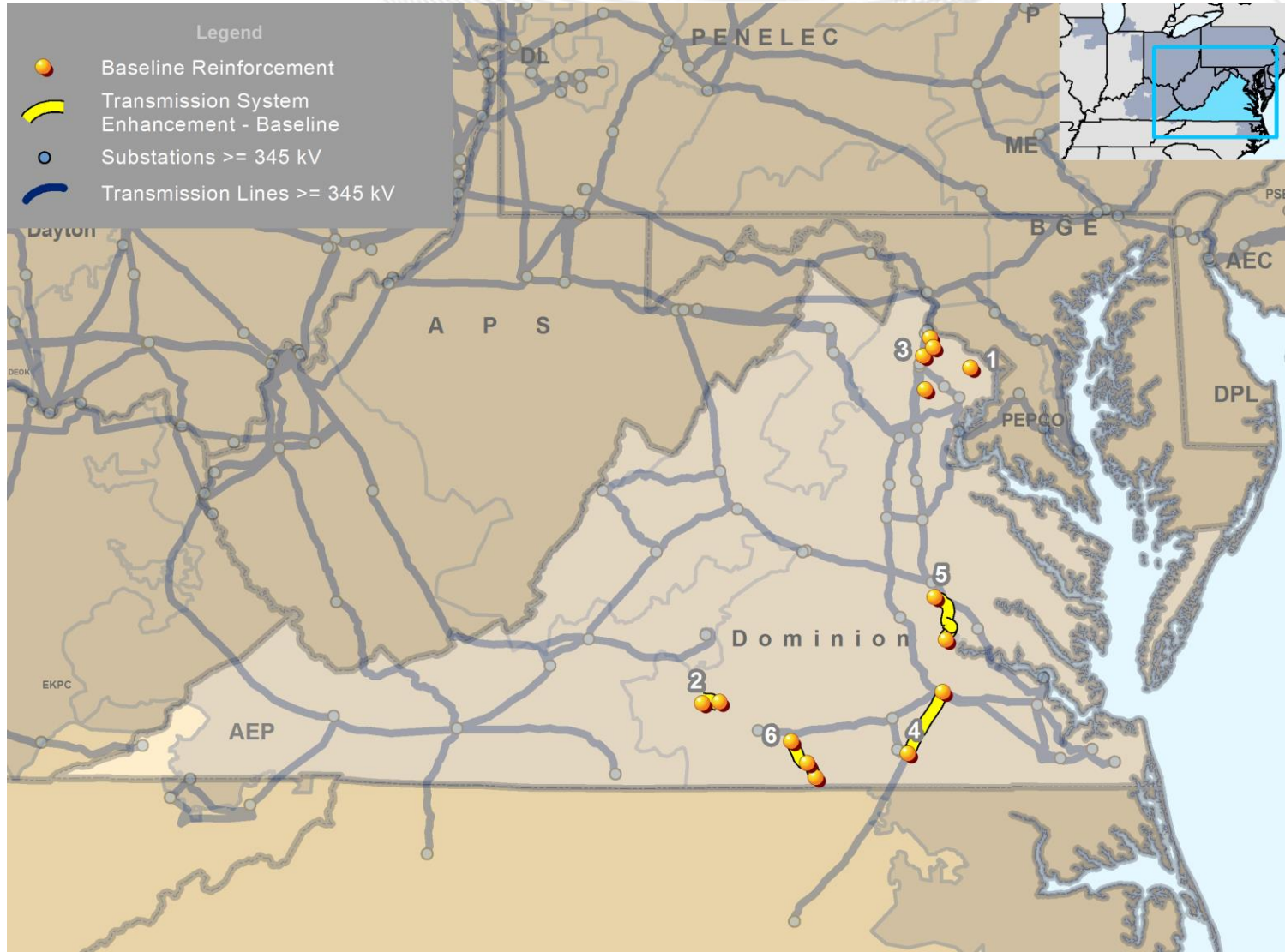
Summary:

- Yorktown units 1 and 2 continued to operate in 2016 under an RMR and changed their deactivation date to April 2017*
- 23 generating units across PJM announced their intent to deactivate, ranging in date from 2016 - 2020.

*As of July 2017, Yorktown Units 1 and 2 are currently operating under DOE section 202 (c) emergency authorization on a 90-day renewable term until the Dominion Skiffes Creek transmission project can be completed in approximately 18 to 20 months.

Planning

Transmission Infrastructure Analysis



Virginia Baseline Project Driver

Map ID	Project ID	Project	Baseline Load Growth/ Deliverability & Reliability	Congestion Relief - Economic	Operational Performance	Generator Deactivation	TO Criteria Violation	Required Date	Cost (\$M)	Designated Entity*	2016 TEAC Review
1	b1696.1	Replace the Idylwood 230 kV '25112' breaker with 50 kA breaker	•					6/1/2017	\$0.35	Dominion	7/26/2016
	b1696.2	Replace the Idylwood 230 kV '209712' breaker with 50 kA breaker	•					6/1/2017	\$0.35	Dominion	7/26/2016

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

Virginia Baseline Project Driver

Map ID	Project ID	Project	Baseline Load Growth/ Deliverability & Reliability	Congestion Relief - Economic	Operational Performance	Generator Deactivation	TO Criteria Violation	Required Date	Cost (\$M)	Designated Entity*	2016 TEAC Review
2	b2719.1	Expand Perth substation and add a 115kV four breaker ring.					•	6/1/2017	\$8.20	Dominion	12/1/2016
	b2719.2	Extend the Hickory Grove DP tap 0.28 miles to Perth and terminate it at Perth.					•	6/1/2017	\$0.00	Dominion	12/1/2016

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

Virginia Baseline Project Driver

Map ID	Project ID	Project	Baseline Load Growth/ Deliverability & Reliability	Congestion Relief - Economic	Operational Performance	Generator Deactivation	TO Criteria Violation	Required Date	Cost (\$M)	Designated Entity*	2016 TEAC Review
2	b2719.3	Split Line #31 at Perth and terminate it into the new ring bus with 2 breakers separating each of the line terminals to prevent a breaker failure from taking out both 115 kV lines.					●	6/1/2017	\$0.00	Dominion	12/1/2016

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

Virginia Baseline Project Driver

Map ID	Project ID	Project	Baseline Load Growth/ Deliverability & Reliability	Congestion Relief - Economic	Operational Performance	Generator Deactivation	TO Criteria Violation	Required Date	Cost (\$M)	Designated Entity*	2016 TEAC Review
3	b2729	Optimal Capacitors Configuration: New 175 MVAR 230 kV capacitor bank at Brambleton substation, new 175 MVAR 230 kV capacitor bank at Ashburn substation, new 300 MVAR 230 kV capacitor bank at Shelhorn substation, new 150 MVAR 230 kV capacitor bank at Liber		•				12/1/2019	\$8.98	Dominion	2/11/2016

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

Virginia Baseline Project Driver

Map ID	Project ID	Project	Baseline Load Growth/ Deliverability & Reliability	Congestion Relief - Economic	Operational Performance	Generator Deactivation	TO Criteria Violation	Required Date	Cost (\$M)	Designated Entity*	2016 TEAC Review
4	b2744	Rebuild the Carson - Rogers Rd 500 kV circuit	•					6/1/2020	\$48.50	Dominion	5/12/2016
5	b2745	Rebuild 21.32 miles of existing line between Chesterfield-Lakeside 230 kV	•					6/1/2020	\$22.00	Dominion	5/12/2016

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

Virginia Baseline Project Driver

Map ID	Project ID	Project	Baseline Load Growth/ Deliverability & Reliability	Congestion Relief - Economic	Operational Performance	Generator Deactivation	TO Criteria Violation	Required Date	Cost (\$M)	Designated Entity*	2016 TEAC Review
6	b2746.2	Rebuild Line No. 1009 Ridge Rd - Chase City 115 kV, 9.5 miles, for 346 MVA summer emergency rating	•					6/1/2018	\$0.00	Dominion	7/26/2016

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

Virginia Baseline Project Driver

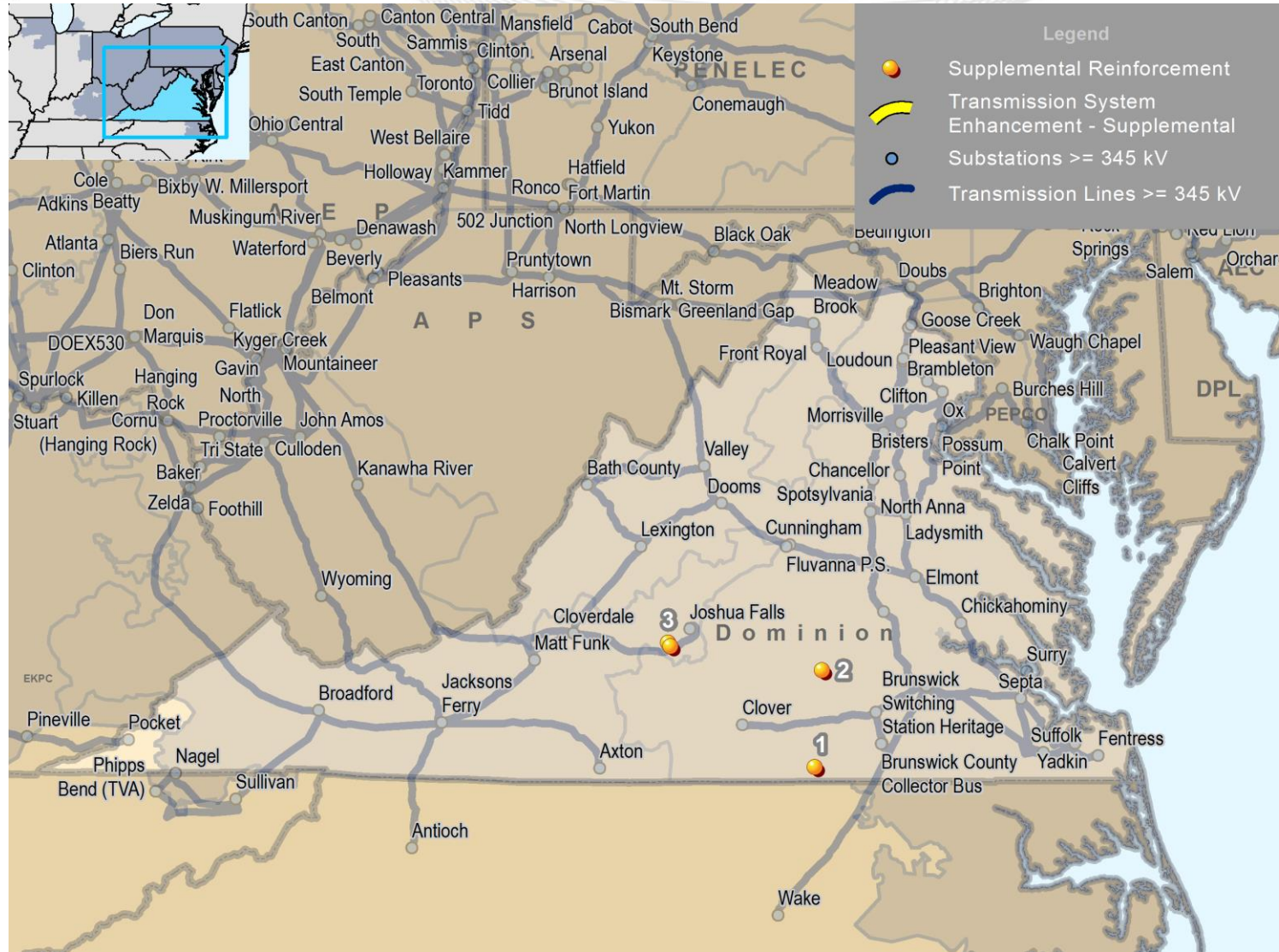
Map ID	Project ID	Project	Baseline Load Growth/ Deliverability & Reliability	Congestion Relief - Economic	Operational Performance	Generator Deactivation	TO Criteria Violation	Required Date	Cost (\$M)	Designated Entity*	2016 TEAC Review
6	b2746.3	Install a 25 MVAR 115kV capacitor bank at Ridge Road	•					6/1/2018	\$0.00	Dominion	7/26/2016

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

			Virginia Network Project Drivers						
Map ID	Project ID	Project	Generation Interconnection	Merchant Transmission Interconnection	Long-term Firm Transmission Service	Required Date	Cost (\$M)	TO Zone(s)	2016 TEAC Review
		None							

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.

Virginia – TO Supplemental Projects





Virginia – TO Supplemental Projects

Virginia Supplemental Project Driver

Map ID	Project ID	Project	Required Date	Cost (\$M)	TO Zone(s)	2016 TEAC Review
1	s0920	Build a new substation at the tap serving Beechwood DP with a 115 kV three-breaker ring to split line No. 90 and terminate the end points. Terminate the Beechwood tap into the ring	12/31/2017	\$7.40	Dominion	12/1/2016
2	s0921.1	Network 115 kV lines No. 98 and No. 158 by splitting Line No.158 between Crewe and the Jetersville tap and building a four-breaker ring switching station.	12/1/2017	\$33.80	Dominion	7/26/2016
3	s1157	Convert the existing 69 kV Lawyers Tap to 138 kV and construct a new 138 kV line from Brush Tavern to a new Lynbrook Station (retiring Lawyers Station) in order to provide two-way service to Brush Tavern, Lynbrook and George Street.	6/1/2017	\$35.00	AEP	7/26/2016

Note: Supplemental projects are transmission expansions or enhancements that are used as inputs to RTEP models, but are not required for reliability, economic efficiency or operational performance criteria, as determined by PJM.

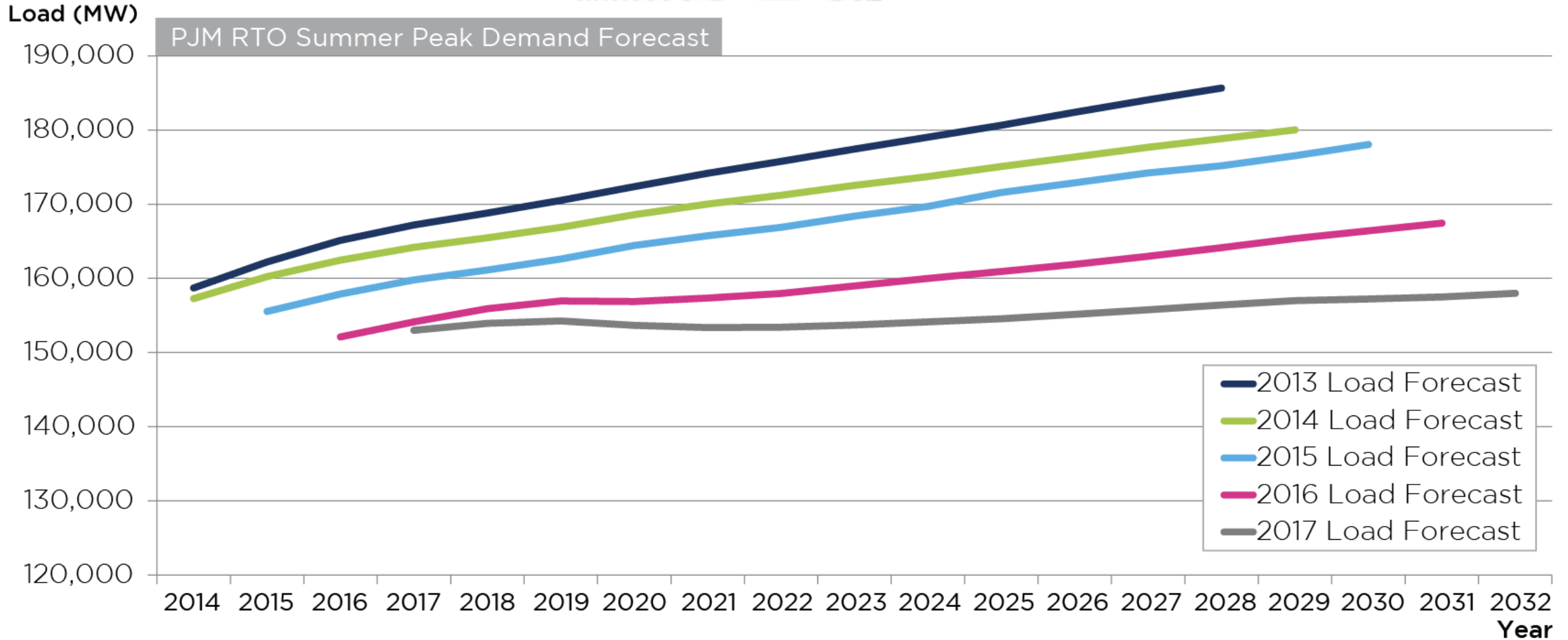


Virginia – Merchant Transmission Project Requests

Queue	Project Name	MFO	Status	In-Service Date	TO
	None				

Planning

Load Forecast





Virginia – 2017 Load Forecast Report

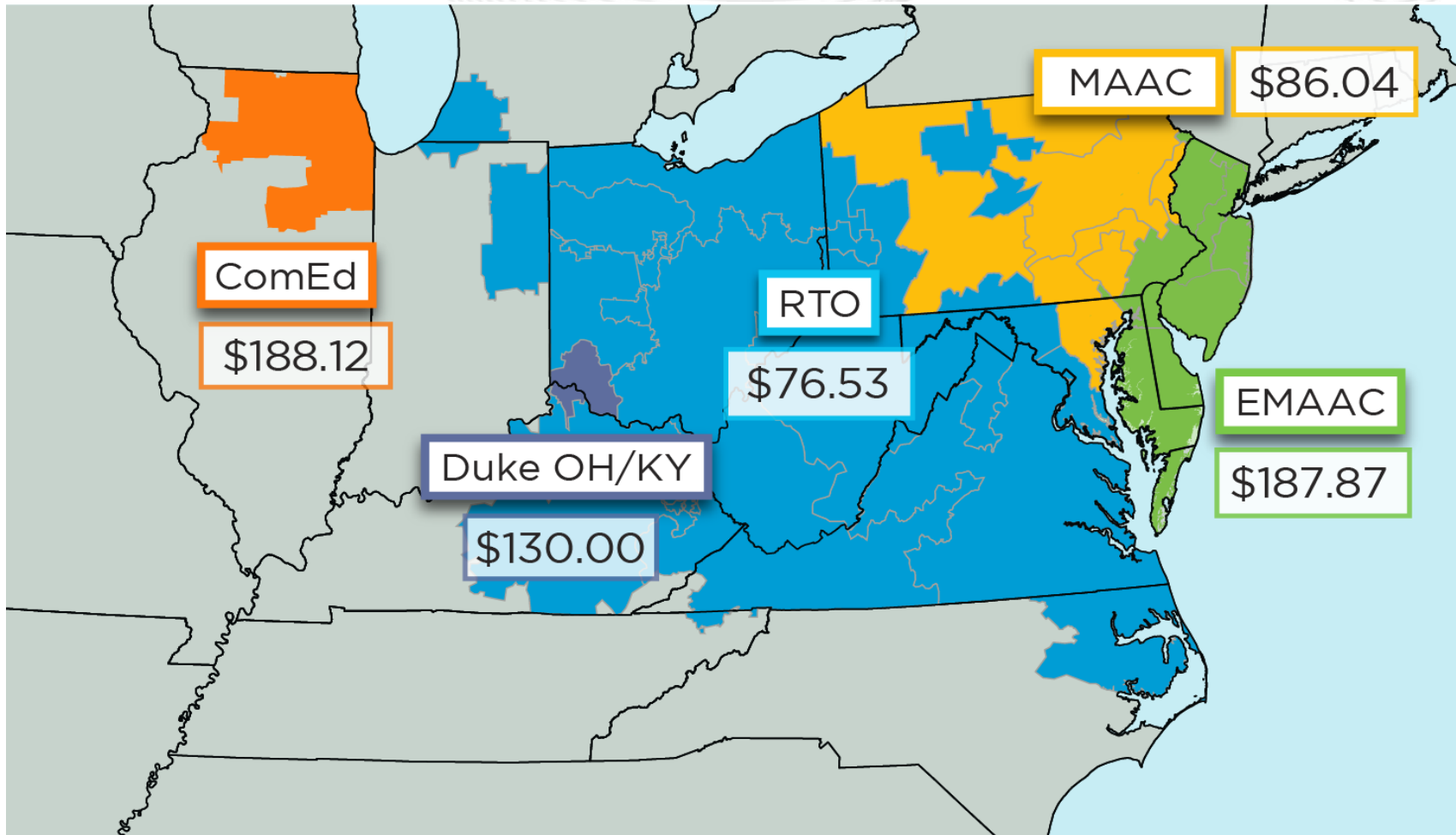
Transmission Owner	Summer Peak (MW)			Winter Peak (MW)		
	2017	2027	Growth Rate (%)	2016/17	2026/27	Growth Rate (%)
American Electric Power Company *	3,382	3,521	0.4%	4,094	4,315	0.5%
Allegheny Power *	666	688	0.3%	684	718	0.5%
Delmarva Power and Light *	145	143	-0.1%	140	143	0.2%
Dominion Virginia Power *	18,645	19,374	0.4%	16,876	17,830	0.6%
PJM RTO	152,999	155,773	0.2%	131,391	134,915	0.3%

***Note:** American Electric Power Company, Delmarva Power and Light, Allegheny Power and Dominion Virginia Power serve load other than in Virginia. 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 Virginia. Estimated amounts were calculated based on the average share of each transmission owner's real-time summer and winter peak load located in Virginia over the past five years.

***PJM's 2017 forecast reflects methodology improvements implemented in 2016:** variables to account for equipment and appliance saturation and efficiency, distributed solar generation adjustments and more refined treatment of weather data.

Markets

Capacity Market Results





Virginia - Cleared Resources in 2020/21 Auction

(May 23, 2017)

	Cleared MW (Unforced Capacity)	Change from 2019/20 Auction
Generation	24,871	(527)
Demand Response	858	(140)
Energy Efficiency	193	35
Total	25,922	(633)

RTO Locational Clearing Price

\$76.53

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 - Cleared Resources in 2020/21 Auction

(May 23, 2017)

	Cleared MW (Unforced Capacity)	Change from 2019/20 Auction
Generation	155,976	882
Demand Response	7,820	(2,528)
Energy Efficiency	1,710	195
Total	165,506	(1,450)



Virginia – Offered and Cleared Resources in 2020/21 Auction

(May 23, 2017)

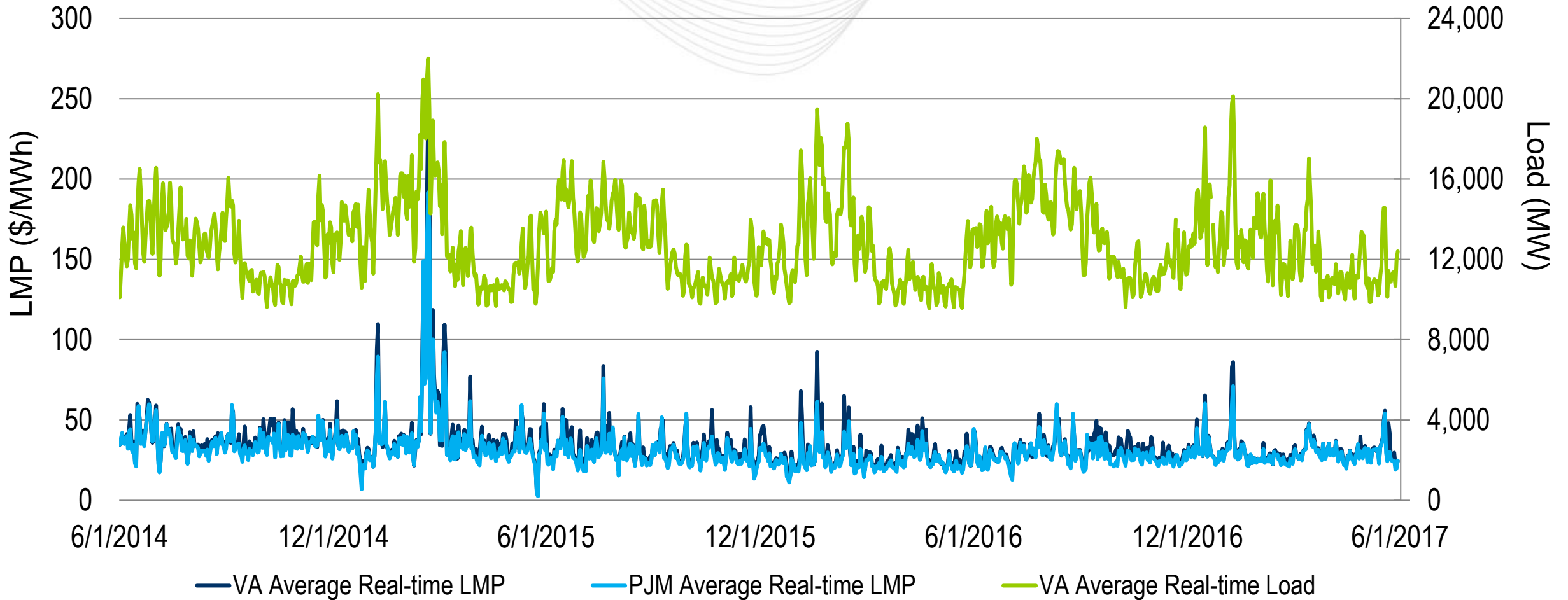
		Unforced Capacity
Generation	Offered MW	25,297
	Cleared MW	24,871
Demand Response	Offered MW	968
	Cleared MW	858
Energy Efficiency	Offered MW	294
	Cleared MW	193
Total Offered MW		26,558
Total Cleared MW		25,922

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

Virginia's average daily LMPs are at or above the PJM average daily LMP

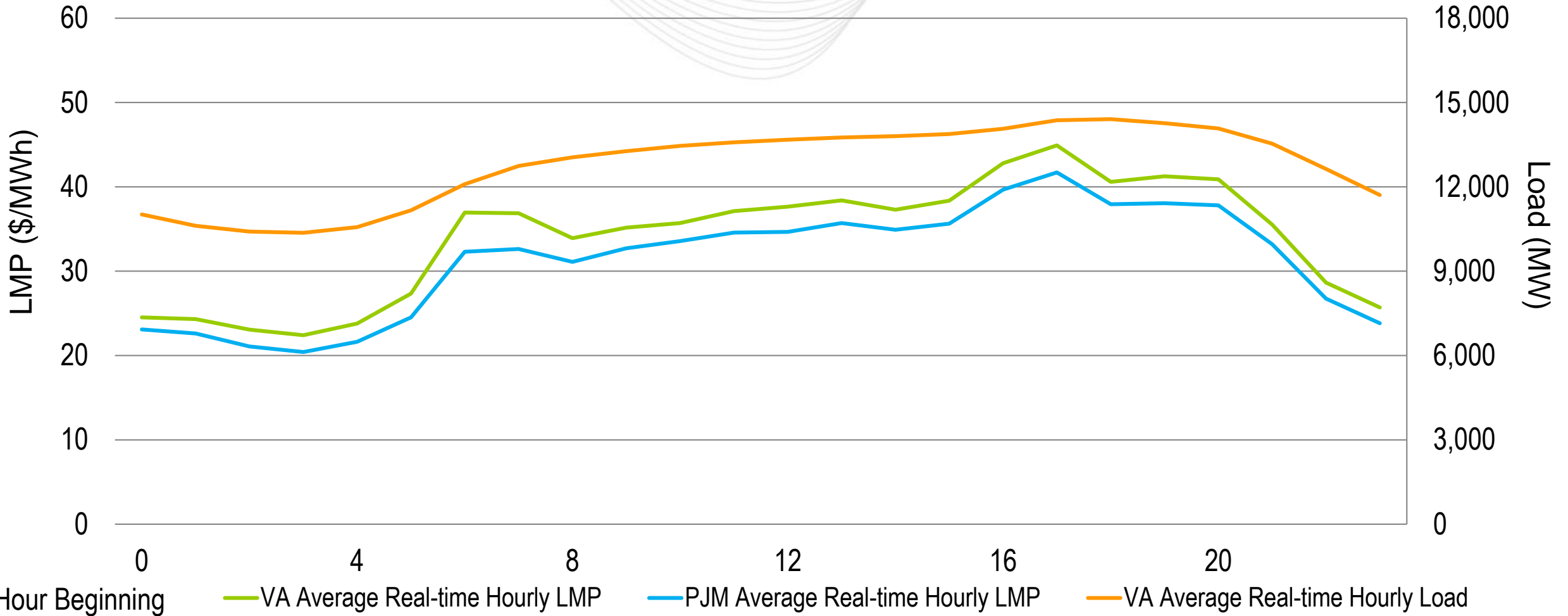




Virginia – Hourly Average LMP and Load

(June 1, 2014 – May 31, 2017)

Virginia's hourly LMPs were above the PJM average.



Operations Emissions Data

