



2016 Indiana State Report

July 2017



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- Generation Portfolio Analysis
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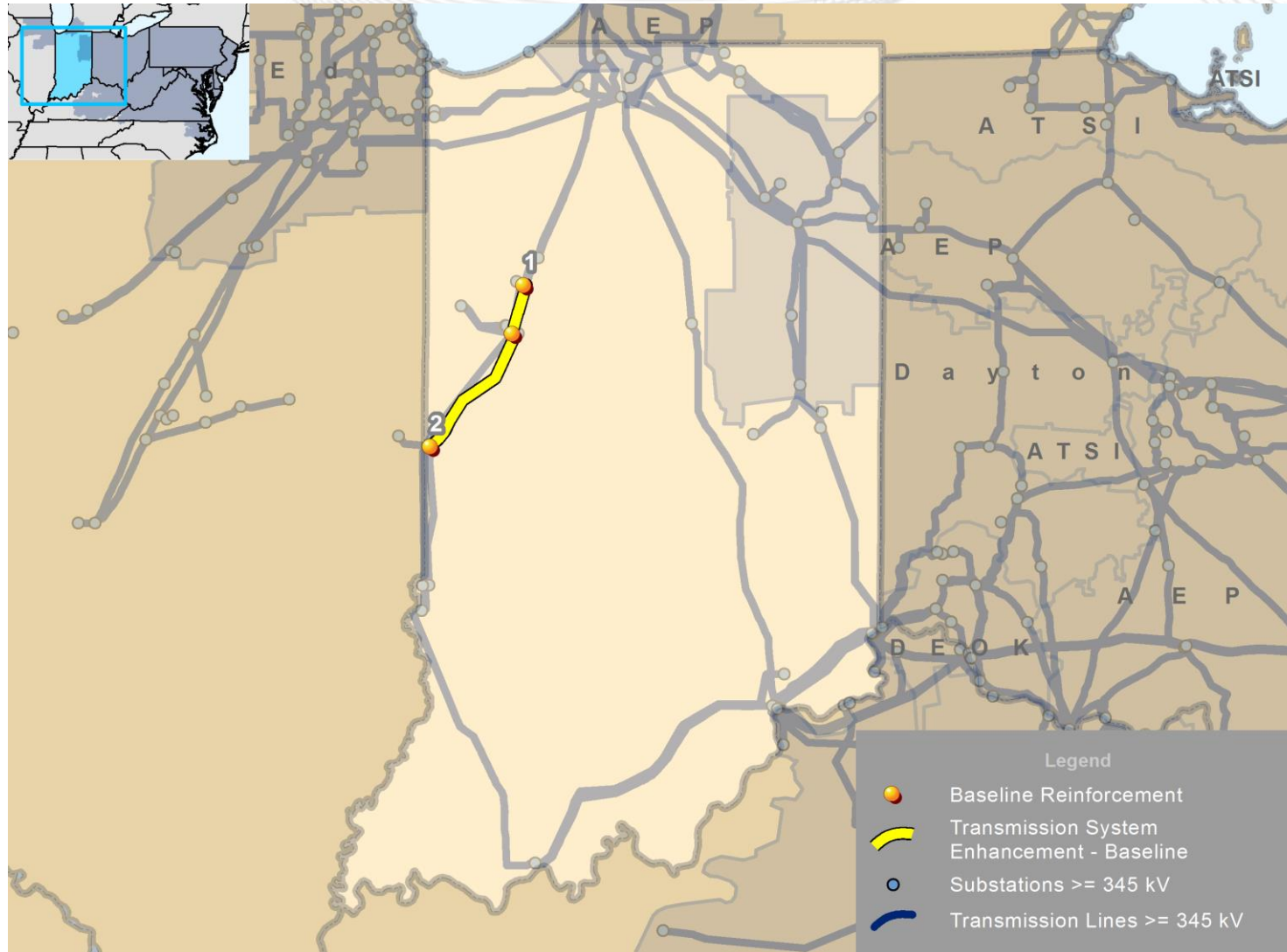
- **Existing Capacity:** Natural gas represents approximately 35 percent of the total installed capacity in Indiana while coal represents approximately 59 percent. This differs from PJM where natural gas and coal are relatively even at 35 and 34 percent respectively.
- **Interconnection Requests:** Natural gas represents approximately 82 percent of new interconnection requests in Indiana.
- **Deactivations:** No generating units in Indiana deactivated in 2016. This compares to 392 MW of capacity retirements PJM-wide in 2016.
- **Load Forecast:** Indiana load growth is nearly flat, averaging between 0.4 and 0.5 percent per year over the next 10 years. This aligns with PJM RTO load growth projections.
- **RTEP 2016:** Indiana RTEP 2016 projects total over \$107 million of investment. Over a quarter represents baseline-type projects.

- **2020/21 Capacity Market:** Compared to the PJM footprint, Indiana's distribution of generation, demand response and energy efficiency is similar.
- **6/1/14 – 5/31/17 Market Performance:** Indiana's average daily locational marginal prices were generally at or below PJM average daily LMPs. Coal resources represented 61 percent of generation produced in Indiana while gas and wind resources represented 24 and 15 percent respectively.
- **Emissions:** 2016 carbon dioxide, nitrogen oxide, and sulfur dioxide emissions all rose slightly from 2015.



Planning

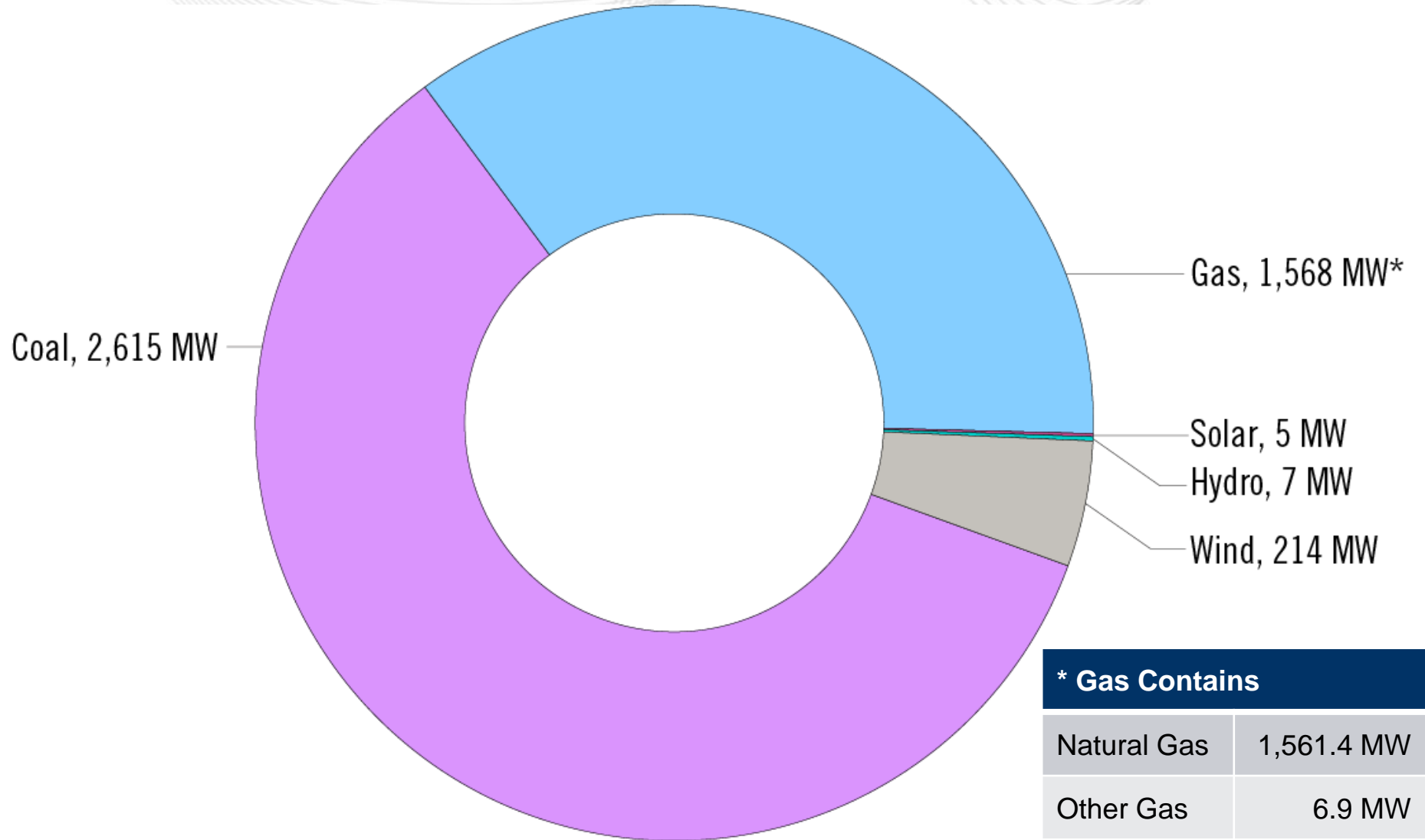
Generation Portfolio Analysis



Summary:

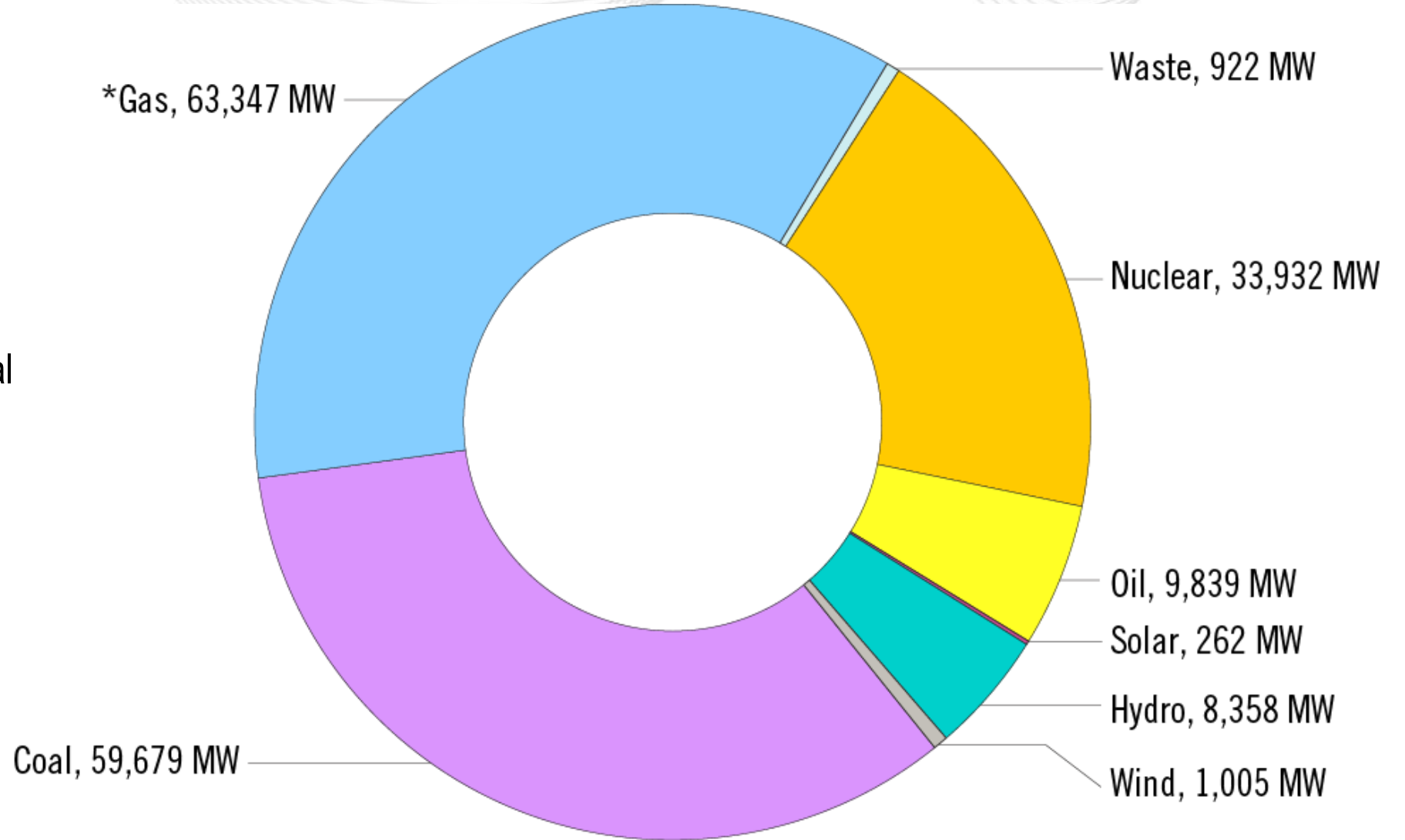
Natural gas represents approximately 35 percent of the total installed capacity in Indiana while coal represents approximately 59 percent.

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



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





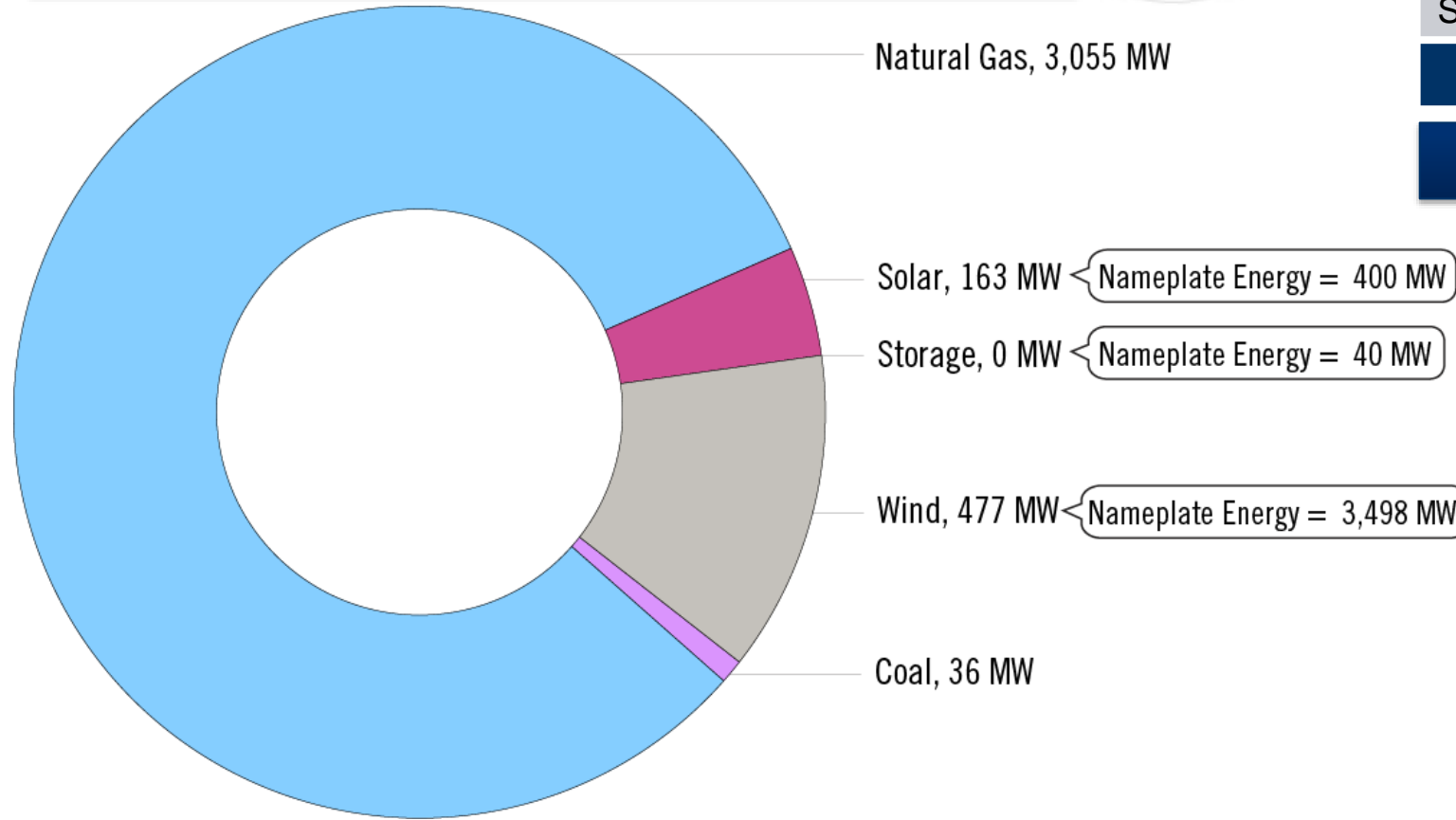
Indiana – Interconnection Requests

(Requested Capacity Rights, December 31, 2016)

Natural gas represents approximately 82 percent of new interconnection requests in Indiana.

	MW	# of projects
Active	2,894	18
Under Construction	798	6
Suspended	39	1
Total	3,731	25

Total MW Capacity by Fuel Type



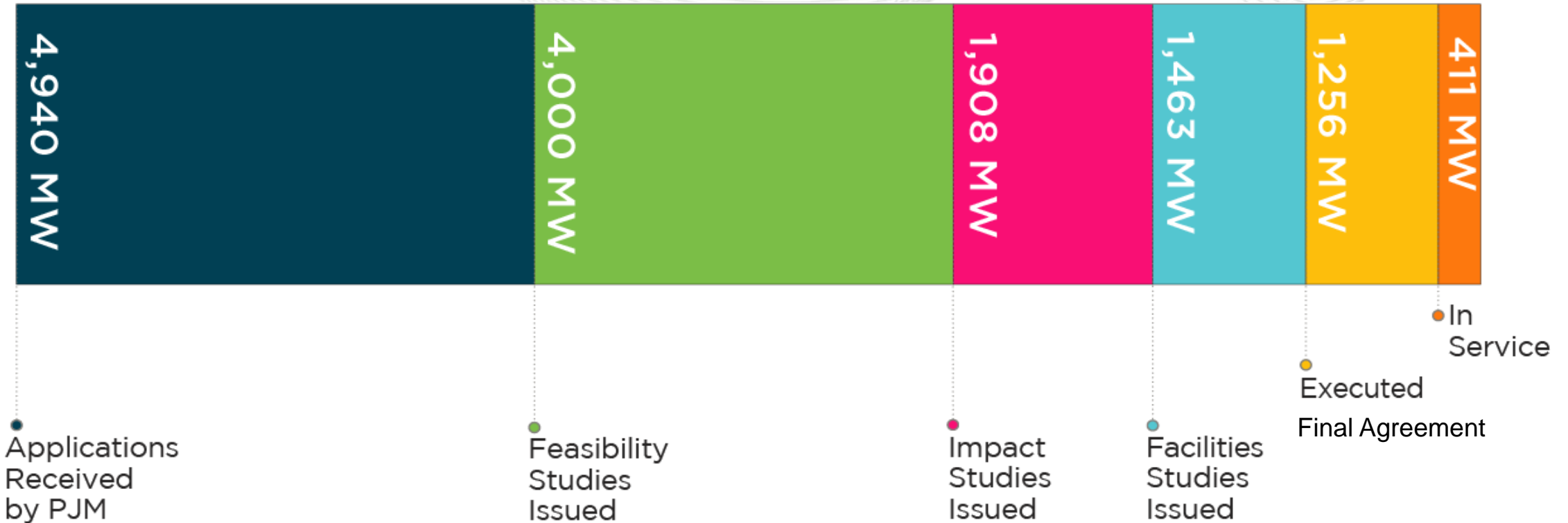
Fuel as a Percentage of Projects in Queue





Indiana - 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
Coal			30.0	3			36.0	1	901.0	2	967.0	6
Methane			8.0	2					3.6	1	11.6	3
Natural Gas	2,380.0	5	46.0	2			675.0	1	1,747.0	2	4,848.0	10
Solar	163.0	4	5.1	3							168.1	7
Storage	0.0	2							3.3	2	3.3	4
Wind	350.8	7	282.0	6	39.0	1	87.4	4	1,037.9	31	1,797.0	49
Total	2,893.8	18	371.1	16	39.0	1	798.4	6	3,692.8	38	7,795.0	79



Following Final Agreement execution 48 MW of capacity withdrew from PJM's interconnection process. Another 797 MW have executed agreements but were not in service as of December 31, 2015 (*Suspended or Under Construction*). Overall, 8% of requested capacity in Indiana reaches commercial operation.



Indiana – 2016 Generation Deactivations

(Capacity, As of December 31, 2016)

Unit	MW Capacity	TO Zone	Age	Actual Deactivation Date
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Summary:

- No generating units in IN deactivated in 2016
- Across PJM, 11 generating units totaling 392 MW of capacity deactivated in 2016

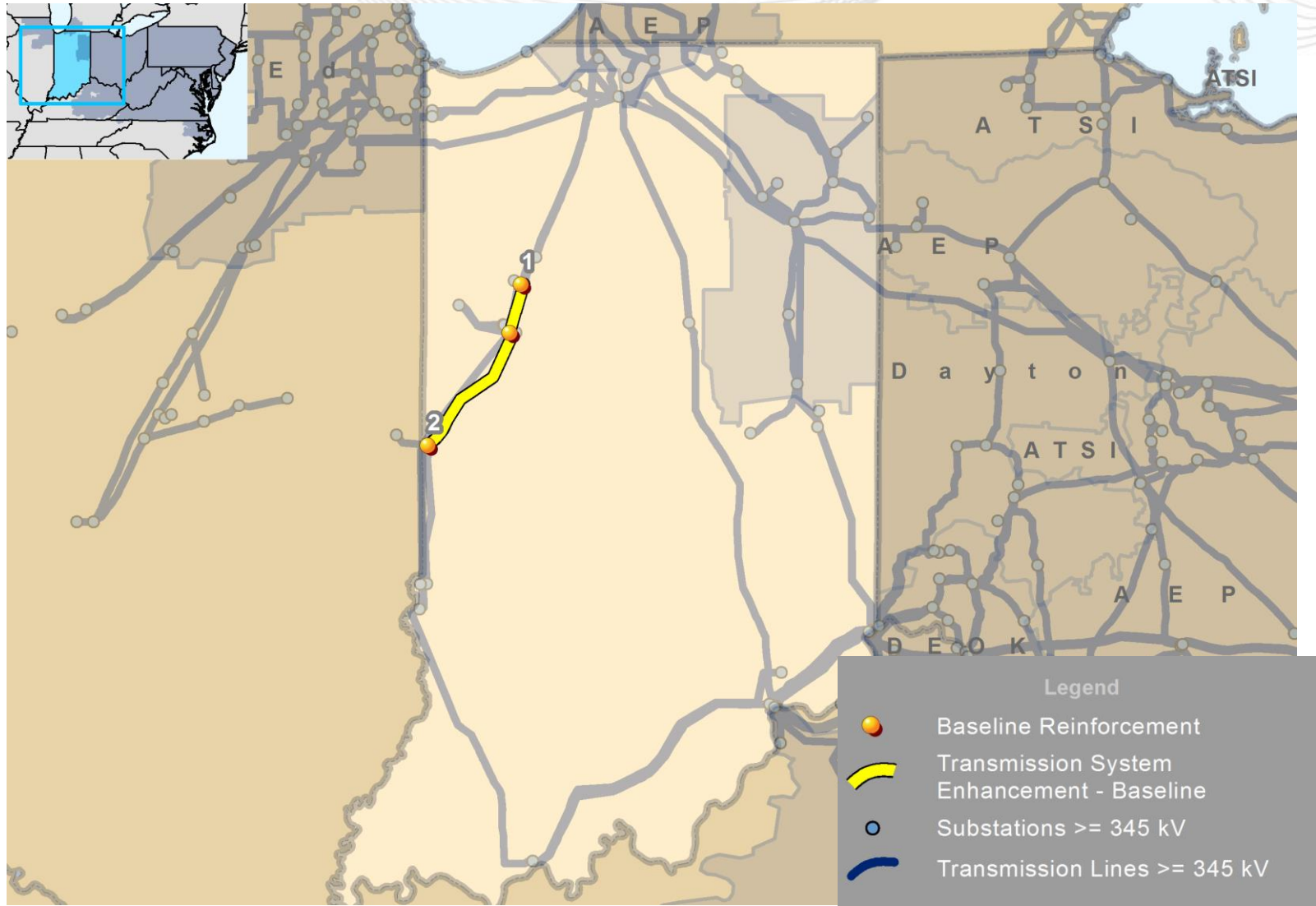
Unit	MW Capacity	TO Zone	Age	Projected Deactivation Date
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Summary:

- No IN generators submitted deactivation notifications in 2016
- Across PJM 23 generating units announced their intent to deactivate, ranging in date from 2016 - 2020.

Planning

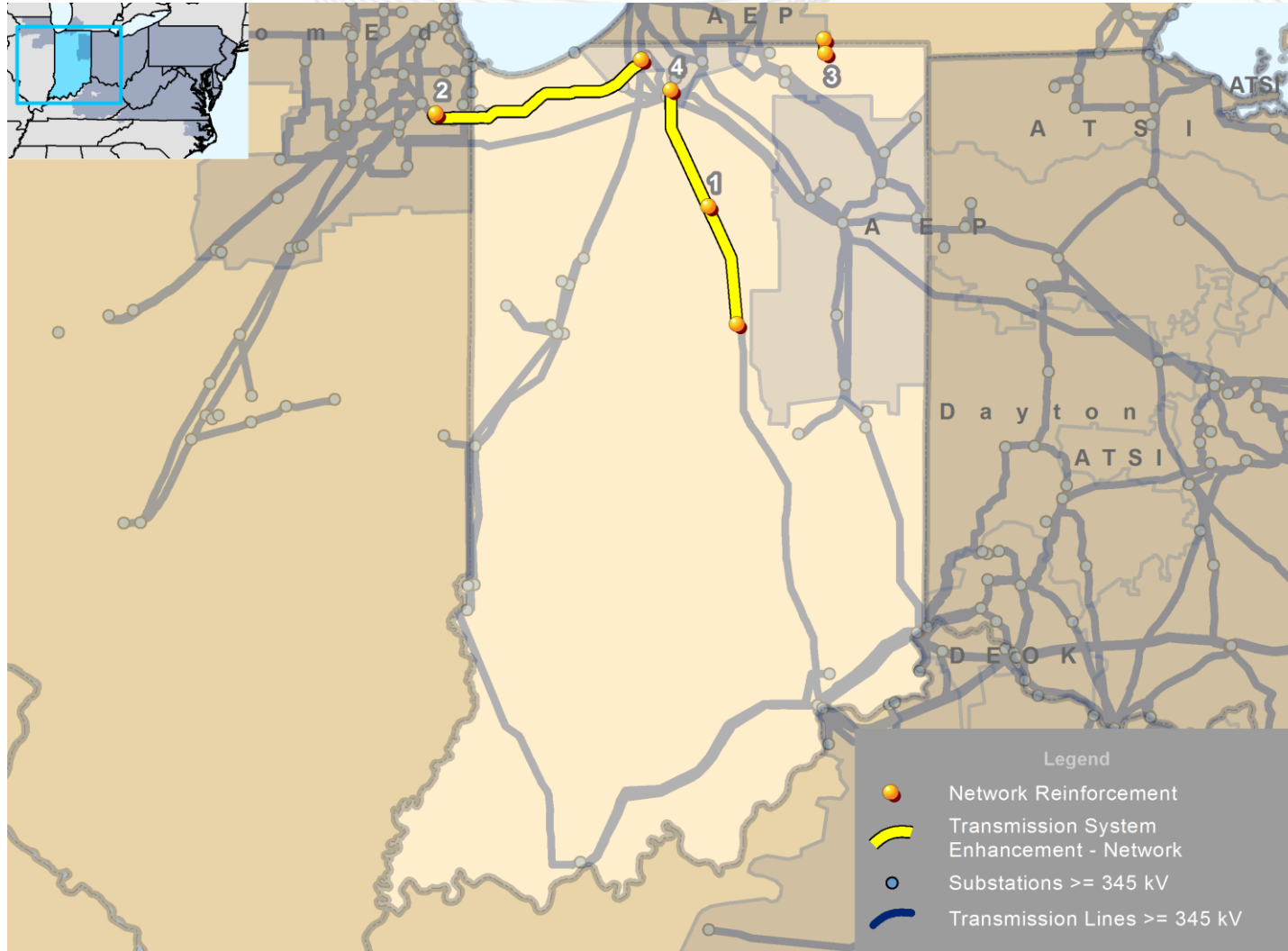
Transmission Infrastructure Analysis



Indiana 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	b2776	Reconductor the entire Dequine-Meadow Lake 345 kV Circuit No. 2	•					6/1/2021	\$6.60	AEP	11/3/2016
2	b2777	Reconductor the entire Dequine-Eugene 345 kV Circuit No. 1	•					6/1/2021	\$22.19	AEP	11/3/2016

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





Indiana – RTEP Network Projects

Greater than \$5 million

Map ID	Project ID	Project	Indiana Network Project Drivers			Required Date	Cost (\$M)	TO Zone(s)	2016 TEAC Review
			Generation Interconnection	Merchant Transmission Interconnection	Long-term Firm Transmission Service				
1	n3528	Install a new 4-breaker 765 kV at the X1-020 Tap switching station laid out in a breaker and one-half arrangement including associated disconnect switch bus work, SCADA and 765 kV revenue metering.	X1-020			6/1/2015	\$30.09	AEP	10/6/2016
2	n4349	Reconductor or rebuild AEP portion of the University Park-Olive 345 kV line. Also upgrade risers and relays	W4-005			12/31/2016	\$45.00	AEP	10/6/2016
3	n4713	Rebuild 2.83 miles of the existing Howe-Sturgis 69 kV line (AEP/MISO tie line).	X1-020			12/1/2015	\$3.40	AEP	10/6/2016

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.



Indiana – RTEP Network Projects

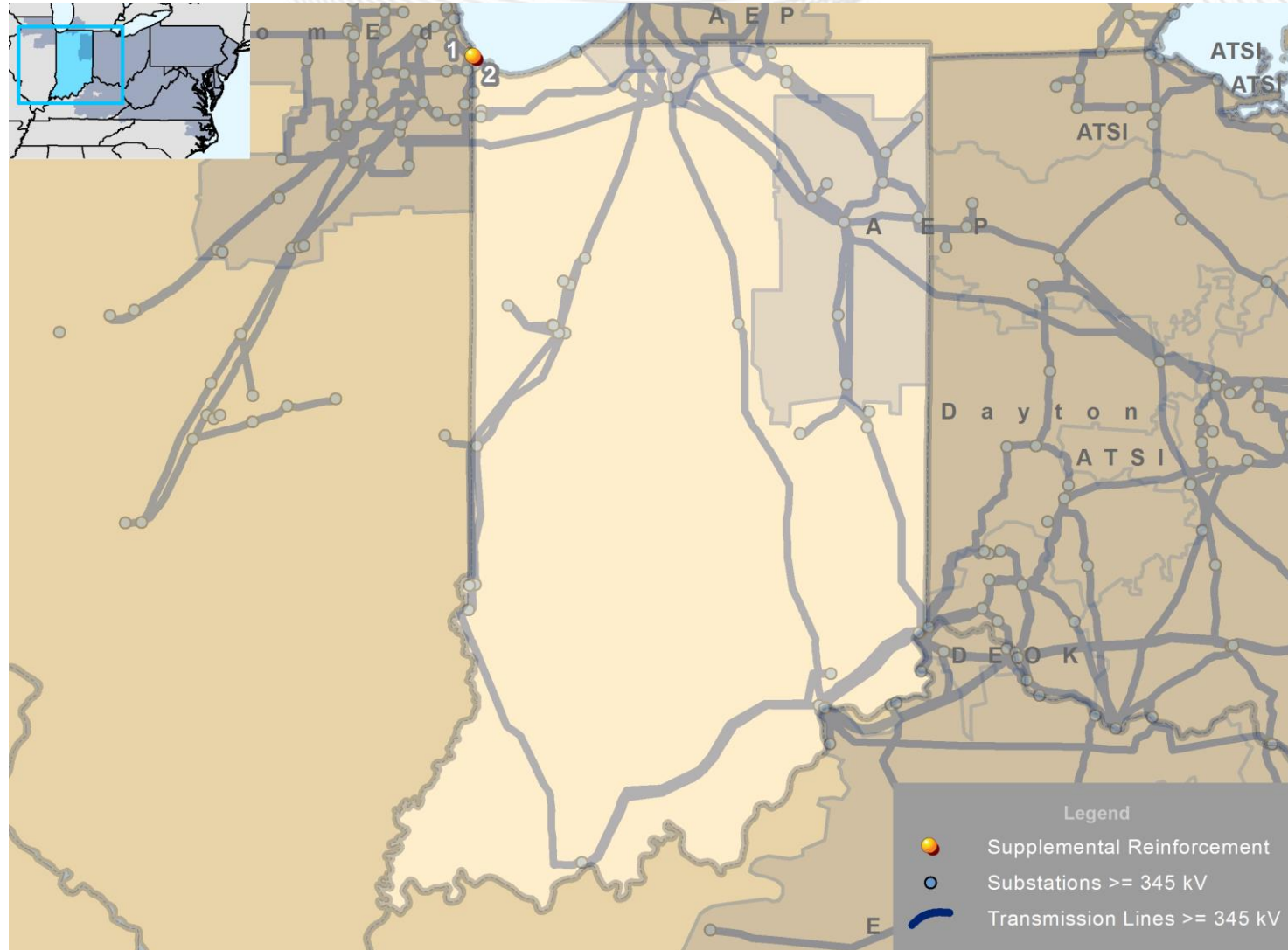
Greater than \$5 million

			Indiana Network Project Drivers			Required Date	Cost (\$M)	TO Zone(s)	2016 TEAC Review
Map ID	Project ID	Project	Generation Interconnection	Merchant Transmission Interconnection	Long-term Firm Transmission Service				
4	n4742	Construct Interconnection Substation with Revenue Metering between Dumont and Greentown 765 kV Circuit	X1-020			12/1/2015	\$30.09	AEP	10/6/2016

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.

Indiana TO – Supplemental Projects

Greater than \$5 million





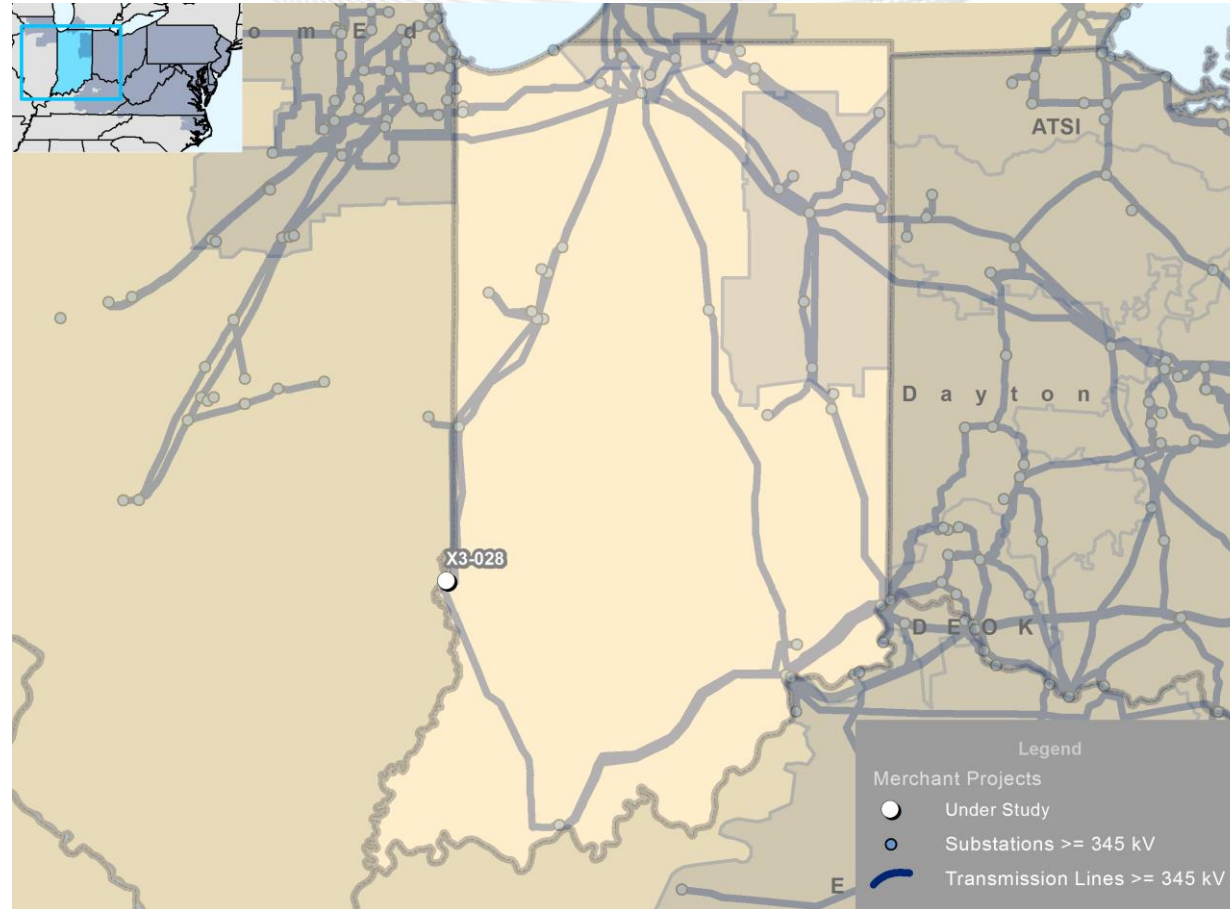
Indiana – TO Supplemental Projects

Greater than \$5 million

Map ID	Project ID	Project	Required Date	Cost (\$M)	TO Zone(s)	2016 TEAC Review
1	s1116	Replace State Line 138 kV PAR on line 0705 with 300 MVA +/- 15 degree unit	6/1/2017	\$8.30	ComEd	2/4/2016
2	s1122	Replace State Line 138 kV PAR on line 0702 with 300 MVA +/-15 degree unit	12/31/2016	\$8.30	ComEd	2/4/2016

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.

Indiana – Merchant Transmission Project Requests



Queue	Project Name	MFO	Status	In Service Date	TO
X3-028	Breed 345 kV	3500	Active	12/31/16	AEP

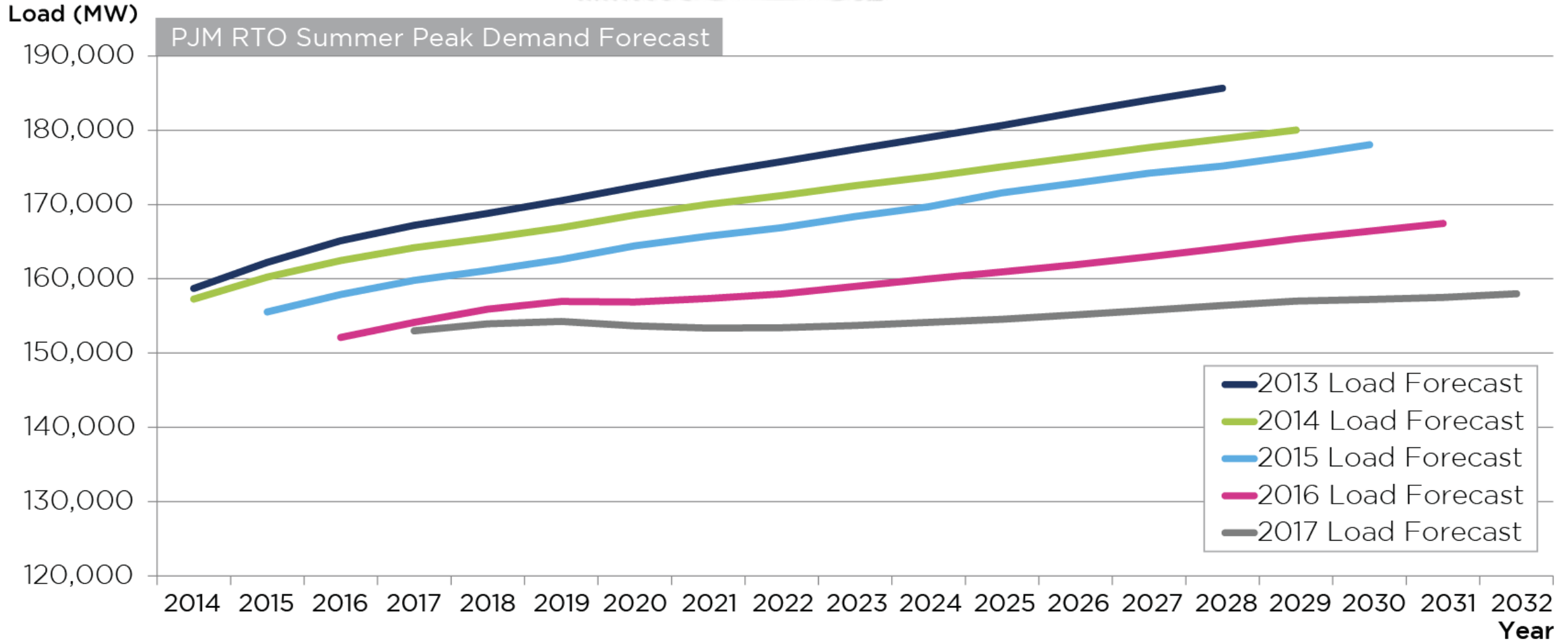
Planning

Load Forecast



PJM Annual Load Forecasts

(January 9, 2017)





Indiana – 2017 Load Forecast Report

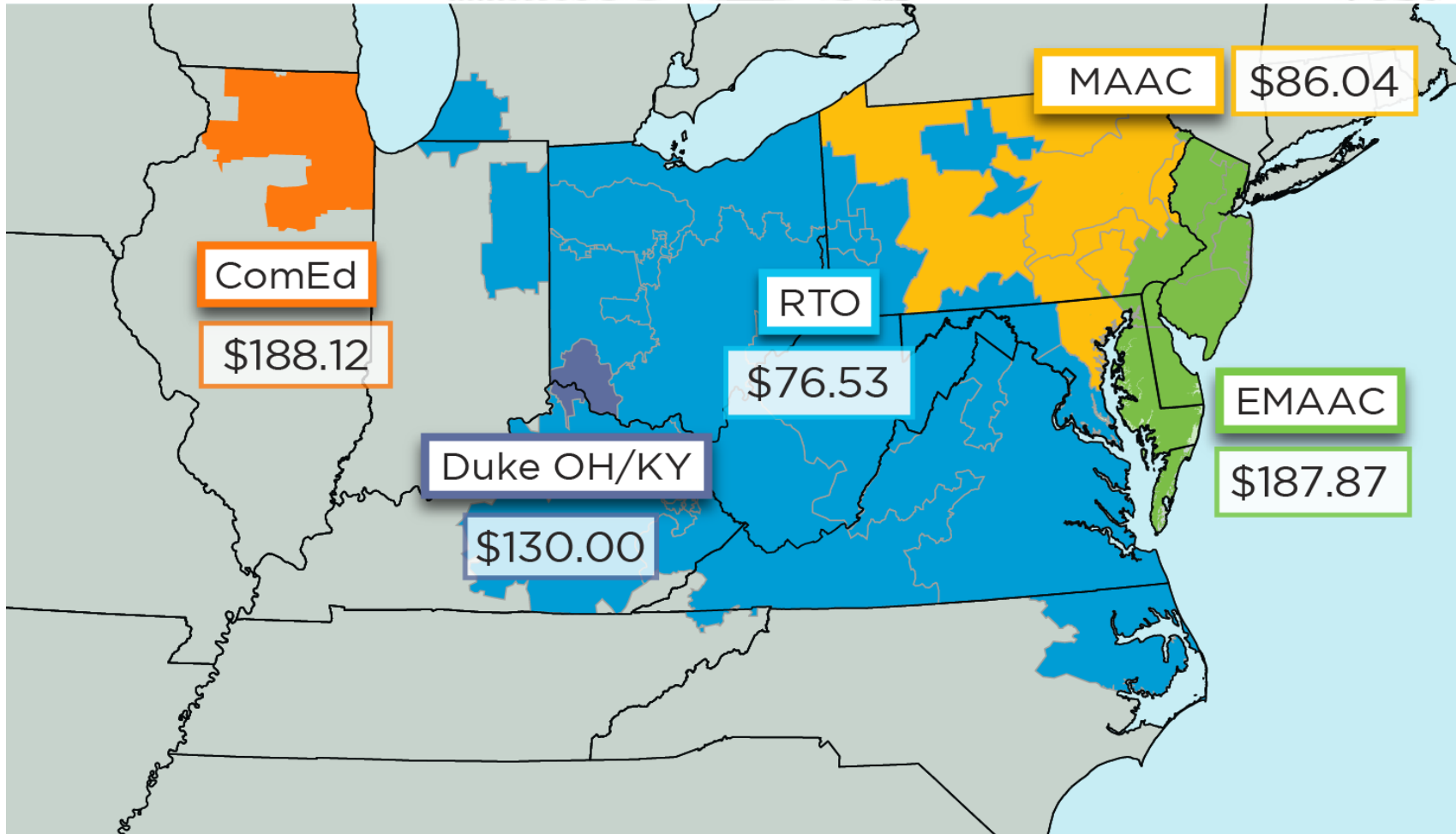
Transmission Owner	Summer Peak (MW)			Winter Peak (MW)		
	2017	2027	Growth Rate (%)	2016/17	2026/27	Growth Rate (%)
American Electric Power Company *	3,756	3,910	0.4%	3,152	3,322	0.5%
PJM RTO	152,999	155,773	0.2%	131,391	134,915	0.3%

*American Electric Power Company serves load other than in Indiana. The Summer Peak and Winter Peak MW values in this table each reflect the estimated amount of forecasted load to be served by American Electric Power Company solely in Indiana. Estimated amounts were calculated based on the average share of American Electric Power Company's real-time summer and winter peak load located in Indiana 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





Indiana - Cleared Resources in 2020/21 Auction

(May 23, 2017)

	Cleared MW (Unforced Capacity)	Change from 2019/20 Auction
Generation	2,240	36
Demand Response	170	(68)
Energy Efficiency	19	6
Total	2,429	(26)

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)



Indiana – Offered and Cleared Resources in 2020/21 Auction

(May 23, 2017)

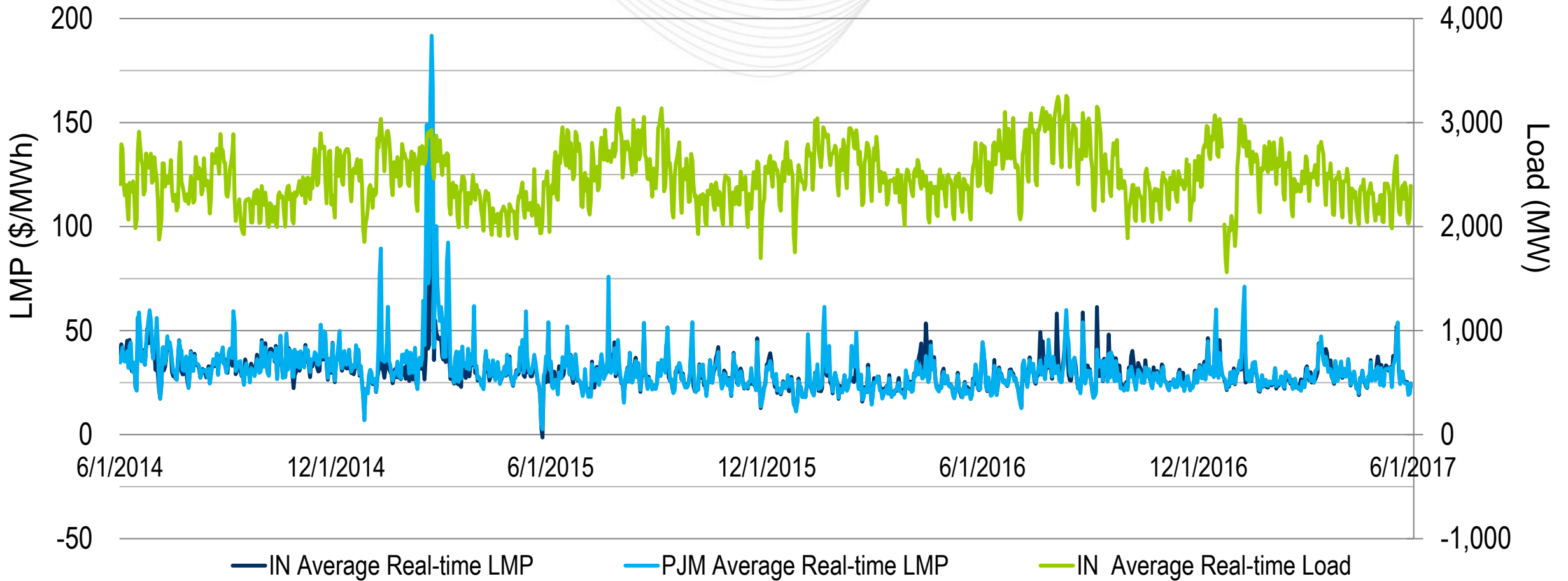
		Unforced Capacity
Generation	Offered MW	2,328
	Cleared MW	2,240
Demand Response	Offered MW	237
	Cleared MW	170
Energy Efficiency	Offered MW	29
	Cleared MW	19
Total Offered MW		2,594
Total Cleared MW		2,429

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

Indiana's average daily LMPs generally align with the PJM average daily LMP

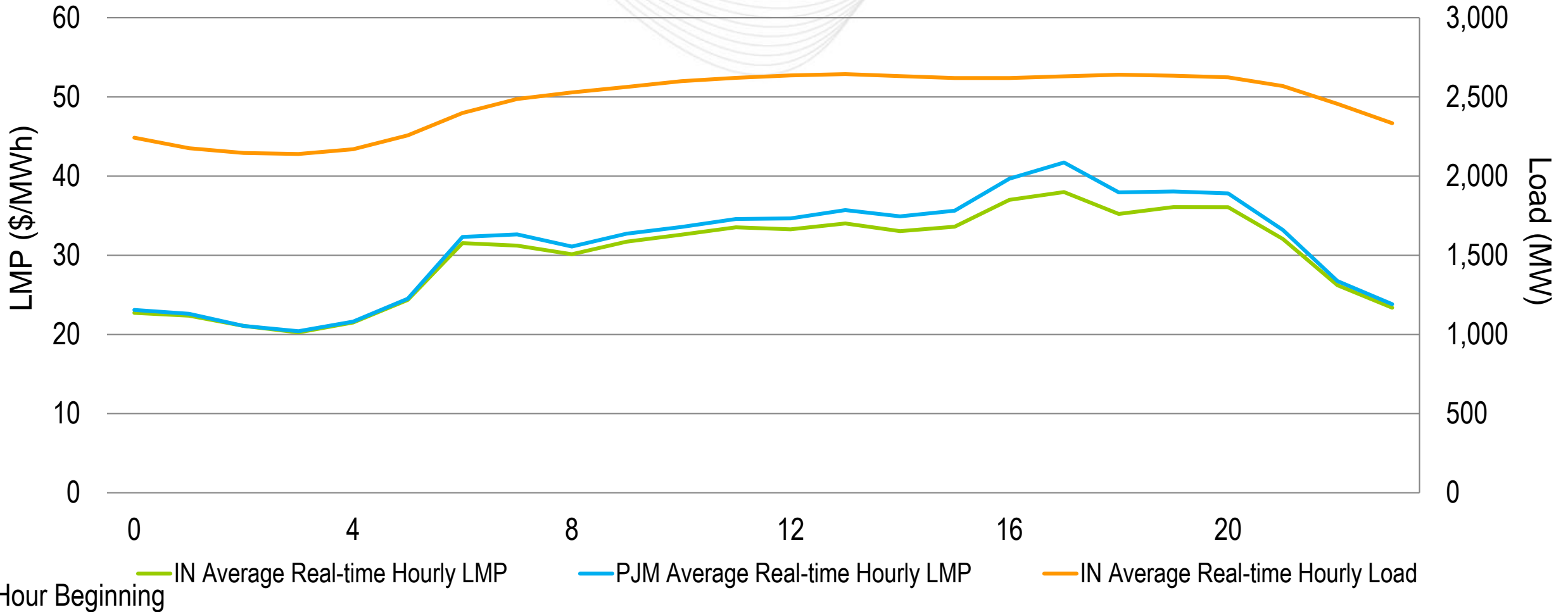




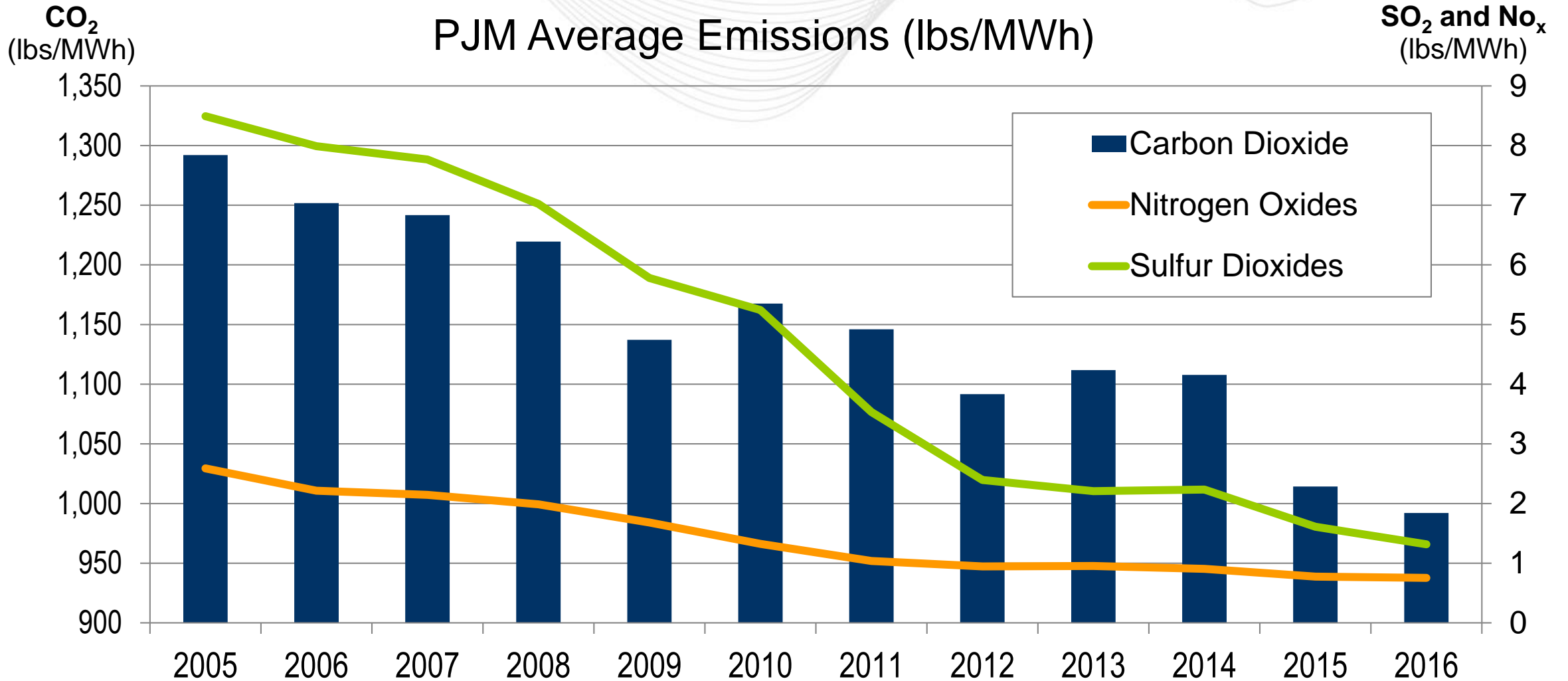
Indiana – Hourly Average LMP and Load

(June 1, 2014 – May 31, 2017)

Indiana's hourly LMPs were below the PJM average.



Operations Emissions Data



CO₂
(lbs/MWh)

Indiana Average Emissions (lbs/MWh)

SO₂ and No_x
(lbs/MWh)

