2019 Indiana State Infrastructure Report
(January 1, 2019 – December 31, 2019)

May 2020

(updated July 2020)

This report reflects information for the portion of Indiana within the PJM service territory.

Table of Contents

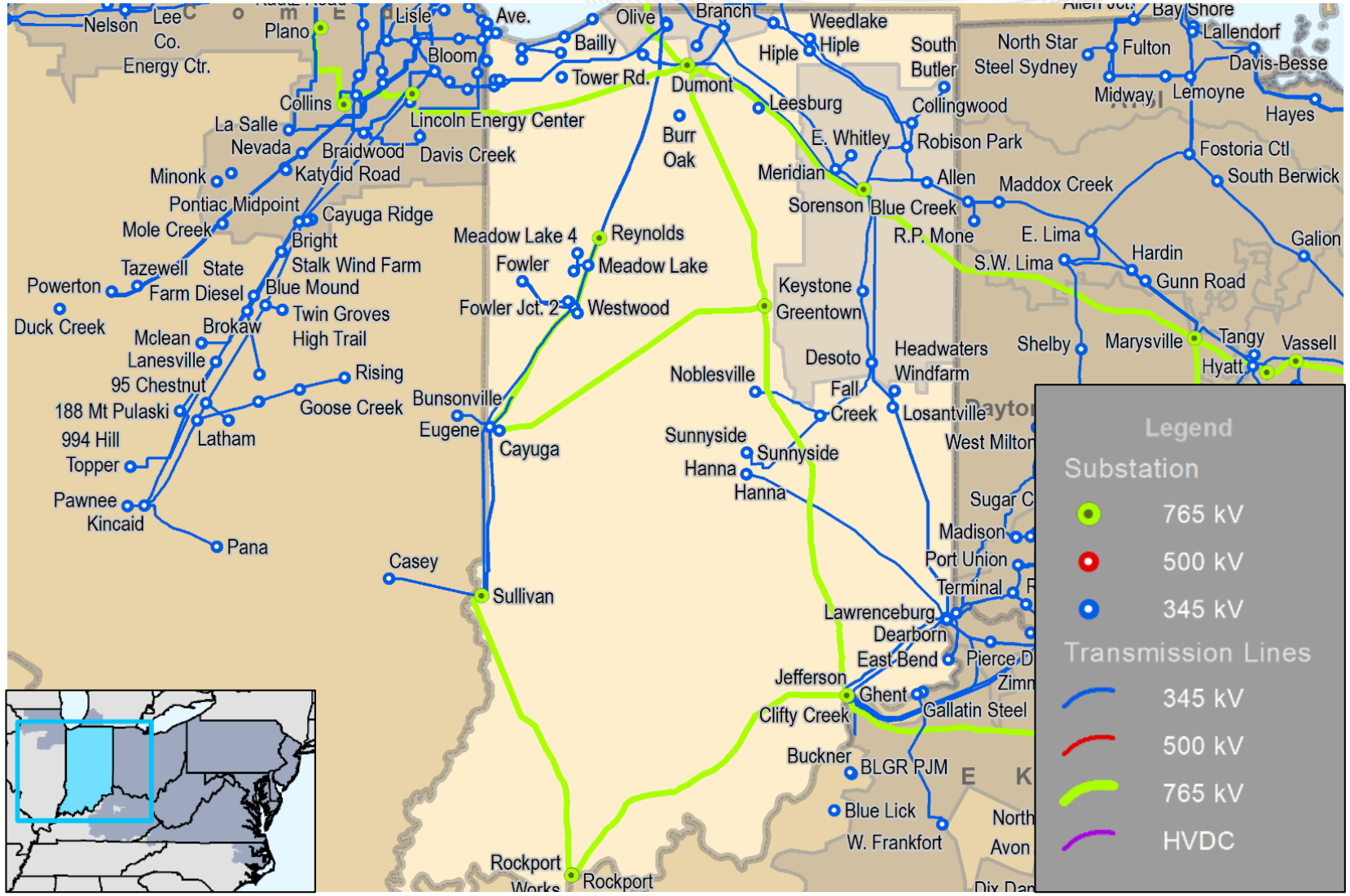
Executive Summary
(May 2020)

- **Existing Capacity:** Coal represents approximately 59.7 percent of the total installed capacity in the Indiana service territory while natural gas represents approximately 36 percent. This differs from PJM where natural gas and coal are at approximately 42.4 and 28.7 percent of capacity.
- **Interconnection Requests:** Solar represents 62.6 percent of queued projects in Indiana, while natural gas represents approximately 22.7 percent.
- **Deactivations:** No generation in Indiana gave notification of deactivation in 2019.
- **RTEP 2019:** Indiana's 2019 RTEP projects total approximately $757.6 million in investment. Approximately 77.9 percent of that represents supplemental projects. These investment figures only represent RTEP projects that cost at least $5 million.

Executive Summary
(May 2020)

- **Load Forecast:** Indiana's load within the PJM footprint is projected to grow at about 0.9 annually over the next ten years. Comparatively, the overall PJM RTO projected load growth rate is 0.6 percent.
- **2022/23 Capacity Market:** No Base Residual Auction was conducted in 2019. For the most recent auction results, please see the 2018 Indiana State Infrastructure Report.
- **1/1/19 – 12/31/19 Market Performance:** Indiana's average hourly LMPs generally aligned with PJM average hourly LMPs.
- **Emissions:** 2019 carbon dioxide, sulfur dioxide, and nitrogen oxide emissions are all down from 2018.

PJM Service Area in Indiana



The PJM service area in Indiana is the AEP zone and is represented by the shaded portion of the map.

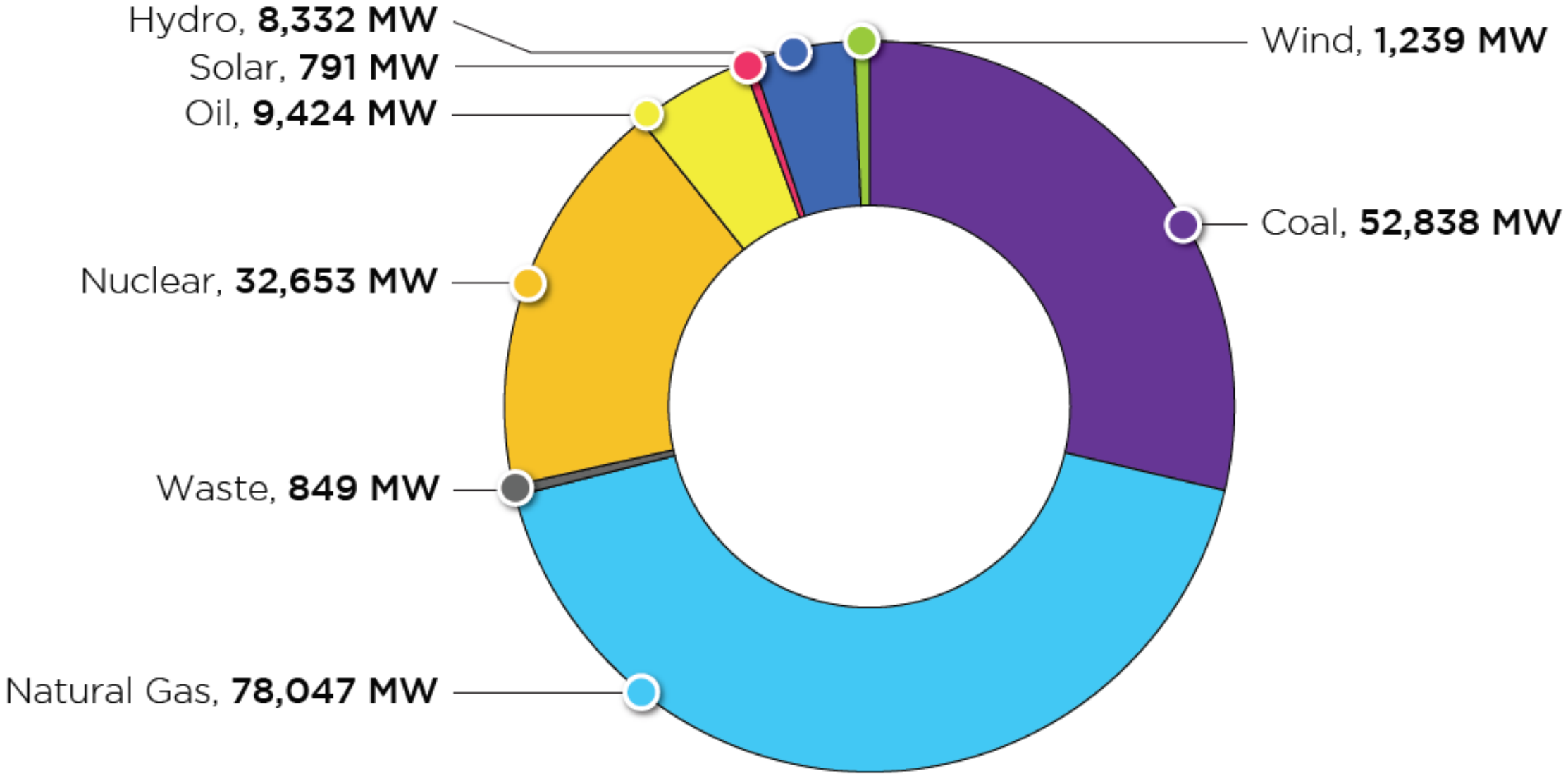
PJM operates transmission lines that extend beyond the service territory.

Planning

Generation Portfolio Analysis

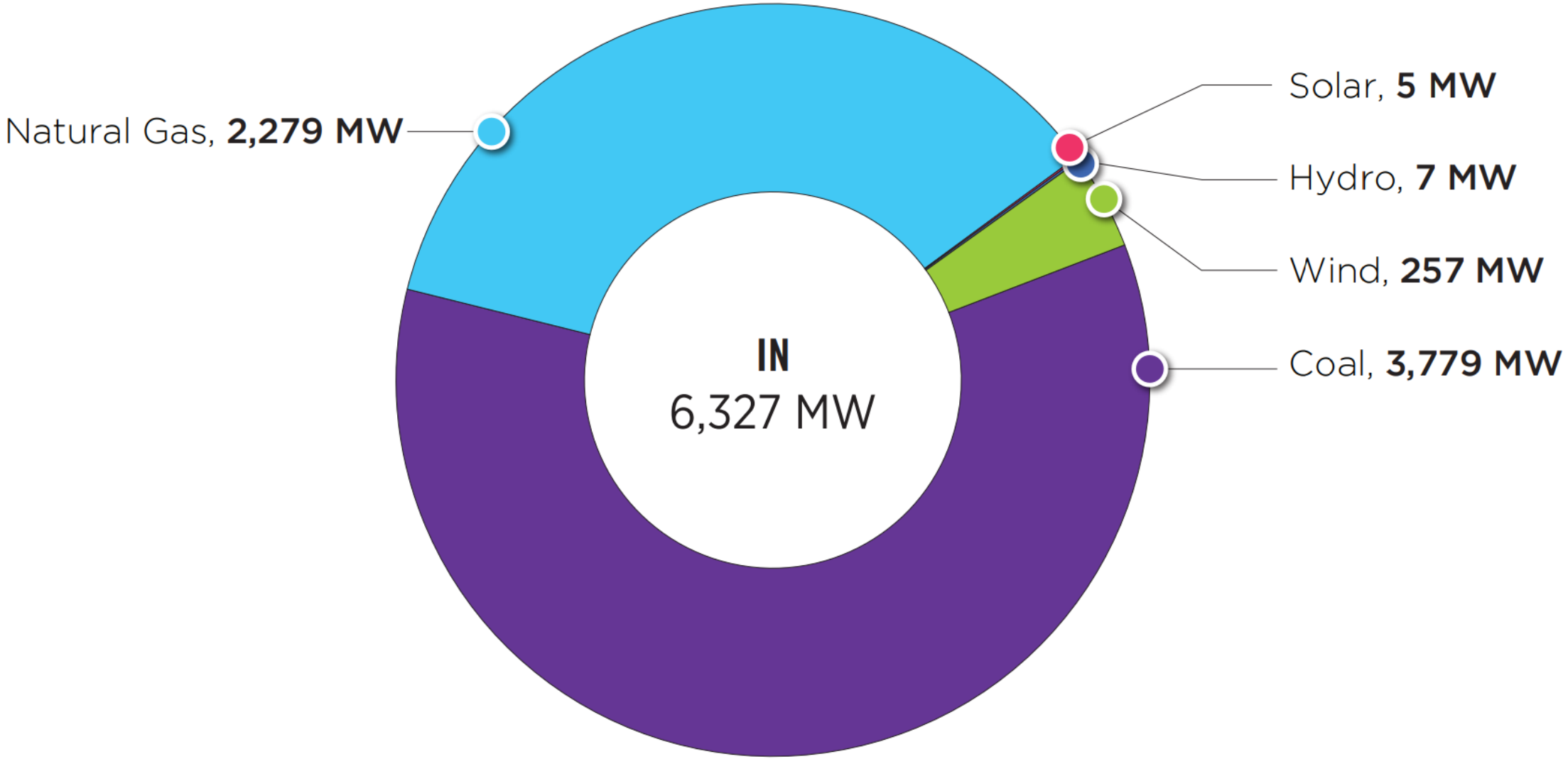
PJM – Existing Installed Capacity

(CIRs – as of Dec. 31, 2019)



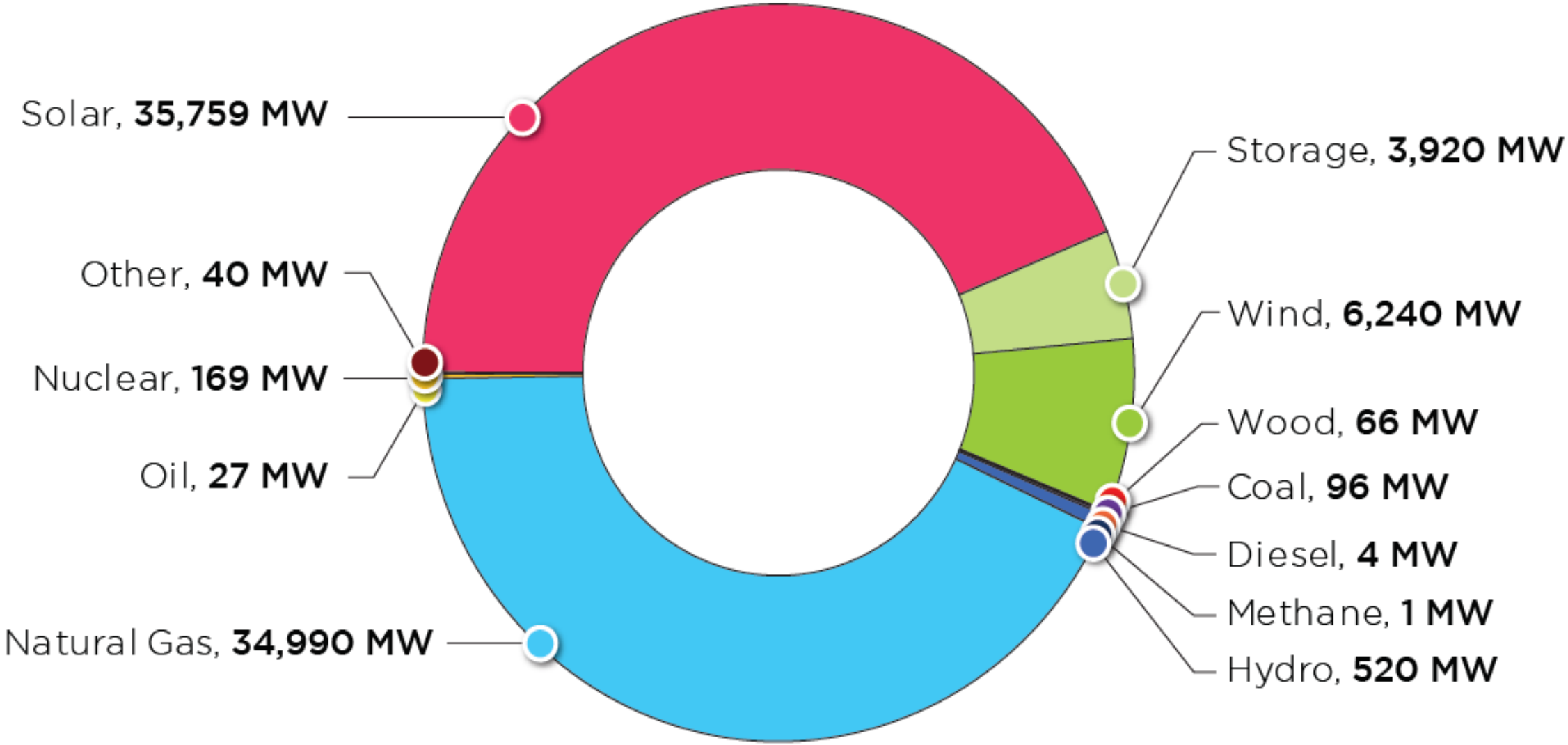
Indiana – Existing Installed Capacity

(CIRs – as of Dec. 31, 2019)



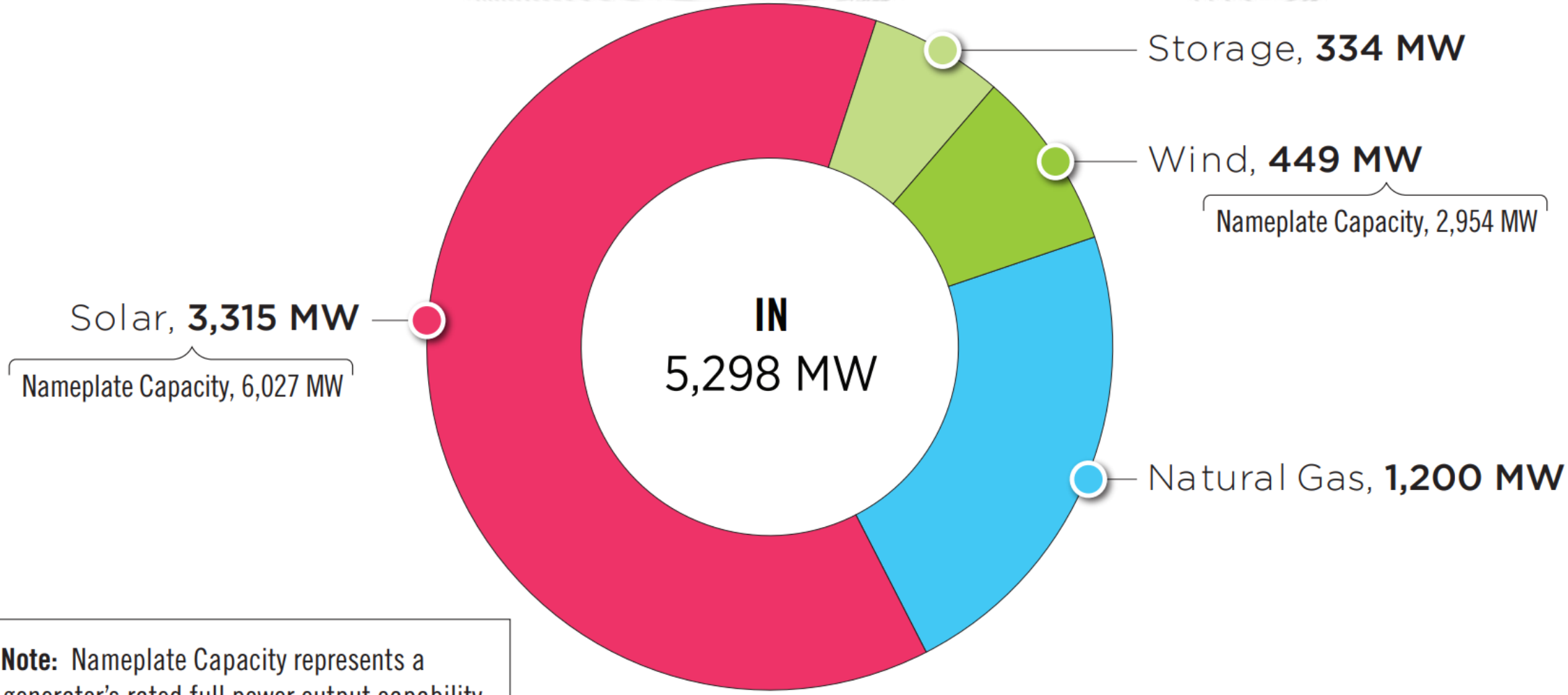
PJM – Queued Capacity (MW) by Fuel Type

(Requested CIRs – as of Dec. 31, 2019)



Indiana – Queued Capacity (MW) by Fuel Type

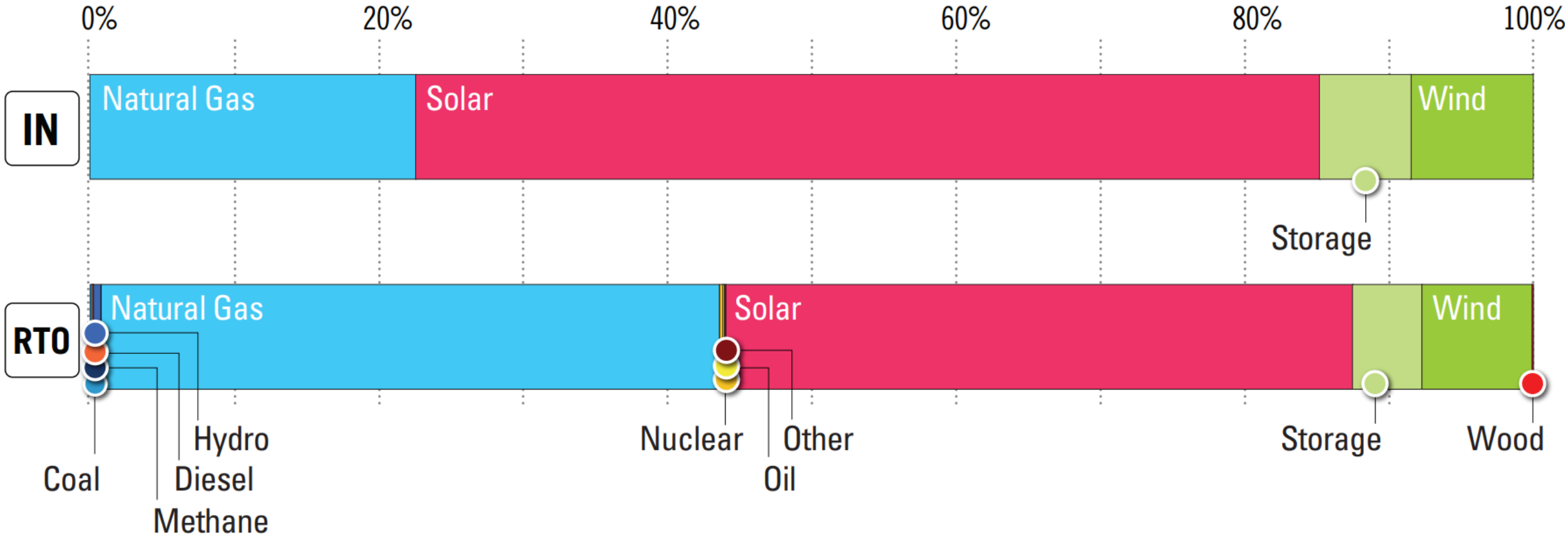
(Requested CIRs – as of Dec. 31, 2019)



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

Indiana – Percentage of MW in Queue by Fuel Type

(Dec. 31, 2019)



Indiana – Interconnection Requests

(Unforced Capacity – as of Dec. 31, 2019)

		In Queue				Complete				Grand Total	
		Active		Under Construction		In Service		Withdrawn			
		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	Coal	0	0.0	0	0.0	4	66.0	2	901.0	6	967.0
	Natural Gas	2	1,100.0	2	100.0	4	761.0	2	1,747.0	10	3,708.0
	Storage	8	334.3	0	0.0	0	0.0	6	232.1	14	566.5
Renewable	Methane	0	0.0	0	0.0	2	8.0	1	3.6	3	11.6
	Solar	36	3,315.0	0	0.0	3	5.1	13	2,005.0	52	5,325.0
	Wind	12	406.5	2	42.9	9	372.0	44	1,634.7	67	2,456.0
	Grand Total	**58**	**5,155.8**	**4**	**142.9**	**22**	**1,212.1**	**68**	**6,523.3**	**152**	**13,034.1**

Note: The ”Under Construction” column includes both “Engineering and Procurement” and “Under Construction” project statuses.

Indiana – Progression History of Interconnection Requests

Projects withdrawn after final agreement		Nameplate Capacity
3 Interconnection Service Agreements	71 MW	420 MW

Percentage of planned capacity and projects that have reached commercial operation	15% Requested capacity megawatt	23% Requested projects

This graphic shows the final state of generation submitted in all PJM queues that reached in-service operation, began construction, or was suspended or withdrawn as of Dec. 31, 2019.

Indiana – Generation Deactivation Notifications Received in 2019

Indiana had no generation deactivation notifications in 2019.

Planning

Transmission Infrastructure Analysis

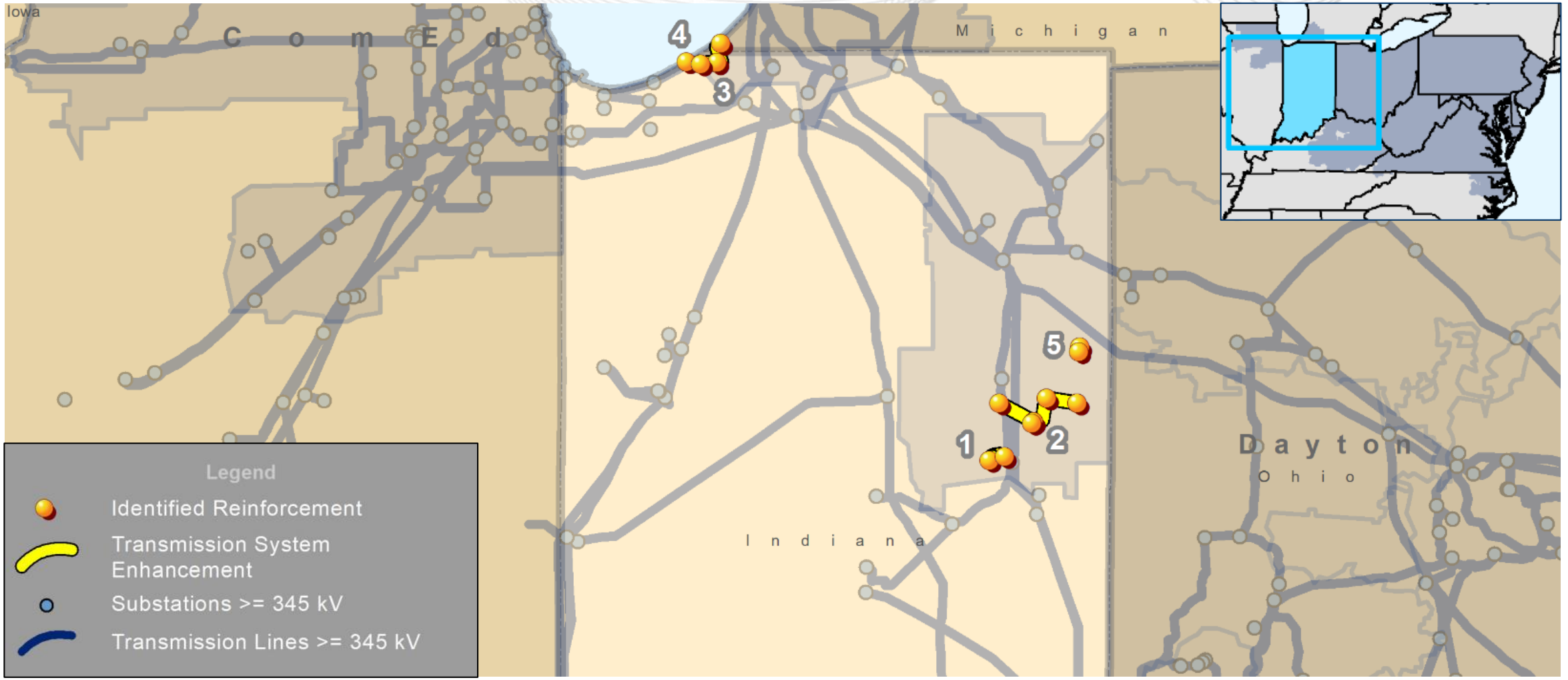
Please note that PJM historically used $5 million as the threshold for listing projects in the RTEP report. Beginning in 2018, it was decided to increase this cutoff to $10 million. All RTEP projects with costs totaling at least $5 million are included in this state report. However, only projects that are $10 million and above are displayed on the project maps.

For a complete list of all RTEP projects, please visit the “RTEP Upgrades & Status – Transmission Construction Status” page on pjm.com.

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

Indiana – RTEP Baseline Projects

(Greater than $10 million)



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

Indiana – RTEP Baseline Projects

(Greater than $5 million)

Map ID	Project	Description	Projected In-Service Date	Project Cost ($M)	TO Zone	TEAC Date
1	b3103	Install a 138/69 kV transformer at Royerton station. Install a 69 kV bus with one 69 kV breaker toward Bosman station. Rebuild the 138 kV portion into a ring bus configuration built for future breaker and a half with four 138 kV breakers.	6/1/2022	$70.8	AEP	1/11/2019
		Rebuild the Bosman/Strawboard station in the clear across the road to move it out of the flood plain and bring it up to 69 kV standards.				
		Retire 138 kV breaker L at Delaware station and re-purpose 138 kV breaker M for the Jay line.				
		Retire all 34.5 kV equipment at Hartford City station. Re-purpose breaker M for the Bosman line 69 kV exit.				
		Rebuild the 138 kV portion of Jay station as a six-breaker, breaker-and-a-half station re-using the existing breakers A, B and G. Rebuild the 69 kV portion of this station as a six-breaker ring bus re-using the two existing 69 kV breakers. Install a new 138/69 kV transformer.				
		Rebuild the 69 kV Hartford City-Armstrong Cork line, but instead of terminating it into Armstrong Cork, terminate it into Jay station.				
		Build a new 69 kV line from Armstrong Cork-Jay station.				
		Rebuild the 34.5 kV Delaware-Bosman line as the 69 kV Royerton-Strawboard line. Retire the line section from Royerton to Delaware stations.				

Indiana – RTEP Baseline Projects

(Greater than $5 million)

Map ID	Project	Description	Projected In-Service Date	Project Cost ($M)	TO Zone	TEAC Date
2	**b3119**	Rebuild the Jay-Pennville 138 kV line as double circuit 138/69 kV. Build a new 9.8 mile single circuit 69 kV line from near Pennville station to North Portland station.	6/1/2022	$43.4	AEP	5/20/2019
		Install three 69 kV breakers and add a low side breaker on Jay transformer No. 2.				
		Install two 69 kV breakers at North Portland station to complete the ring and allow for the new line.				
3	**b3132**	Rebuild 3.11 miles of the LaPorte Junction-New Buffalo 69 kV line with 795 ACSR.	6/1/2022	$12.3	AEP	6/17/2019
4	**b3142**	Rebuild Michigan City-Trail Creek-Bosserman 138 kV (10.7 miles).	1/1/2023	$24.7	NIPSCO	10/17/2019
5	**b3209**	Rebuild the 10.5 mile Berne-South Decatur 69 kV line using 556 ACSR in order to alleviate the overload and address a deteriorating asset.	6/1/2022	$16.6	AEP	4/23/2019

Indiana – RTEP Network Projects

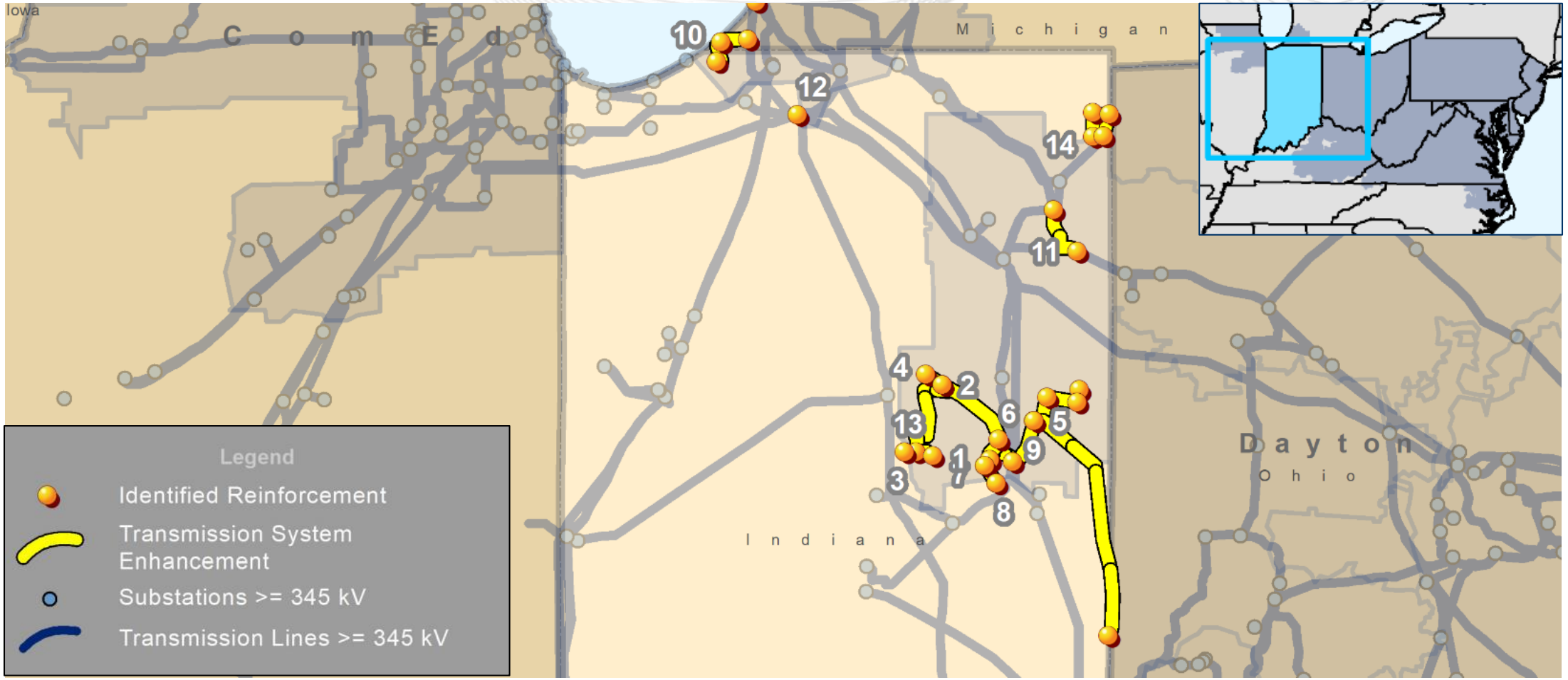
(Greater than $5 million)

Indiana had no network project upgrades in 2019.

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, as well as certain direct connection facilities required to interconnect proposed generation projects.

Indiana – TO Supplemental Projects

(Greater than $10 million)



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.

Indiana – TO Supplemental Projects

(Greater than $5 million)

Map ID	Project	Description	Projected In-Service Date	Project Cost ($M)	TO Zone	TEAC Date
1	S1854	Medford Station	6/1/2022	$68.9	AEP	1/11/2019
		Install a new distribution transformer and bay at Arnold Hogan substation. Replace existing transformer and install a switcher on both transformers. Rebuild the 138 kV side as a breaker-and-a-half with three new 138 kV breakers. Rebuild the 34.5 kV voltage class as a ring bus with a new 28.8 MVAR cap bank.				
		Retire Elmridge Station				
		Rebuild the 34.5 kV voltage class 23rd Street substation as a six-breaker ring bus with five new 69 kV-rated breakers. Install three 138 kV breakers to form a ring bus on the high side. Retire the cap banks. Rebuild the underground line exits as overhead.				
		Rebuild Medford station with a three breaker, 69 kV-rated ring bus on the 34.5 kV side. Rebuild the high side as a three breaker 138 kV ring bus. Replace the transformer with a 138/69/34.5 kV bank. Retire the cap bank.				
		Retire Blaine Street station breaker E and construct a new 69 kV-rated bus with a new 69 kV-rated breaker and distribution bank.				
		Build a new 138 kV Fuson station with a 138 kV bus tie breaker and two distribution banks to serve the Delco Battery site.				
		Rebuild the Arnold Hogan-23rd Street 138 kV line from Arnold Hogan-STR 56 north of Utica using 556 ACSR.				
		Build a new 138 kV line tapping the Arnold Hogan-23rd Street line toward the Fuson station site using 1033.5 ACSR.				
		Retire the Elmridge tap line.				

Indiana – TO Supplemental Projects

(Greater than $5 million)

Map ID	Project	Description	Projected In-Service Date	Project Cost ($M)	TO Zone	TEAC Date
2	**s1855**	Deer Creek-Delaware 138 kV line.	10/8/2021	$57.3	AEP	2/20/2019
		Rebuild ~19.8 miles of the Deer Creek-Delaware double circuit 138 kV line from structure 16 to structure 127.				
		Install a 138 kV breaker at Gaston in the bus tie position (facing Desoto).				
		Reterminate into the 138 kV breaker P at Delaware.				

Indiana – TO Supplemental Projects

(Greater than $5 million)

Map ID	Project	Description	Projected In-Service Date	Project Cost ($M)	TO Zone	TEAC Date
3	s2012	Retire the ~10.5 mile South Summitville-Jonesboro 34.5 kV line.	10/1/2021	$16.3	AEP	4/23/2019
		Retire Jonesboro 34.5 kV station.				
		Build the new 69 kV Dean station with a single bus tie breaker to replace the Fairmount and Peacock 34.5 kV stations.				
		Replace the 138/34.5 kV transformer No. 1 and the existing 34.5 kV breaker at South Elwood station with a 138/69 kV transformer and a 69 kV breaker.				
		Build a three breaker 69 kV ring bus at Deer Creek 138/69/34.5 kV station in the clear to connect to the now 69 kV South Summitville line. Add a 138 kV breaker to the high side of transformer No. 1 to replace the motor-operated air break.				
		Install a 138 kV bus tie breaker at Aladdin station to break up the four motor-operated air breaks in series.				
		Rebuild Elwood 34.5 kV station in the clear as an in and out station with a bus tie breaker.				
		Energize the Ohio Oil, South Summitville and Strawton stations and the lines connecting them to 69 kV. These stations and lines are already built to this standard.				

Indiana – TO Supplemental Projects

(Greater than $5 million)

Map ID	Project	Description	Projected In-Service Date	Project Cost ($M)	TO Zone	TEAC Date
4	s2013	Rebuild the 2.2 mile Grant-West End 34.5 kV line using 556.5 ACSR.	6/1/2022	$19.0	AEP	5/20/2019
		Retire the Deer Creek-Miller Ave 34.5 kV line.				
		Rebuild the 3.5 mile Deer Creek-Marion Plant 34.5 kV line using 556.5 ACSR				
		Retire the Deer Creek-East Tap 34.5 kV line.				
		Re-route the Atlas Tap 34.5 kV line into West End station.				
		Retire 34.5 kV breakers H, F, K and V and the 34.5 kV cap banks at Deer Creek 138/69/34.5 kV station. Re-use the 69 kV-rated breaker J toward South Side station. Re-use breakers A and E from South Summitville to replace breaker M and W at Deer Creek.				
		Install a 69 kV breaker on Marion Plant line exit at South Side 34.5 kV station.				
		Install a 14.4 MVAR138 kV cap bank and a 138 kV high side circuit switcher at Grant 138/34.5 kV station.				
5	s2014	Rebuild the 62 mile College Corner-Jay 138 kV line as single circuit 138 kV. New conductor will be 795 ACSR.	12/1/2023	$113.5	AEP	5/20/2019

Indiana – TO Supplemental Projects

(Greater than $5 million)

Map ID	Project	Description	Projected In-Service Date	Project Cost ($M)	TO Zone	TEAC Date
6	s2015	Retire the ~20 mile Delaware-Jay 34.5 kV line.	12/10/2021	$24.7	AEP	5/20/2019
		Rebuild the 2.5 miles of the Delaware-Haymond 34.5 kV line from Delaware to a point near Centennial Road using 556.5 ACSR (south of the road the line is newer construction).				
		Reconfigure the Desoto-Jay 138 kV line to allow for the Perch Extension connection.				
		Build a new ~1 mile 138 kV Perch extension to connect the new station to the Desoto-Jay 138 kV line.				
		Rebuild the 34.5 kV bus at the Delaware 138/34.5 kV station as a 69 kV ring bus using three new breakers.				
		Retire all 34.5 kV equipment at the Jay 138/69/34.5 kV station.				
		Build a new in and out Perch 138 kV station with two motor-operated air breaks to allow retirements of the Delaware-Jay 34.5 kV line. Perch will pick up loads from retiring Sharon Road, Barley and Albany stations.				
7	s2016	Arnold Hogan-Kenmore 34.5 kV (West Section): Rebuild 1.3 miles in the clear from structure 1 to structure 47 utilizing double circuit 34.5 kV line (69 kv-rated) with only the north side strung. New conductor will be 556.5 ACSR	6/1/2022	$15.7	AEP	5/20/2019
		Arnold Hogan-Kenmore 34.5 kV (East Section): Rebuild the 0.5 miles from STR 80 to Kenmore as underground construction.				

Indiana – TO Supplemental Projects

(Greater than $5 million)

Map ID	Project	Description	Projected In-Service Date	Project Cost ($M)	TO Zone	TEAC Date
8	s2018	Rebuild the 3.3 mile Medford-Blaine Street 34.5 kV line to 69 kV using 795 Drake ACSR.	12/1/2022	$14.4	AEP	6/17/2019
		Retire the 3.7 mile Haymond-Blaine 34.5 kV line.				
		Retire the 3.3 mile Haymond-Medford 34.5 kV line portion south of 21st Street station.				
		Build a new 34.5 kV Blaine Street double circuit extension to facilitate the re-termination of the Haymond and 23rd Street lines into Blaine Street.				
		Retire the unused 34.5 kV breaker E at Haymond station.				
9	s2021	Rebuild the Antiville 69 kV station throughpath to allow for connection to the new Jay-North. Portland 69 kV line.	6/1/2022	$71.0	AEP	5/20/2019
		Retire the radial Antiville Tap 69 kV line.				
		Rebuild the ~38.5 mile Jay-Allen 138 kV line from Pennville to the juncture west of Allen station. This line is a single circuit 138 kV line using 795 ACSR.				

Indiana – TO Supplemental Projects

(Greater than $5 million)

Map ID	Project	Description	Projected In-Service Date	Project Cost ($M)	TO Zone	TEAC Date
10	**s2022**	Rebuild 3.52 miles of the LaPorte-New Buffalo 69 kV line and re-terminate into Bosserman station.	12/15/2020	$15.7	AEP	6/17/2019
		At Bosserman station, install new 138/69 kV transformer, install 69 kV low side breaker on transformer No. 1, and 69 kV line breaker B towards Three Oaks Station.				
		Replace 69 kV line breakers C and B at Three Oaks station.				
		Replace 69 kV line breakers B, A and C at Bridgman station.				
		Retire Laporte Junction 69 kV Station.				
11	**s2058**	Rebuild 12 miles of the Allen-Robison Park double circuit 138 kV line using 795 ACSR Drake conductor.	10/15/2022	$34.9	AEP	8/29/2019

Indiana – TO Supplemental Projects

(Greater than $5 million)

Map ID	Project	Description	Projected In-Service Date	Project Cost ($M)	TO Zone	TEAC Date
12	**s2086**	Replace Dumont 765/345 kV, 1500 MVA Transformer T2 with new 2250 and install associated protective equipment, including two 345 kV breakers.	11/1/2020	$27.8	AEP	10/17/2019
13	**s2092**	Rebuild 16.5 miles of the Deer Creek-Makahoy 138 kV line using 795 ACSR Drake conductor. Rebuild 3.9 miles of the Deer Creek-Makahoy 138 kV line as double circuit using 795 ACSR Drake conductor west from Deer Creek. Operate as double circuit to allow for bringing the Grant line into Deer Creek, eliminating the three terminal line.	10/1/2022	$47.1	AEP	10/25/2019
		Install a 138 kV circuit breaker at Deer Creek Station for the new line exit.				

Indiana – TO Supplemental Projects

(Greater than $5 million)

Map ID	Project	Description	Projected In-Service Date	Project Cost ($M)	TO Zone	TEAC Date
14	**s2098**	Rebuild 0.15 miles Butler-Basket Factory 69 kV section and rebuild 7.2 miles Basket Factory-Hamilton 69 kV section with 556 ACSR.	6/22/2022	$42.8	AEP	10/25/2019
		Build 1.6 mile long greenfield line on the Hamilton-Muskrat SW 69 kV Section to loop Hamilton and upgrade roughly 0.8 miles of poles with woodpecker holes on the Hamilton-Muskrat SW 69 kV section.				
		Build 8.37 mile long greenfield line with 556 ACSR from Federal SW to Muskrat SW to provide two way service to University Tool, Hamilton and Dome Stations.				
		Build a 0.04 mile long greenfield line with 556 ACSR to eliminate the hard tap on the Butler-Hicksville Junction 138 kV Line.				
		Relocate the line entrance at Butler Station.				
		At Butler 69 kV station, install three 69 kV breakers and two cap banks.				
		Install 69 kV switch outside Universal Tool called Basket Factory Switch.				
		At Hamilton 69 kV station, install one line air break and one line breaker.				
		Install 69 kV phase-over-phase switch outside Dome station called Muskrat switch.				
		Install 69 kV phase-over-phase switch outside Therma Tru called Federal switch.				
		Remove Metcalf tap from Butler-North Hicksville 69 kV line and reconnect the path.				
		Remote end relay upgrades at North Hicksville 69 kV.				

Indiana – TO Supplemental Projects

(Greater than $5 million)

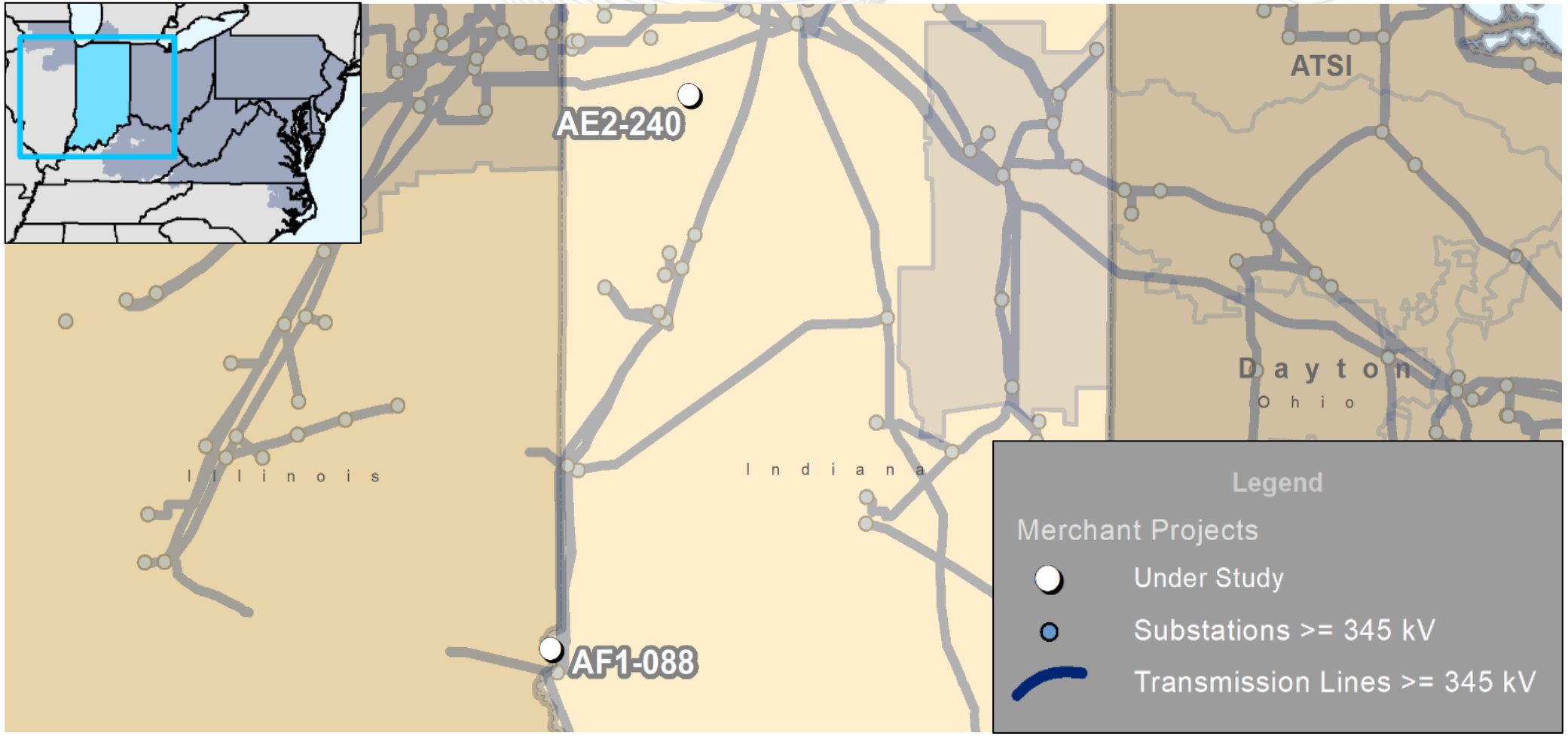
Map ID	Project	Description	Projected In-Service Date	Project Cost ($M)	TO Zone	TEAC Date
	s2019	Install two new 345 kV breakers and move the existing M2 breaker into the new N string at Tanners Creek station. Terminate the Dearborn line and the transformer into the new N string. Install a new 345 kV breaker "T" to complete the T string.	6/1/2021	$5.93	AEP	5/16/2019
	s2061	At Kline station, replace the 34.5 kV line breakers A, B & C and 138/69/34 kV transformer No.1. Install a 138 kV line breaker, a 138 kV circuit switcher and a 34 kV breaker.	5/7/2021	$8.6	AEP	9/25/2019
		At Virgil station, upgrade remote end relaying.				
		At Virgil station, reconfigure line entrance spans on the 138 kV side.				
		At Virgil station, reconfigure line entrance spans on the 34.5 kV side.				

Indiana – TO Supplemental Projects

(Greater than $5 million)

Map ID	Project	Description	Projected In-Service Date	Project Cost ($M)	TO Zone	TEAC Date
	s2091	Retire the 4 mile Jackson Road-Kankakee 34.5 kV circuit up to Torrington tap. Torrington will continue to be fed from Kankakee station at 34.5 kV.	3/25/2021	$6.2	AEP	10/25/2019
		Retire the 4 mile New Carlisle-Tulip 34.5 kV circuit.				
		Install 69 kV Snowberry Switch to feed existing customer from Tulip Road-Olive 69 kV line.				
		Reconfigure 0.2 miles of Tulip Road-Snowberry 69 kV lines to create Tulip Road-Snowberry Switch 69 kV circuit.				
		Install a 69/34 kV transformer, a 69 kV circuit switcher and two new 34 kV circuit breakers at Tulip Road to connect to customer loads.				
		Re-terminate Lydick-Westside 34.5 kV circuit and re-locate the 69 kV breaker M to the 69 kV bus at Westside.				
		Replace 34.5 kV rated transformer and switchgear at Lydick with 69 kV rated equipment.				

Indiana – Merchant Transmission Projects



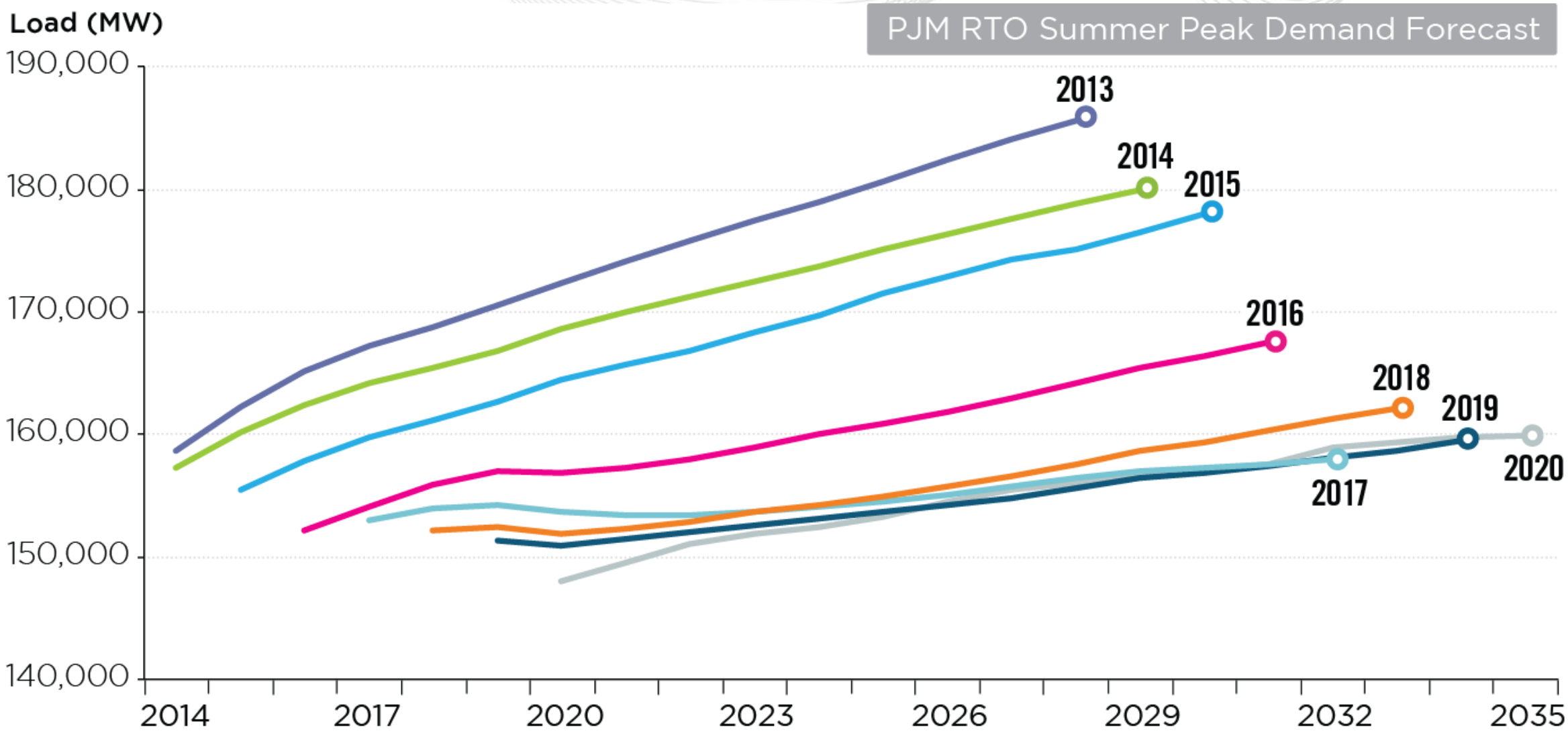
Indiana – Merchant Transmission Projects

Queue Number	Queue Name	TO Zone	Status	Actual or Requested In-Service Date	Maximum Output (MW)
AE2-240	Olive-Reynolds 345 kV No. 1 & 2	AEP	Active	6/1/2019	3,170
AF1-088	Sullivan 345 kV	AEP	Active	12/31/2025	1,000

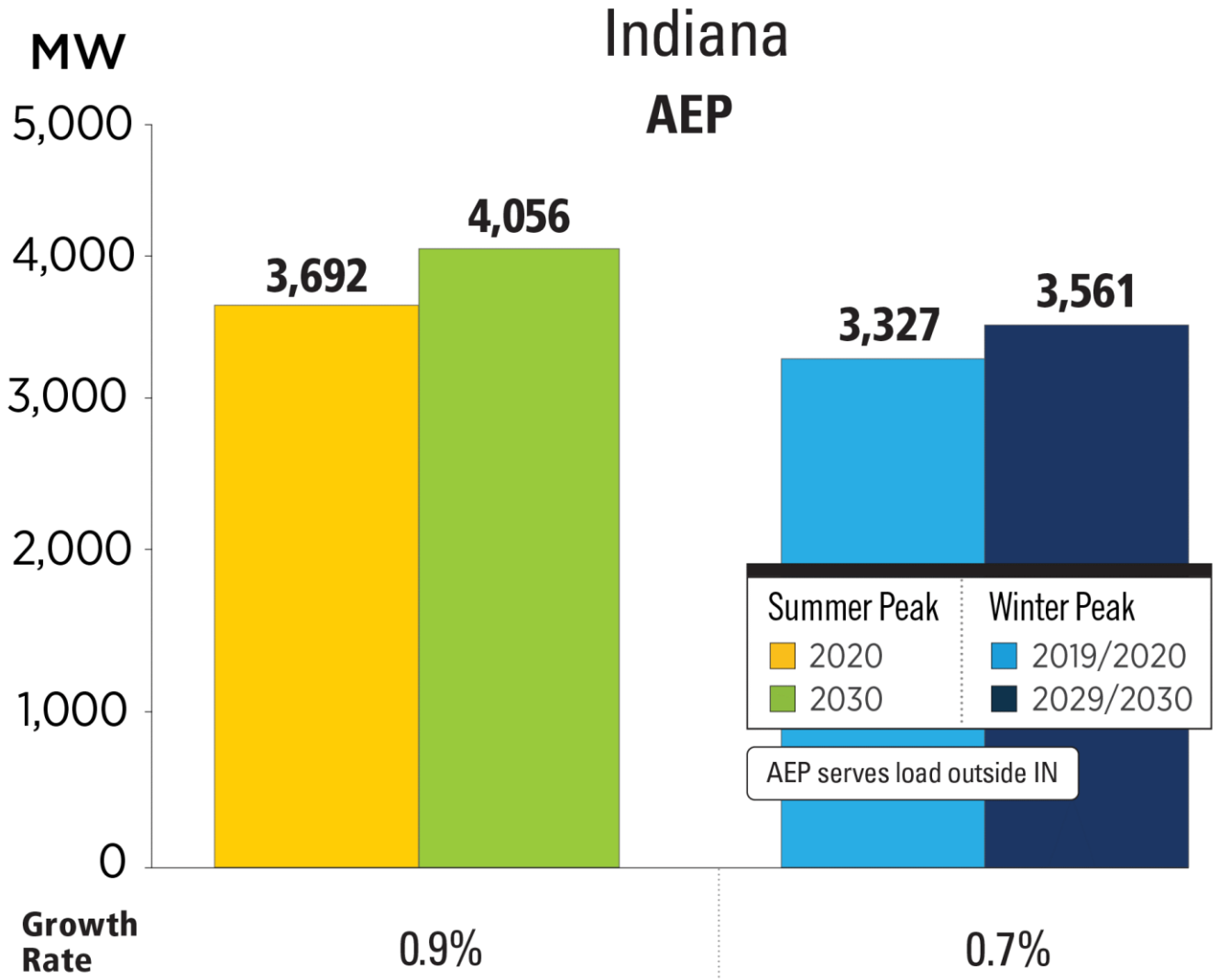
Planning
Load Forecast

PJM Annual Load Forecasts

(January 2020)



Indiana – 2020 Load Forecast Report



PJM RTO Summer Peak		PJM RTO Winter Peak	
2020	2030	2019/2020	2029/2030
148,092 MW	157,132 MW	131,287 MW	139,970 MW
Growth Rate 0.6%		Growth Rate 0.6%	

The summer and winter peak megawatt values reflect the estimated amount of forecasted load to be served by each transmission owner in the noted state. 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.

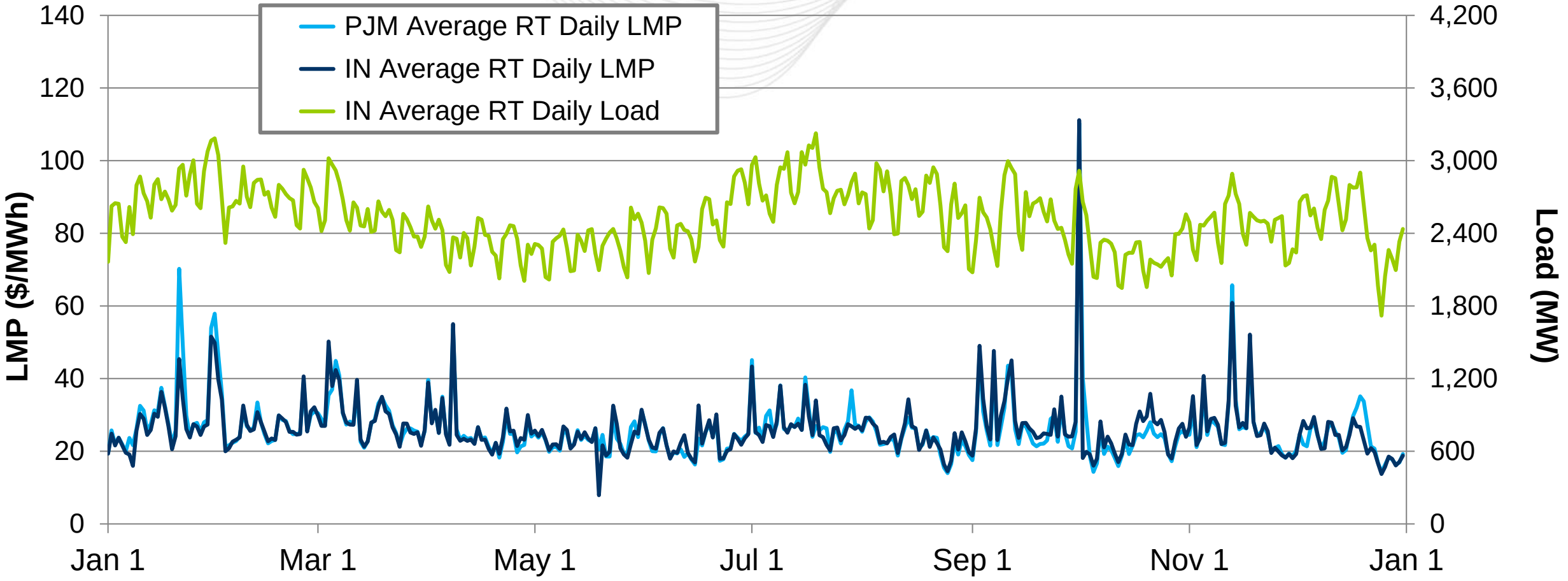
The Load Forecast was produced prior to COVID-19 and will be updated before the next Base Residual Auction to reflect changes in load patterns.

Markets

Market Analysis

Indiana – Average Daily Load and LMP

(Jan. 1, 2019 – Dec. 31, 2019)

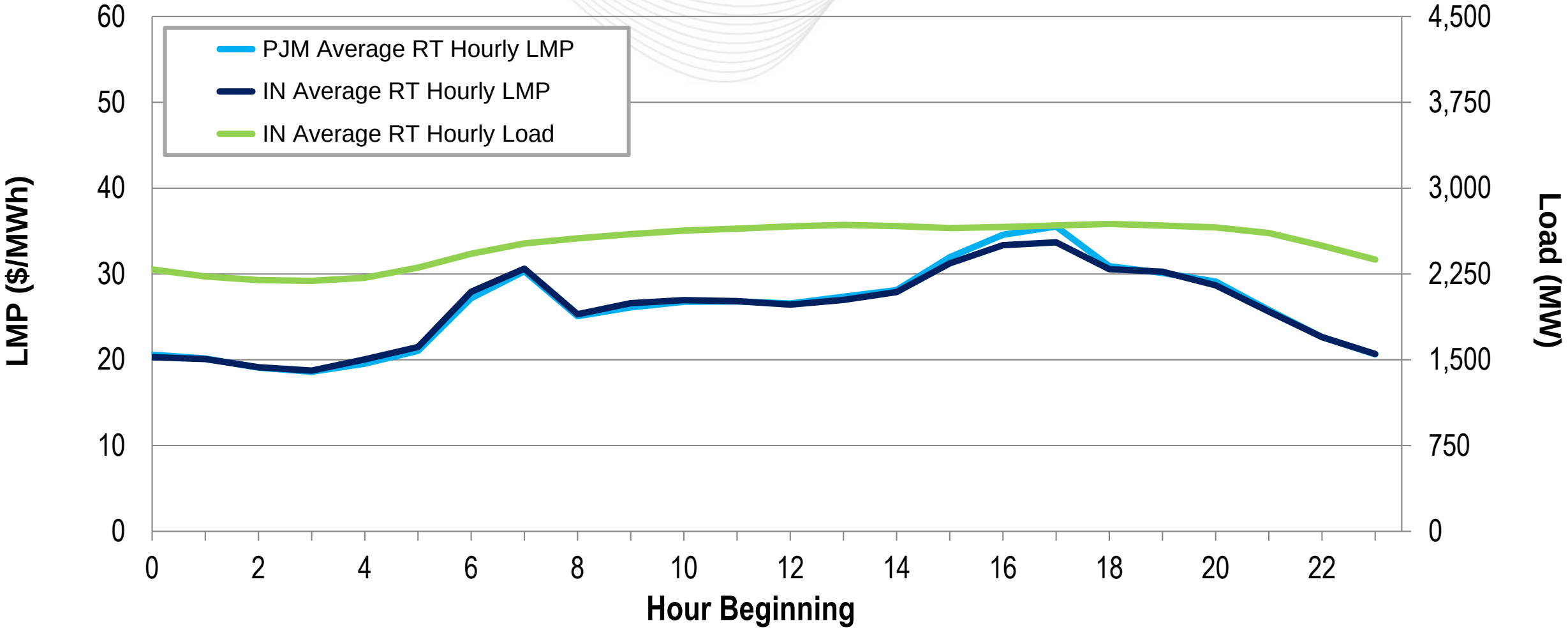


Note: The price spike in October reflects the Performance Assessment Interval event that occurred on October 2nd.

Indiana – Average Hourly Load and LMP

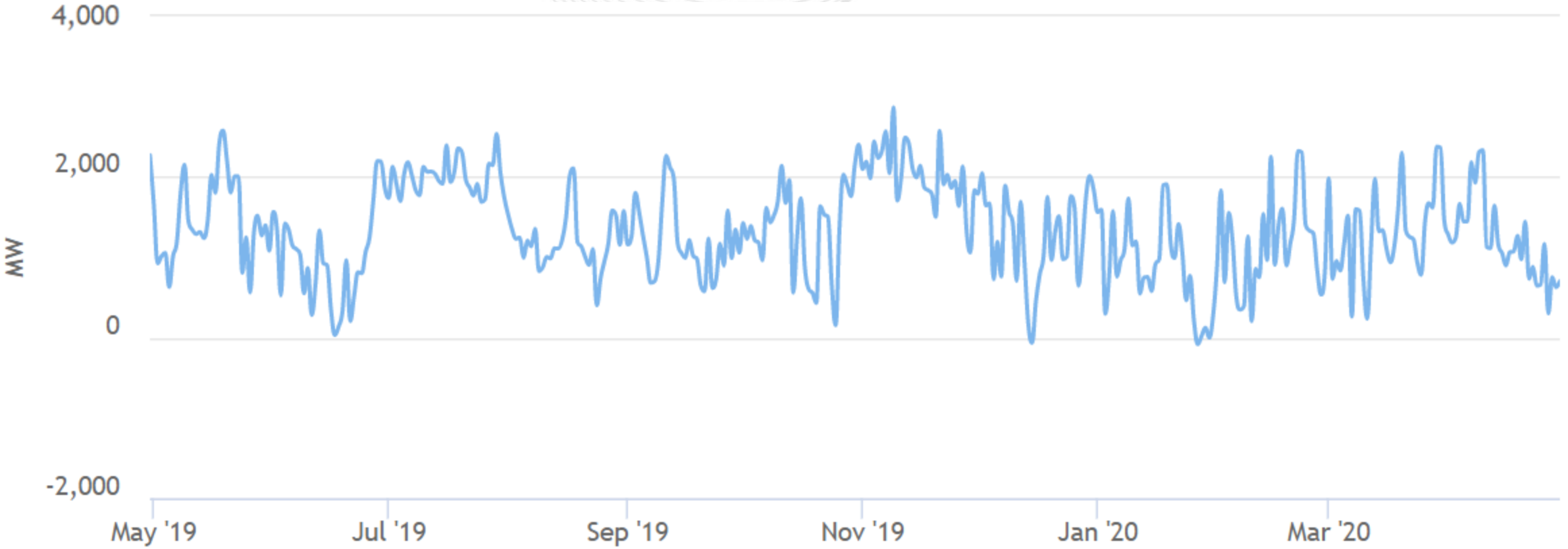
(Jan. 1, 2019 – Dec. 31, 2019)

Indiana's average hourly LMPs generally aligned with the PJM average hourly LMP.



Indiana – Net Energy Import/Export Trend

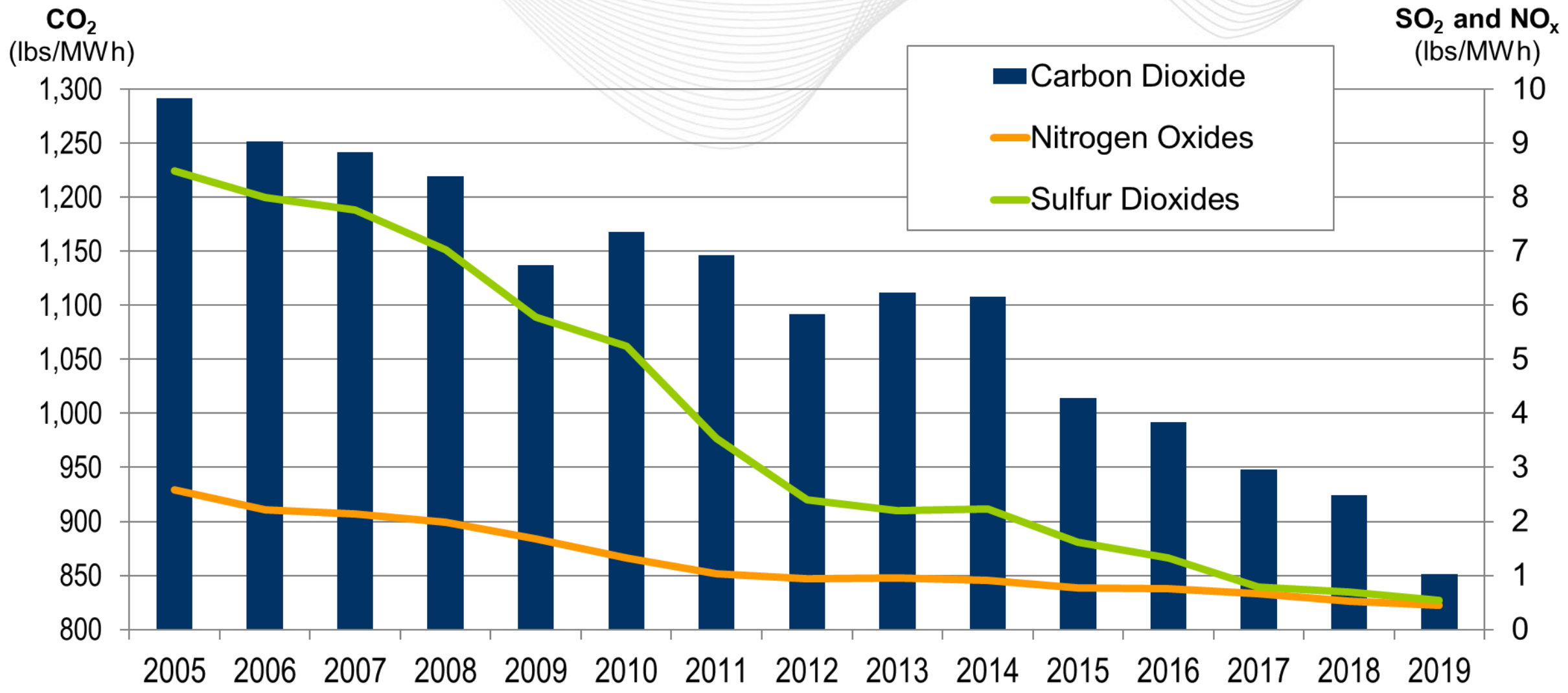
(May 2019 – April 2020)



This chart reflects the portion of Indiana that PJM operates. Positive values represent exports and negative values represent imports.

Operations
Emissions Data

2005 – 2019 PJM Average Emissions



Indiana – Average Emissions (lbs/MWh)

(Feb. 7, 2020)