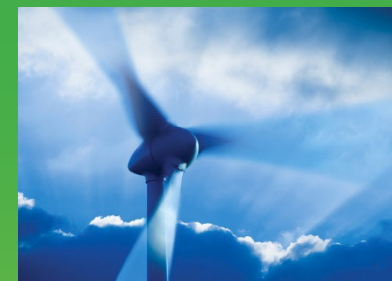


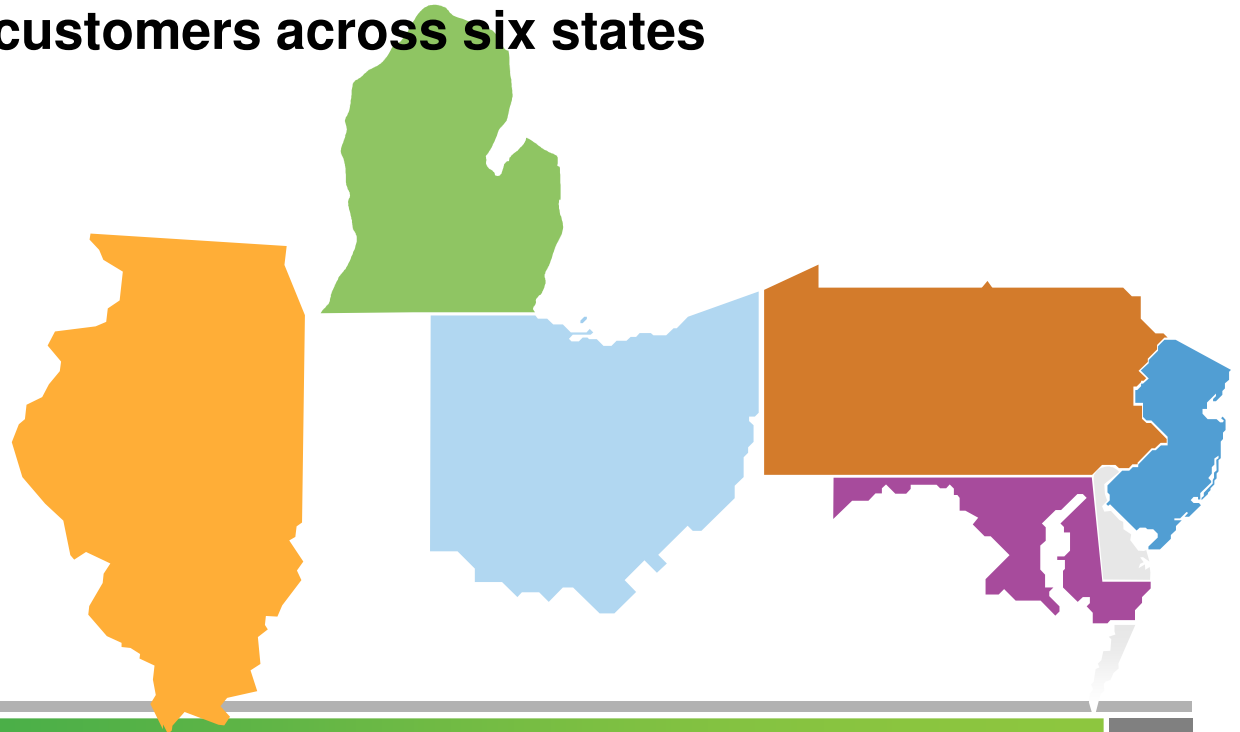
FirstEnergy Solutions  
Energy Market Update  
AEE Meeting  
March 20, 2014

**John Ogurchak – PE/CEM**  
Manager, Commercial/Industrial Energy Sales

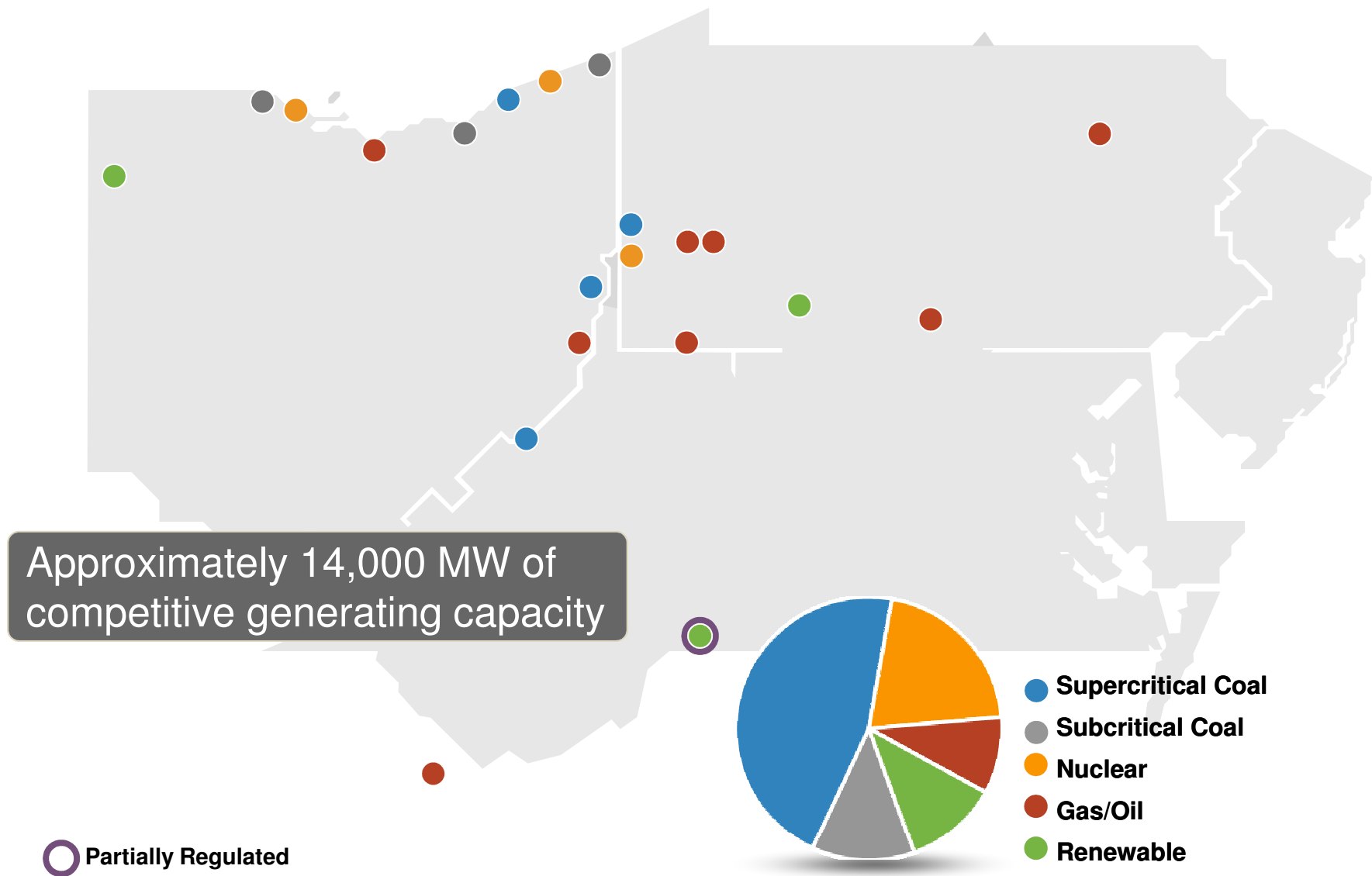


# FirstEnergy Solutions Corp. (FES)

- ❑ **Retail subsidiary of FirstEnergy Corp. and headquartered in Akron, Ohio**
- ❑ **Second largest retail supplier of electricity in US to C&I accounts**
  - Second largest retail supplier to residential electric account
- ❑ **Serves 2.7 million customers across six states**

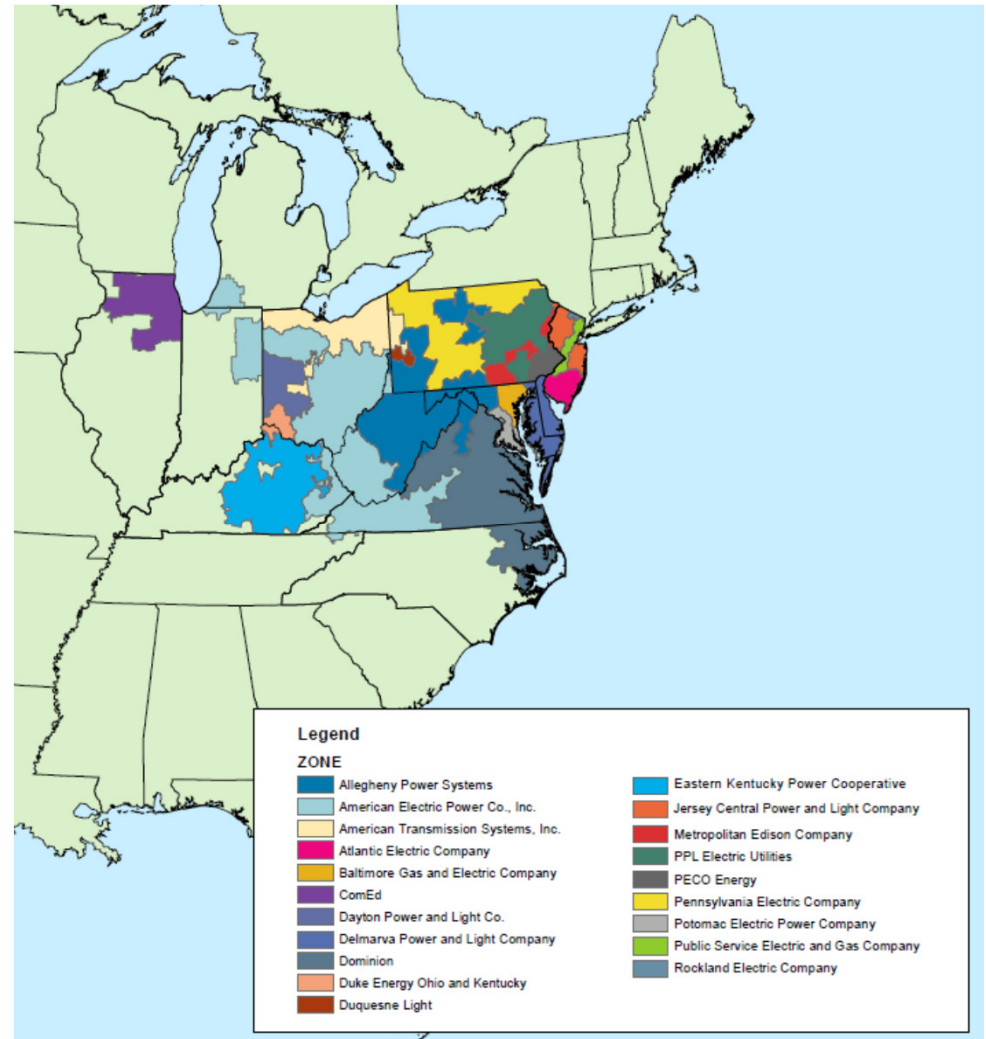


# Our Diverse Generating Sources



# PJM System

- ❑ **Generating Capacity:**  
**185,600 MW**
- ❑ **Peak Demand:**  
**163,848 MW**
- ❑ **Transmission Lines:**  
**59,750 miles**
- ❑ **Population Served:**  
**60 million in 13 States and DC**
- ❑ **21% of U.S. GDP**  
**produced in region**



# PJM's Focus



# Reliability Roles

## □ **Federal Energy Regulatory Commission (FERC)**

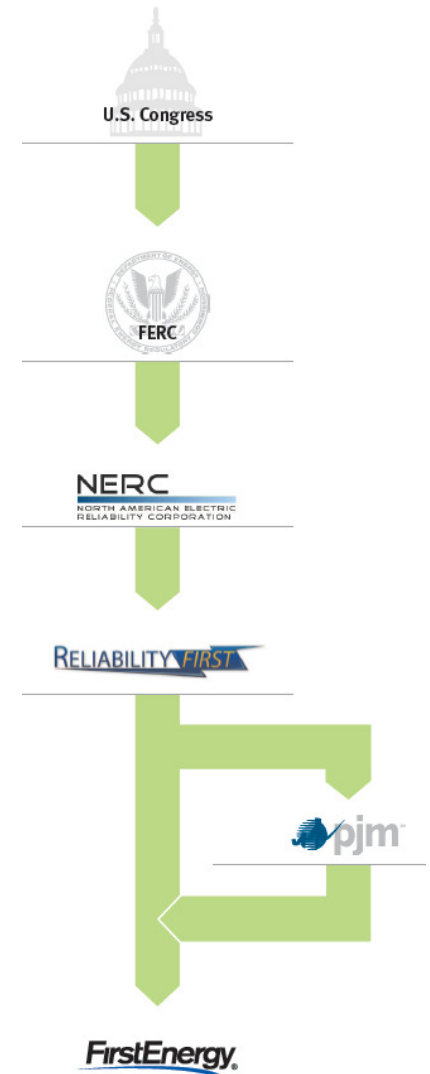
- Agency that regulates interstate transmission of electricity, natural gas and oil
- Has authority to impose mandatory reliability standards on bulk transmission system

## □ **North American Electric Reliability Corporation (NERC)**

- Ensures the bulk electric system in North America is reliable, adequate and secure
- Responsible for developing and enforcing reliability standards

## □ **ReliabilityFirst Corporation (RFC)**

- One of eight regional reliability entities in North America
- Delegated authority from NERC to propose and enforce reliability standards
- Monitor compliance with reliability standards



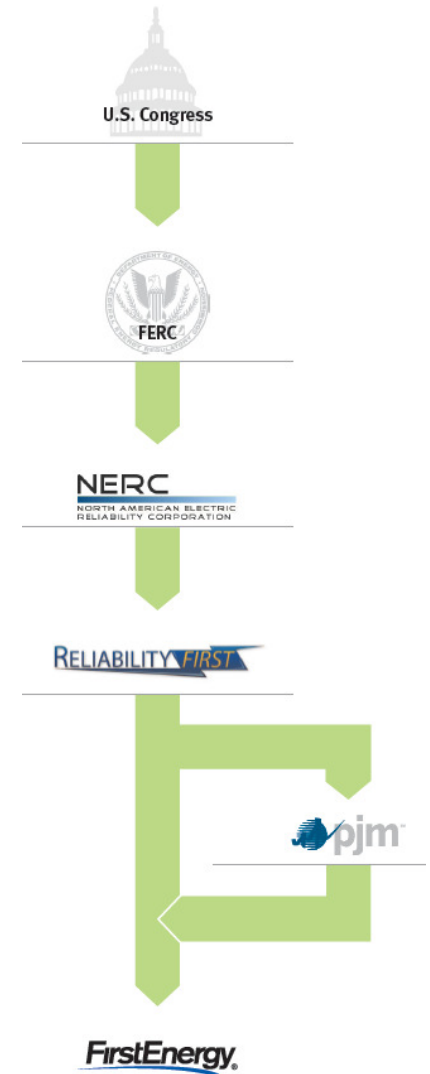
# Reliability Roles (Continued)

## □ **PJM Interconnection L.L.C. (PJM)**

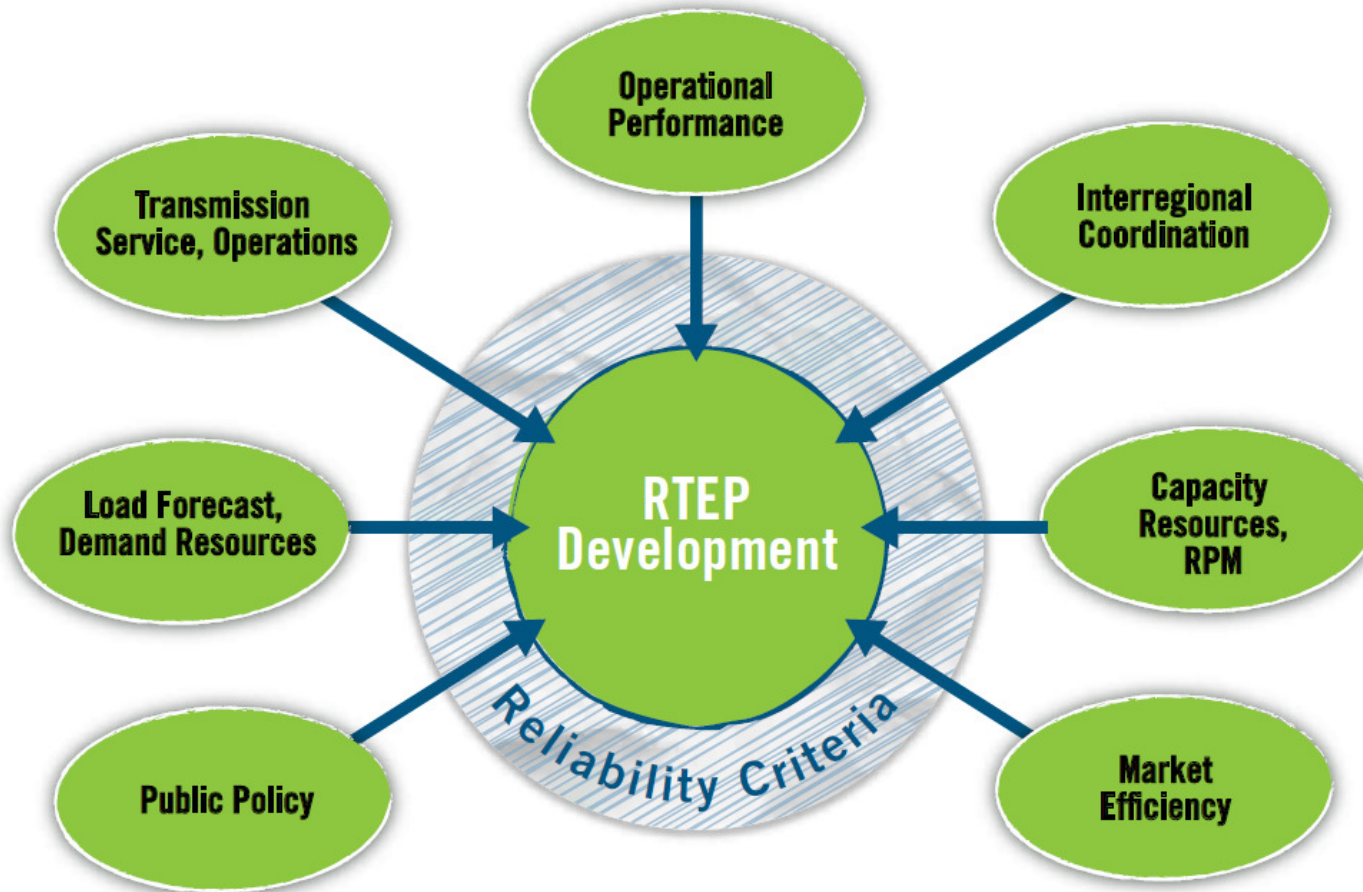
- A Regional Transmission Organization (RTO)
- Coordinates and directs operation of the region's transmission grid
- NERC-registered reliability coordinator and transmission operator for its footprint
- Develop and maintain procedures and policies consistent with the reliability standards

## □ **Transmission Owners**

- Responsible for constructing, operating and maintaining transmission facilities



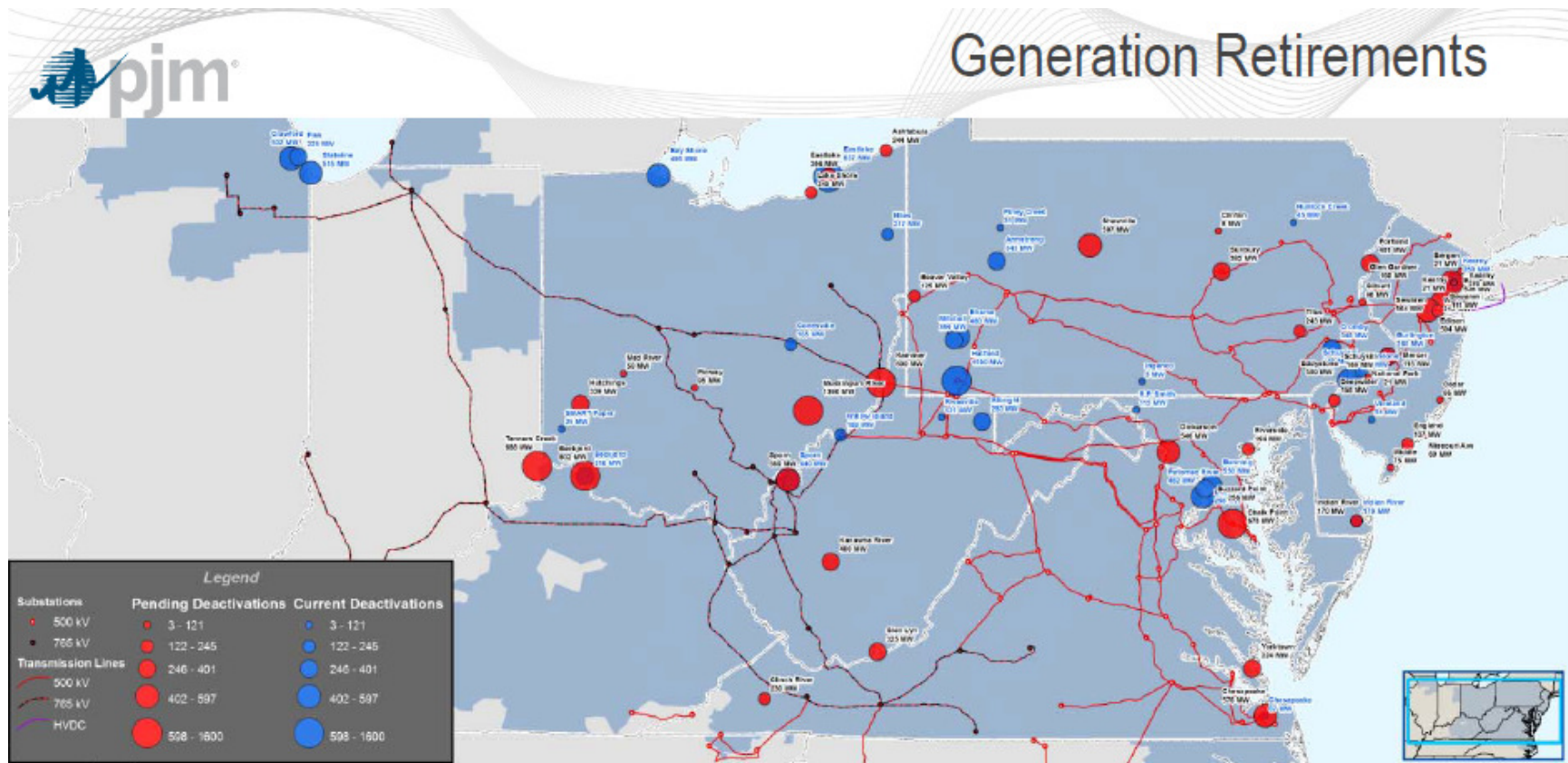
# PJM RTEP Project Development



Sources: PJM website [www.pjm.com](http://www.pjm.com)



# PJM Key Drivers to the RTEP Projects

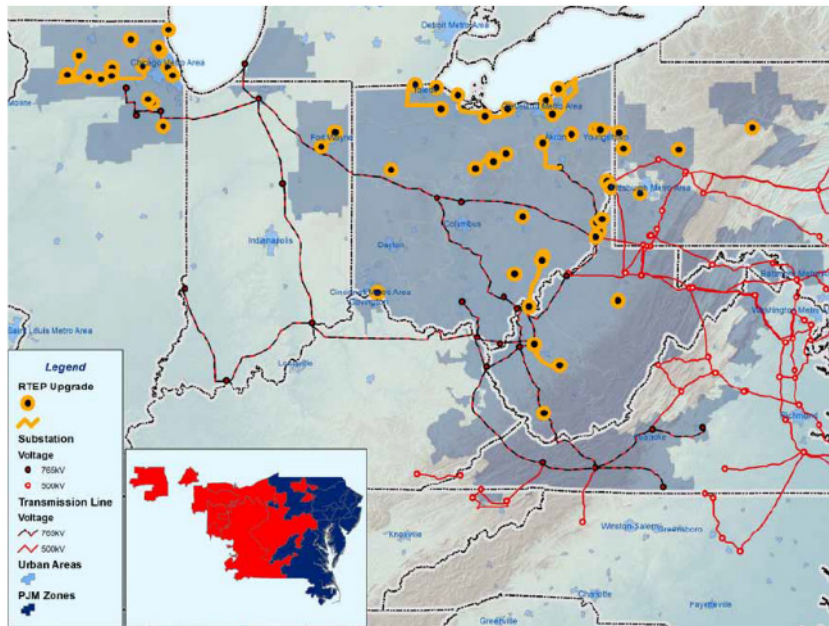


Sources: PJM website [www.pjm.com](http://www.pjm.com)

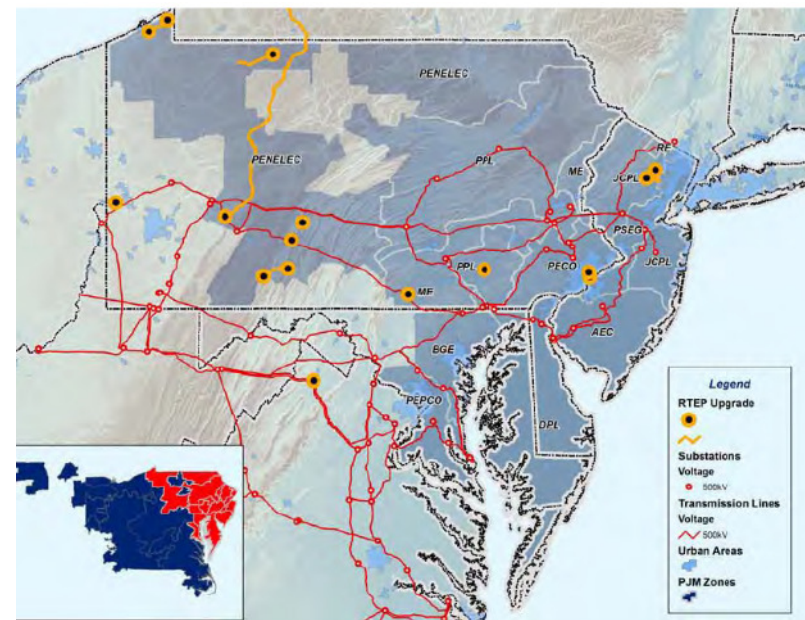
# PJM RTEP Project Upgrades

## Driven by Baseline Upgrades including Generator Deactivations

PJM Western Area

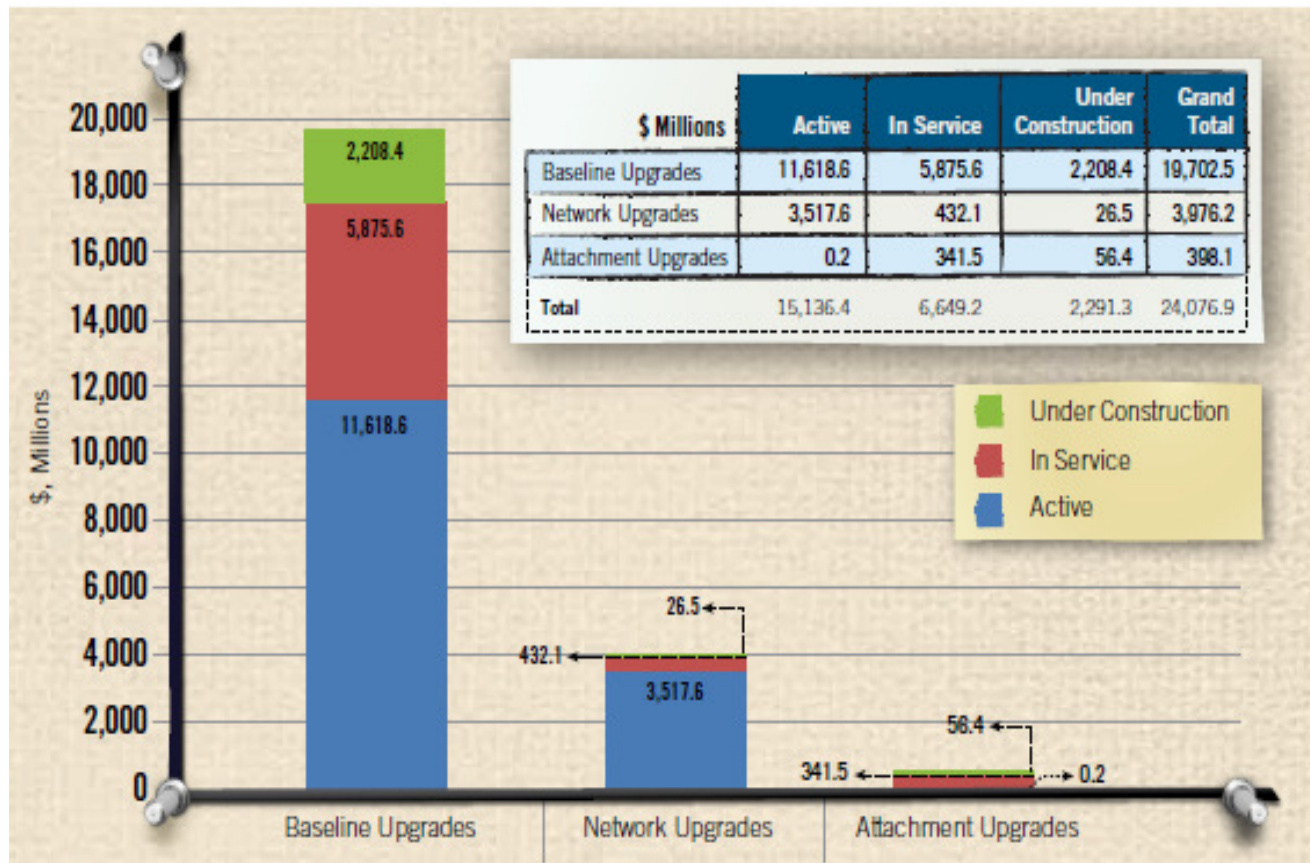


PJM Mid-Atlantic Area



Sources: PJM website [www.pjm.com](http://www.pjm.com)

# PJM Annual RTEP System Expansion 1997 through the 2012 RTEP (\$24B)



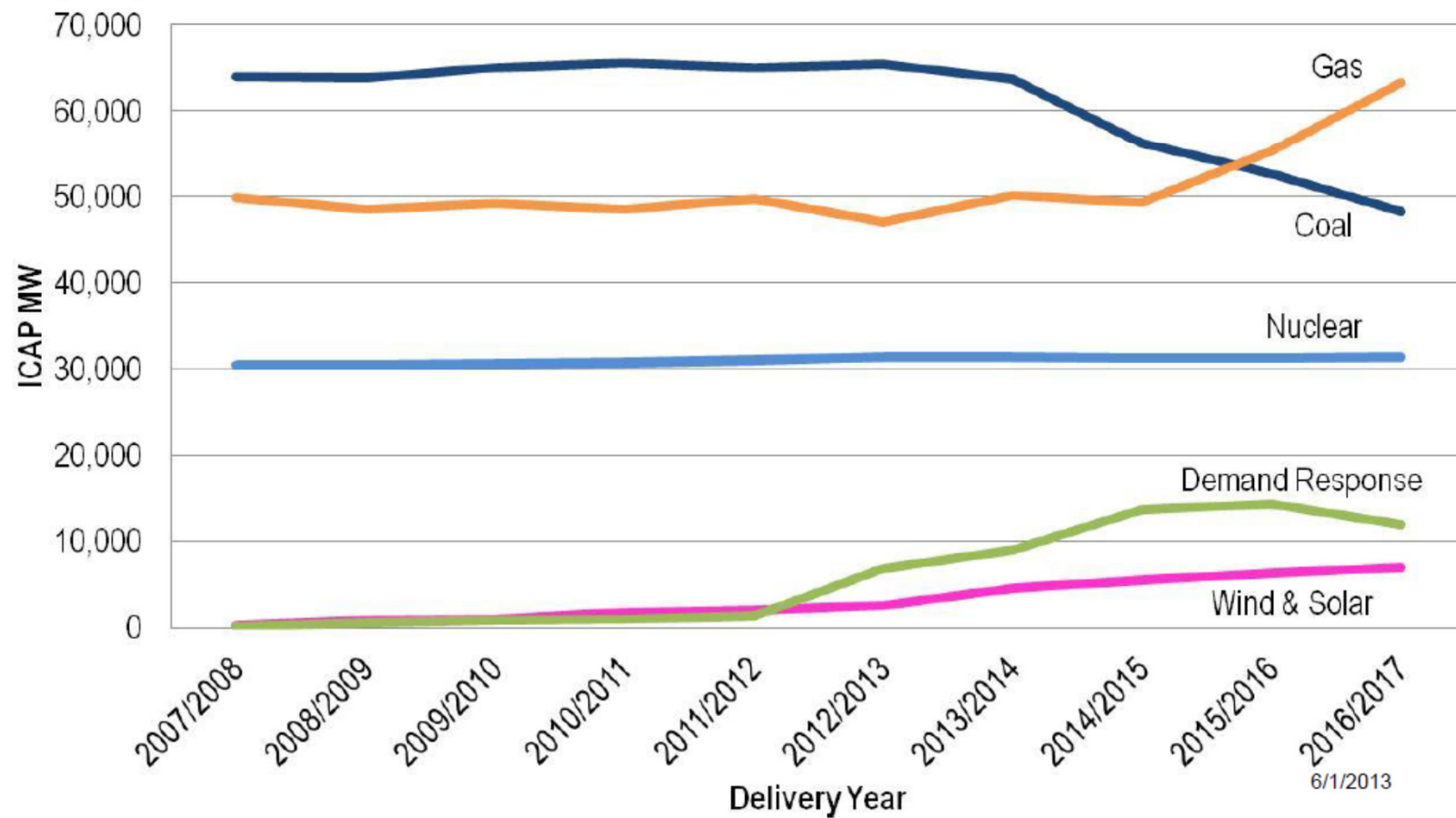
Sources: PJM website [www.pjm.com](http://www.pjm.com)





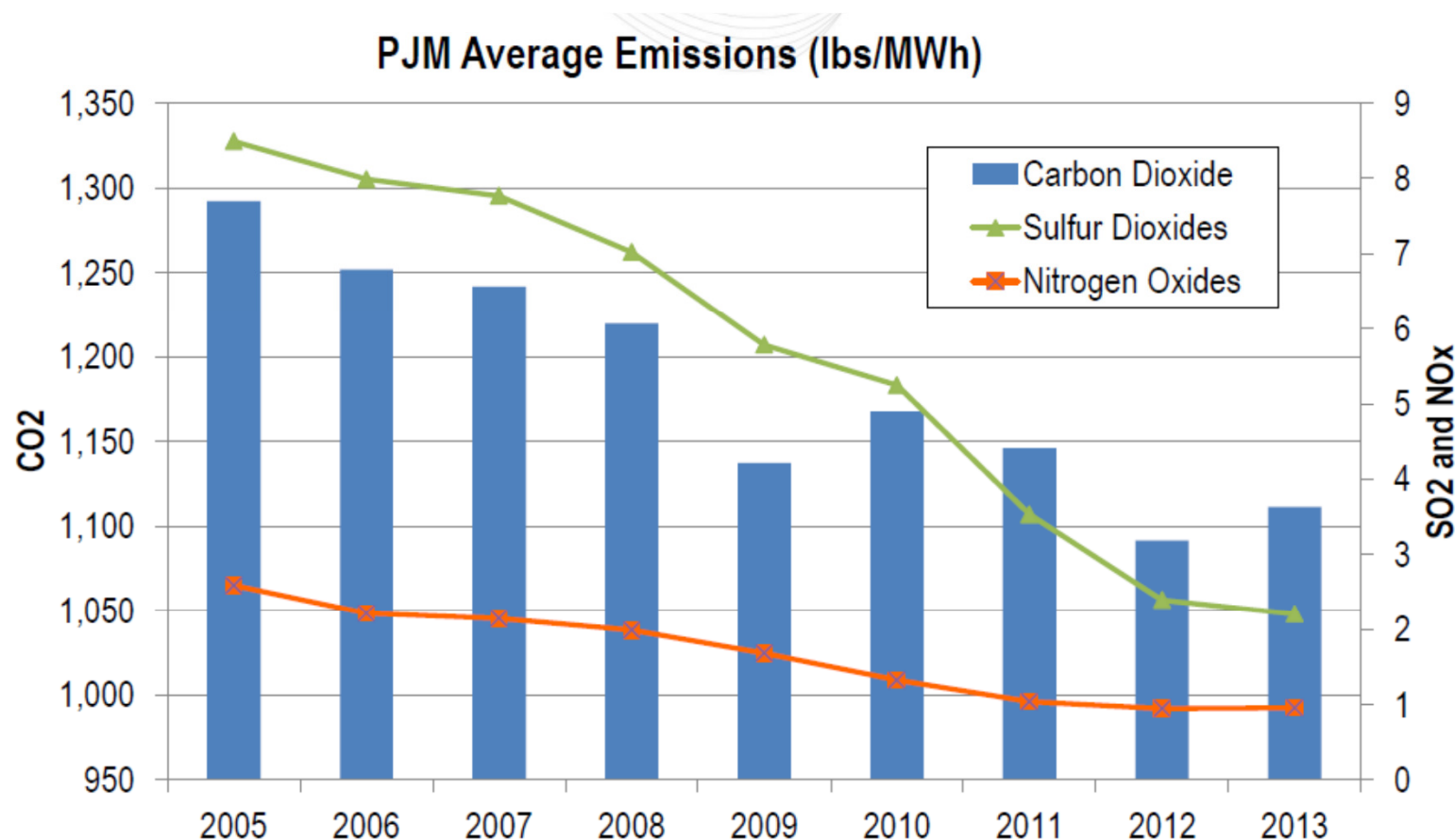
## Managing a Sea-Change

PJM Installed  
Capacity Cleared

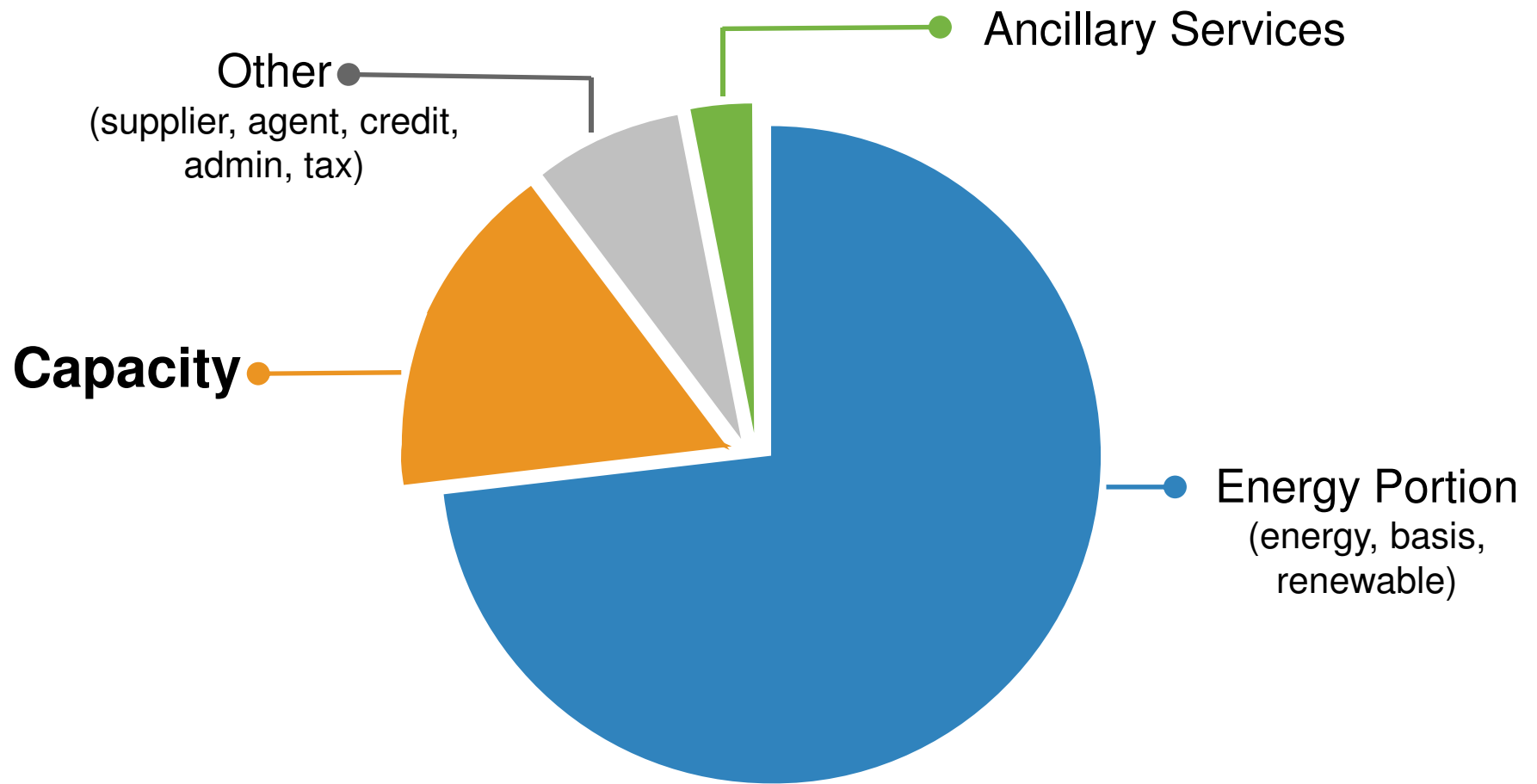


Sources: PJM website [www.pjm.com](http://www.pjm.com)

# PJM Market – Average Power Generation Emissions Pounds per MWh of Electricity Produced



# Components of a Generation Price



# What is Capacity?

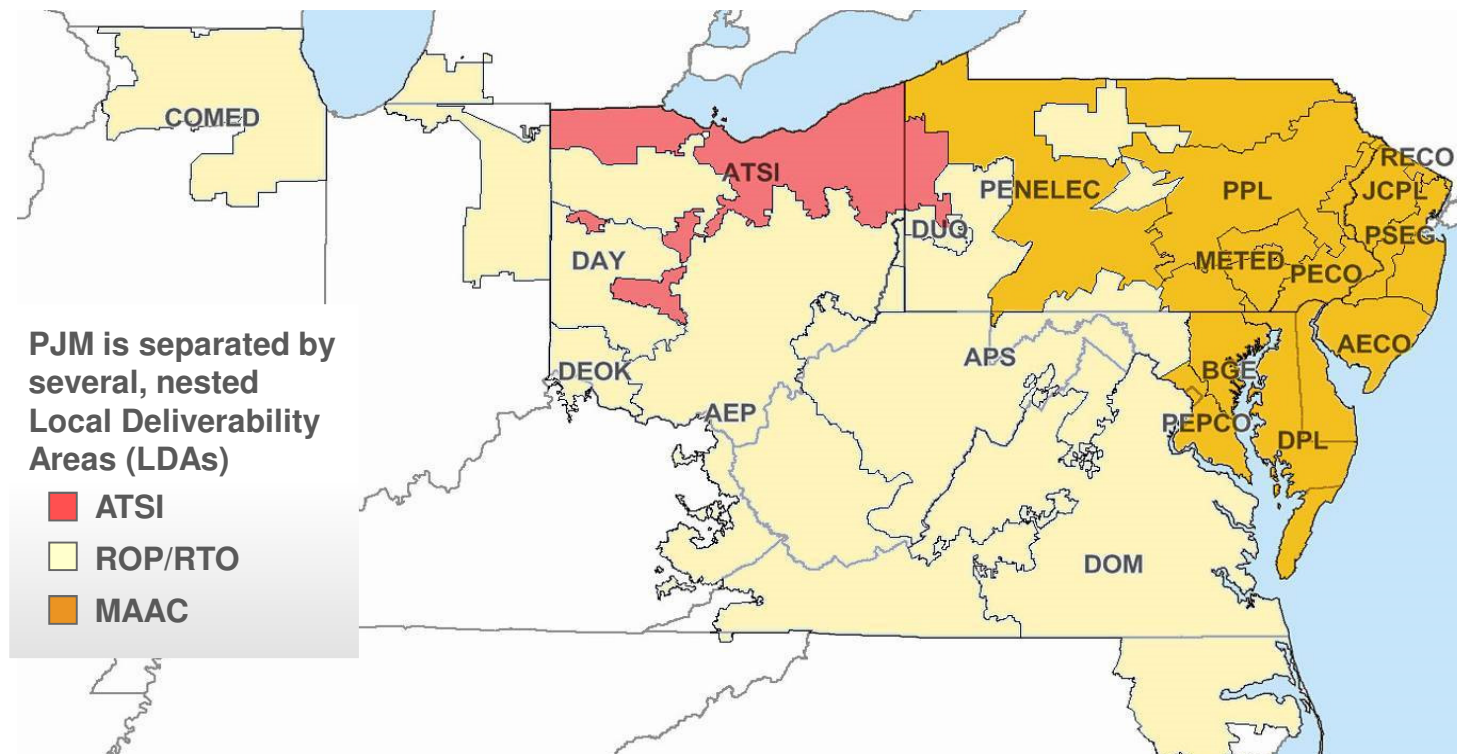
- ❑ **Represents the need for adequate generating resources**
  - Capacity ensures there is enough electric supply to meet peak demand at all times
- ❑ **Regional Transmission Organizations (RTO) are responsible for maintaining adequate capacity between utility companies**
  - RTO serving our region is Pennsylvania Jersey Maryland Interconnection (or PJM)



# PJM Determines Capacity Rates

## □ PJM uses a Reliability Price Model (RPM)

- Auction process that sets price for capacity, sending price signal to potential developers of generation, demand response, and/or transmission to locate resources in that area



ROP / RTO: Rest of Pool / Regional Transmission Organization Map represents Planning Year 2015 View, ATSI and MAAC: constrained LDAs



# How the Auction Process Works

- ❑ **Generators offer their price to serve based on their forecasted supply**
  - Auction results (prices) are set where supply and demand meet
- ❑ **Auctions held in May three years in advance to determine June to May Planning Period**
  - Example: May 2014 Auction held for June 2017 through May 2018 period
  - Allows time for new generating resources to be built if needed
- ❑ **PJM determines if there are any constrained zones that need to be isolated and bid separately**
  - Auction results are intended to relieve constraints which may require incremental investments (generation or transmission).
  - In theory constrained zone auctions could result in higher capacity costs

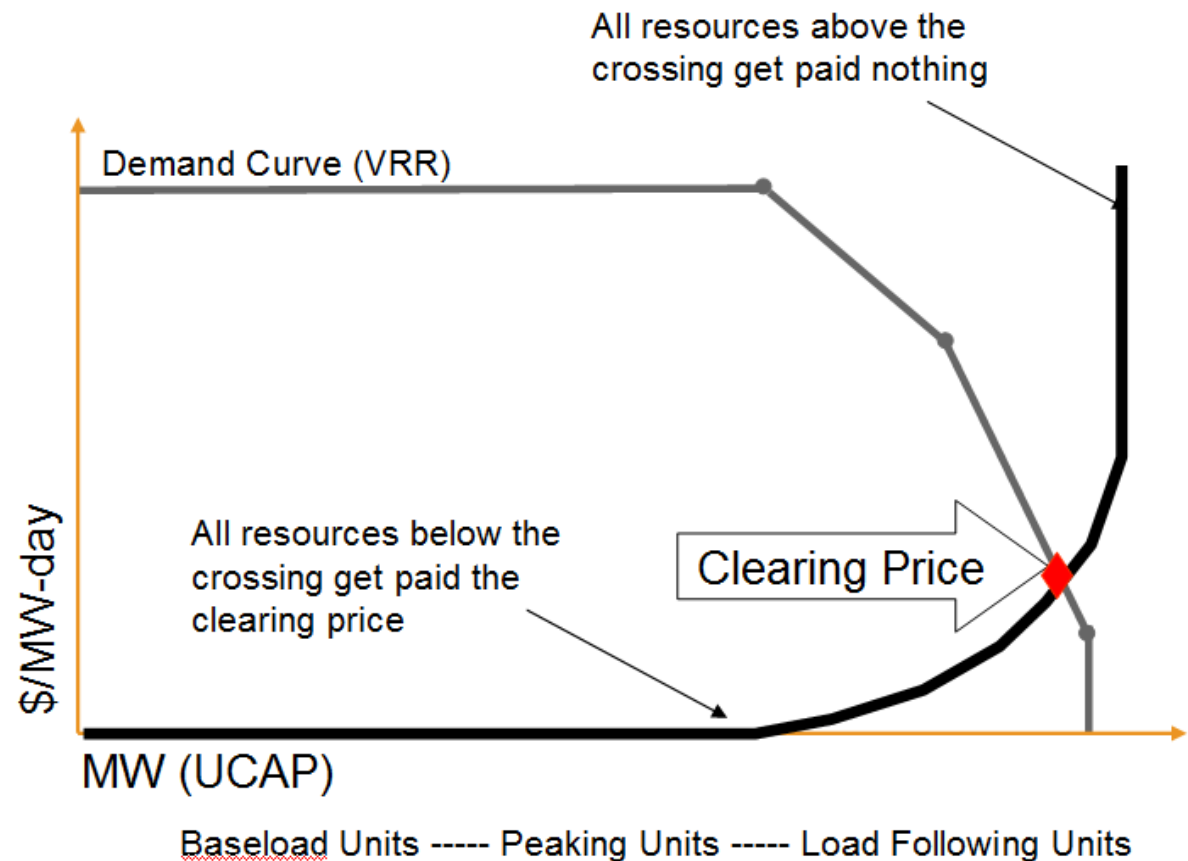
# What Factors Affect the Price of Capacity?

## ❑ Reducing Supply

- New emission rules force plants to retire
- Depressed energy prices force marginal plants out

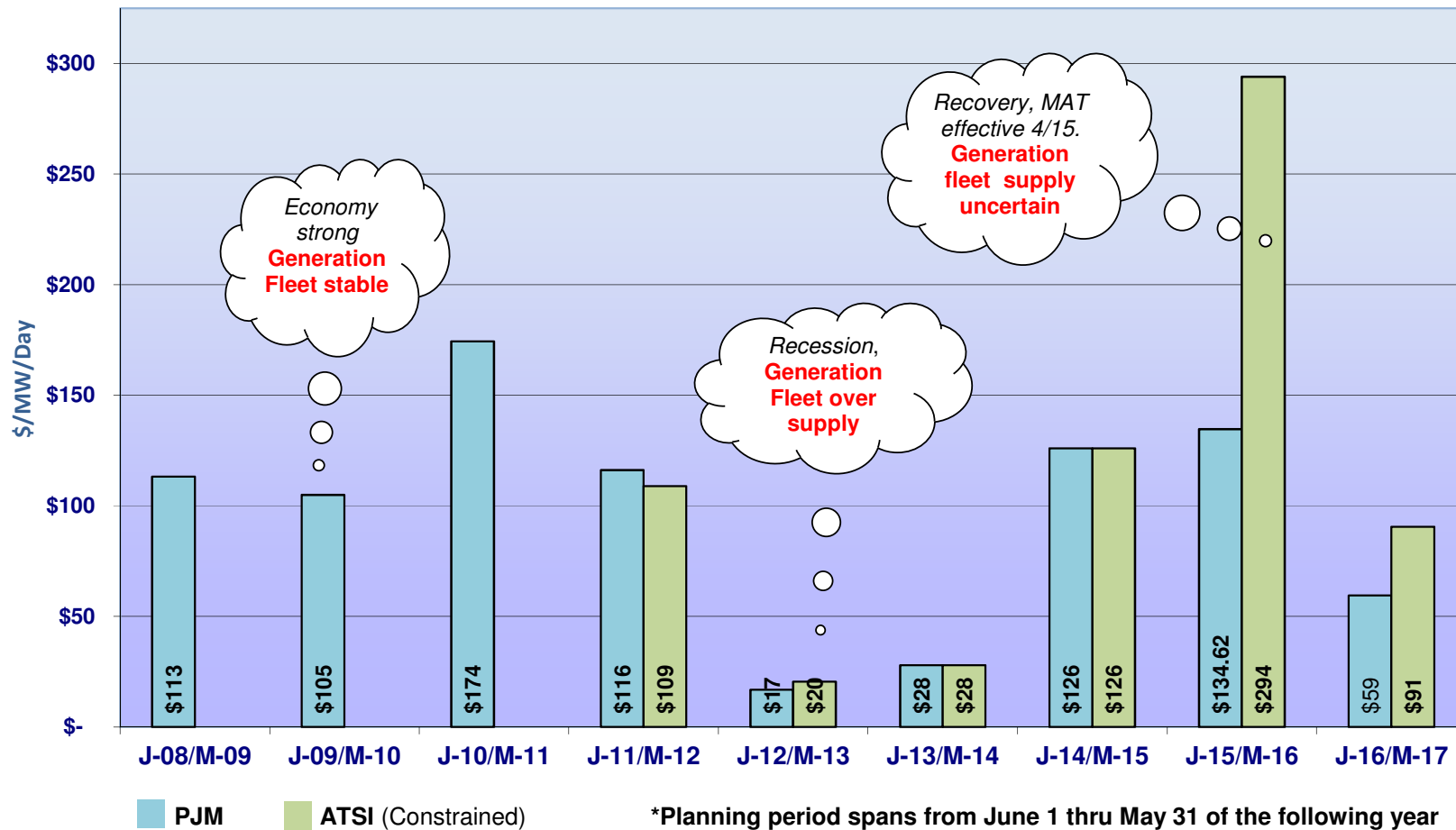
## ❑ Increasing Demand

- Economic recovery
- New industry to support emerging energy industry

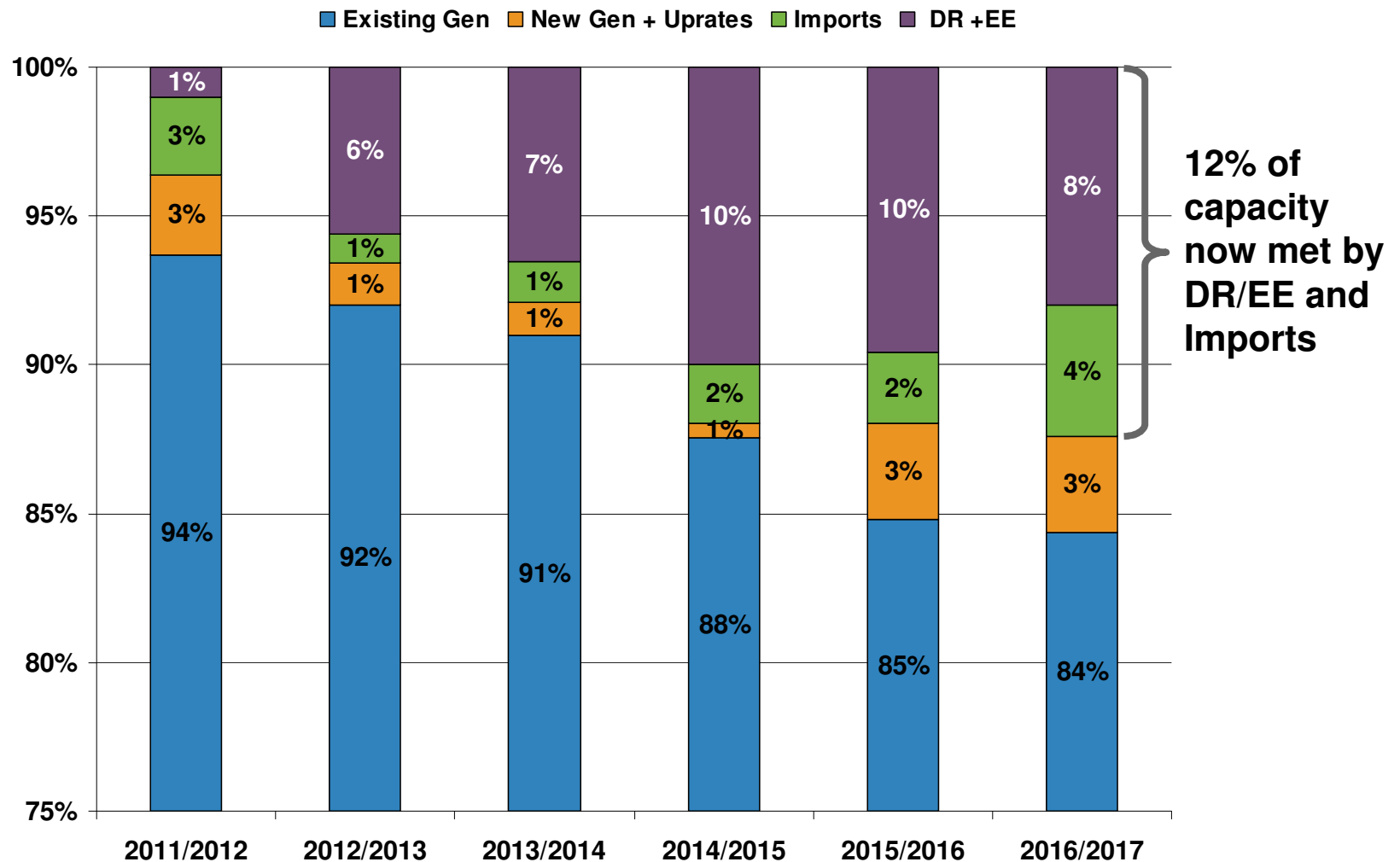


# PJM Capacity Charges in Ohio

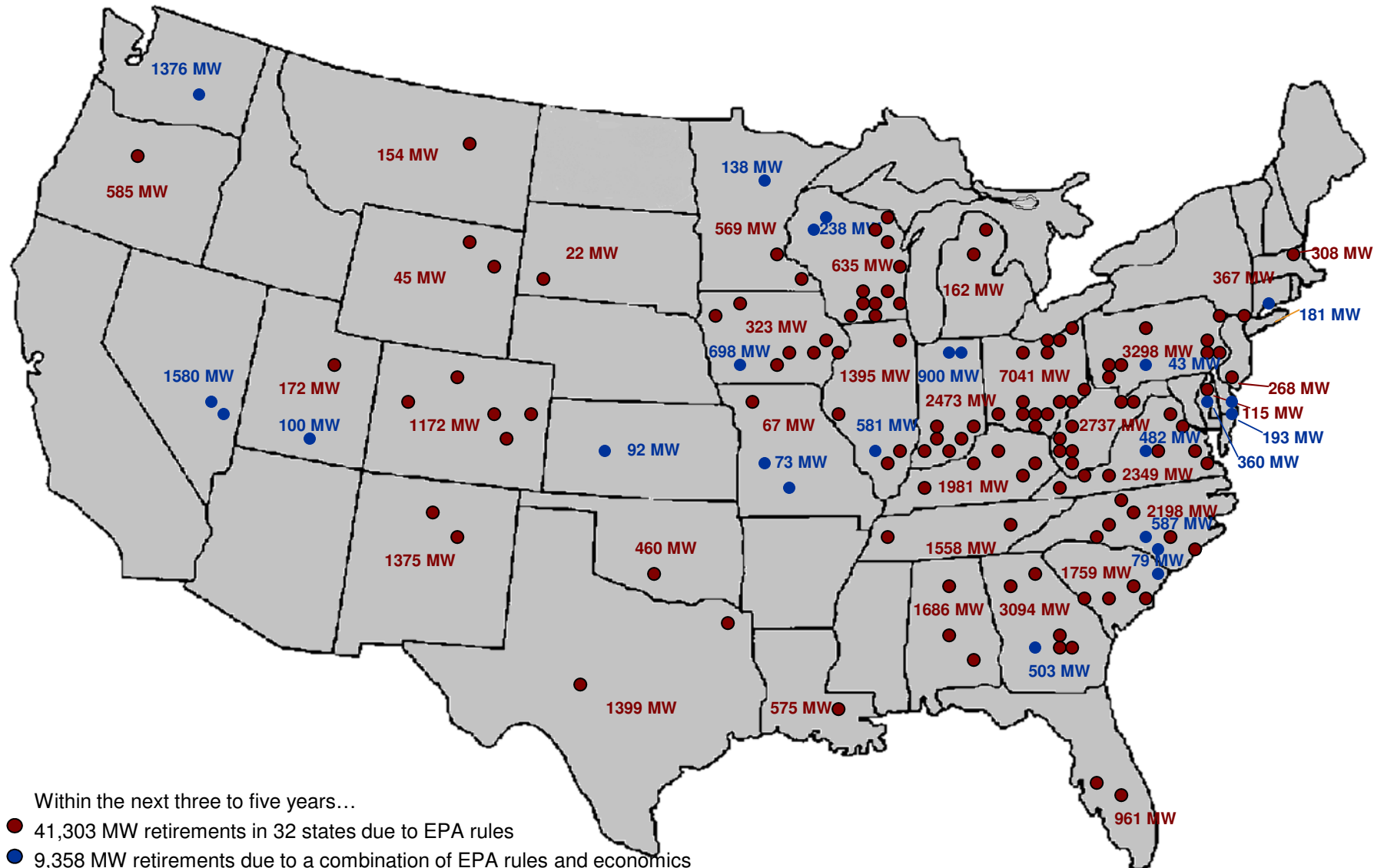
**PJM Reliability Pricing Model (RPM) Prices set three years in advance each May**



# PJM increasing reliance on DR/EE, imports and proposed new generation to meet peak load



# Reported Near-Term Coal-Fired Generator Retirements



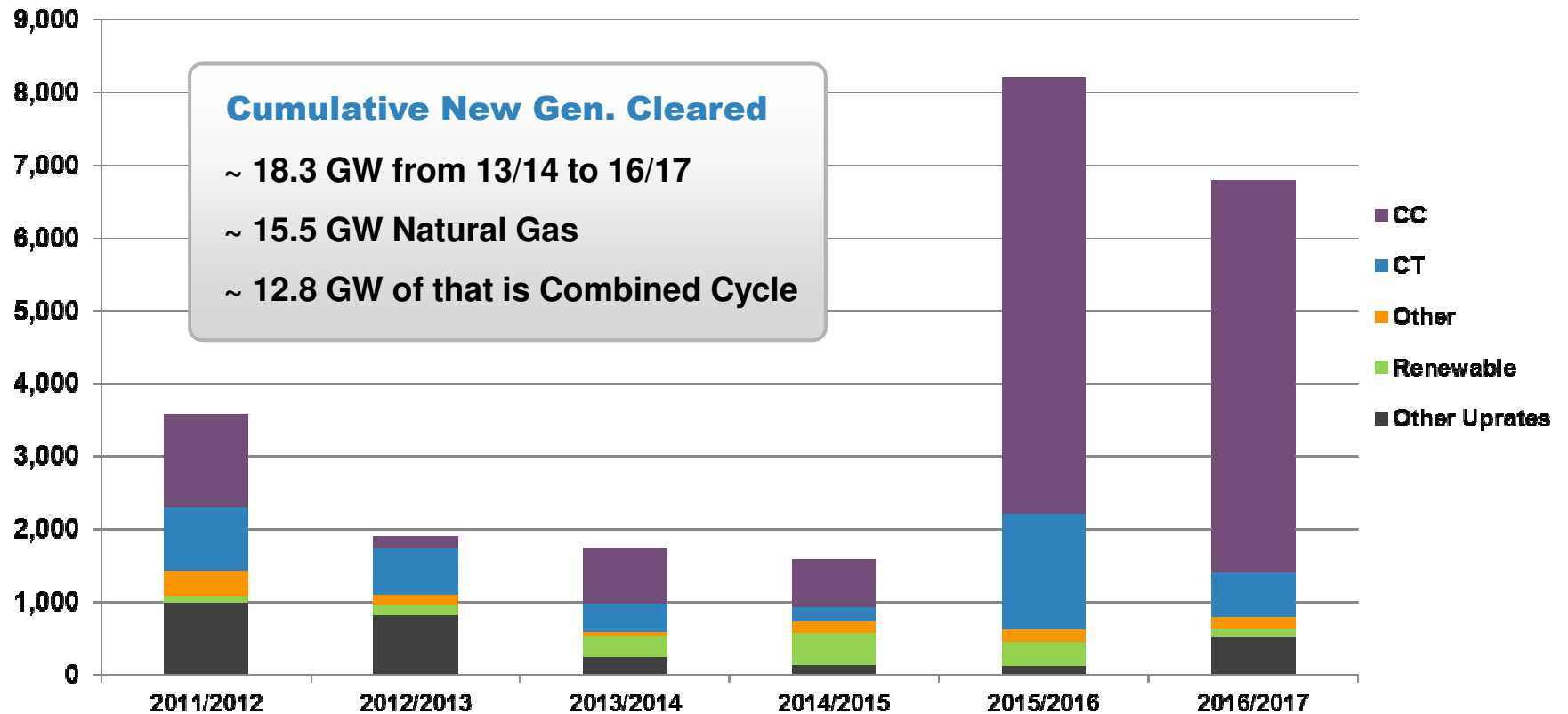
Within the next three to five years...

- 41,303 MW retirements in 32 states due to EPA rules
  - 9,358 MW retirements due to a combination of EPA rules and economics
- In total, 367 coal units will be closing in 38 states totaling 50,661 MW

Source: American Coalition for Clean Coal Electricity (ACCCE), June 20, 2013

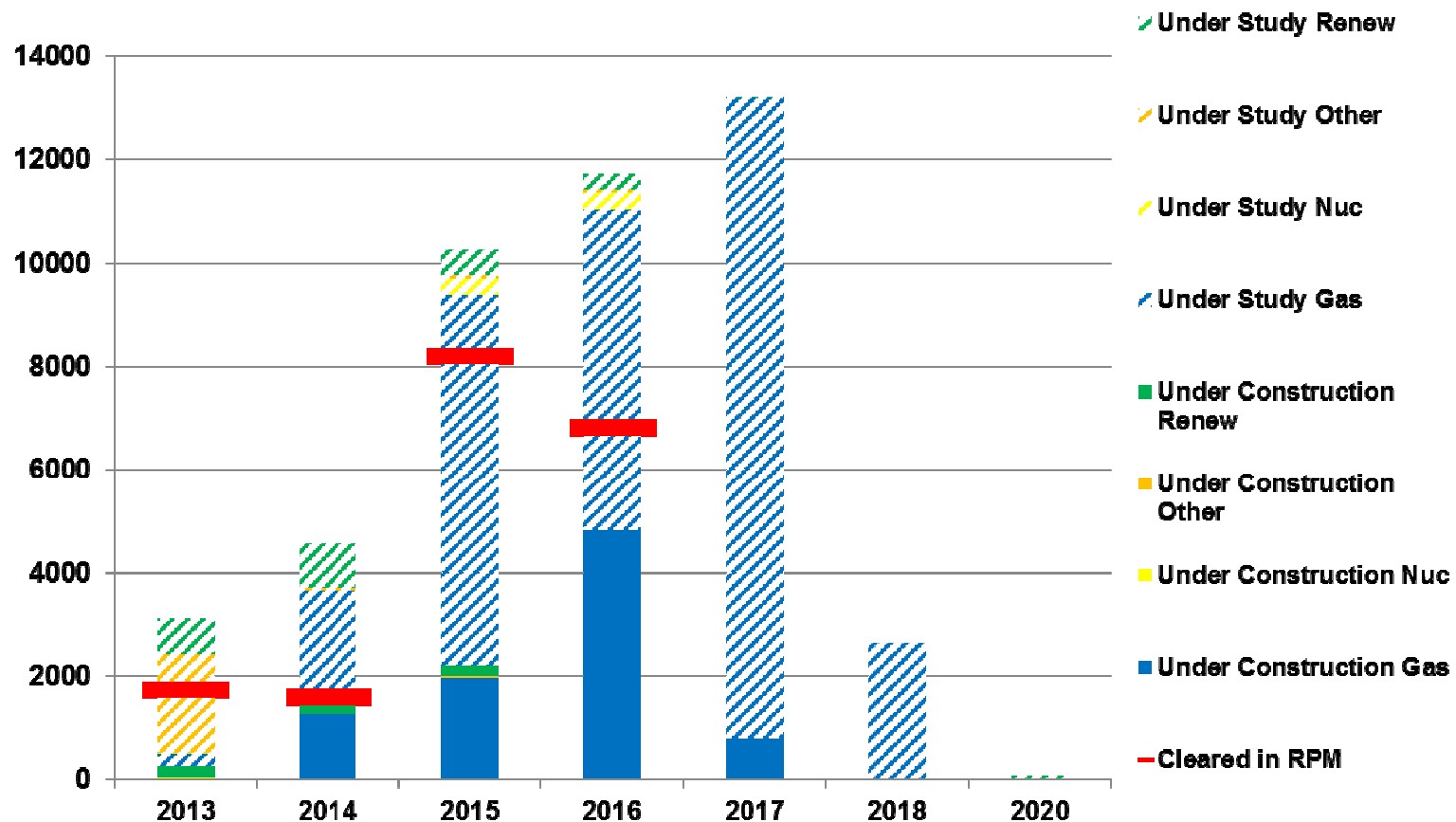
# Most New Generation Cleared Is Gas Fired

## Cleared New Entrants and Uprates in RPM

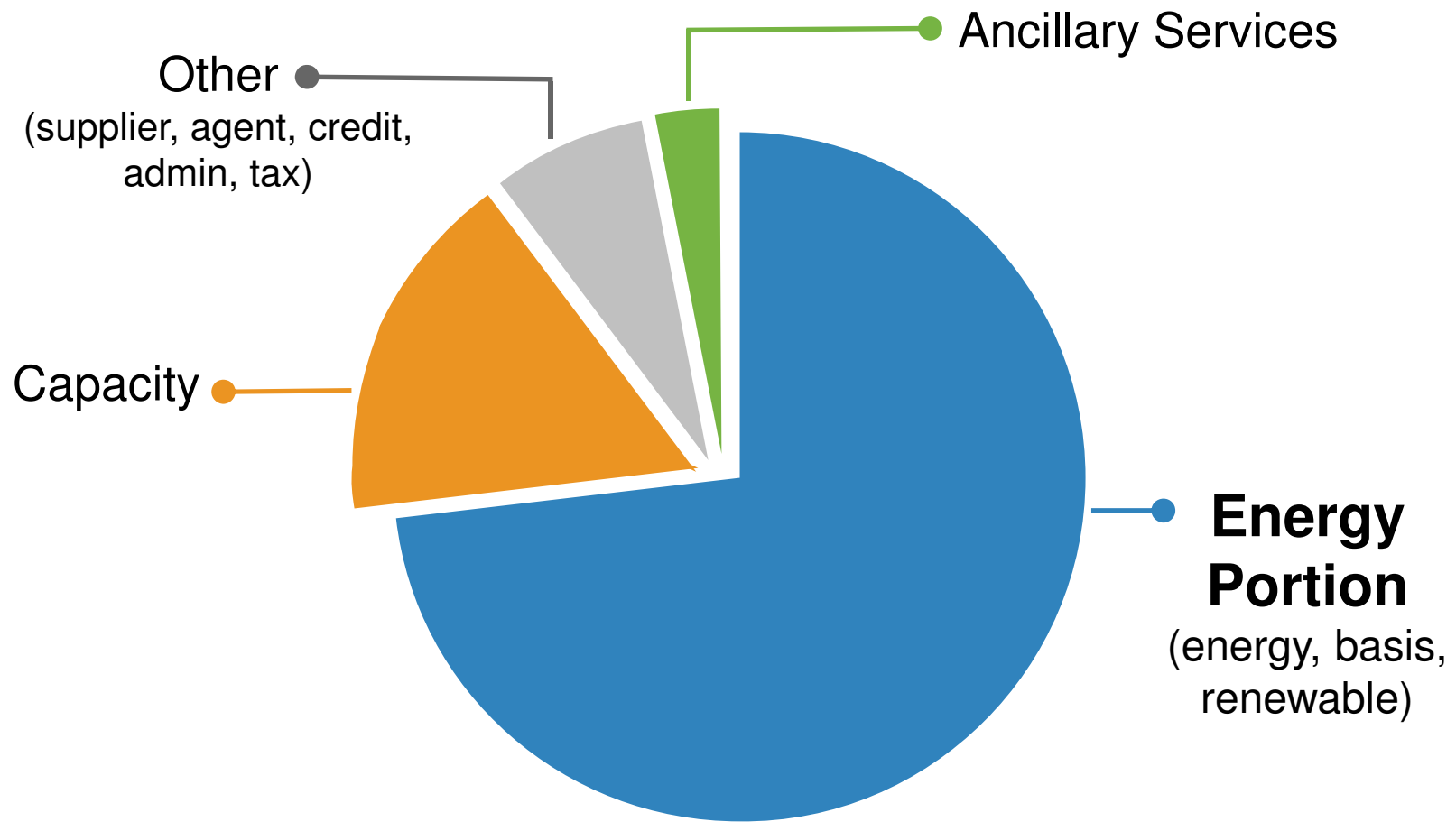


# 43 GW of new generation in PJM queue – most is not yet under construction

## PJM Interconnection Queue



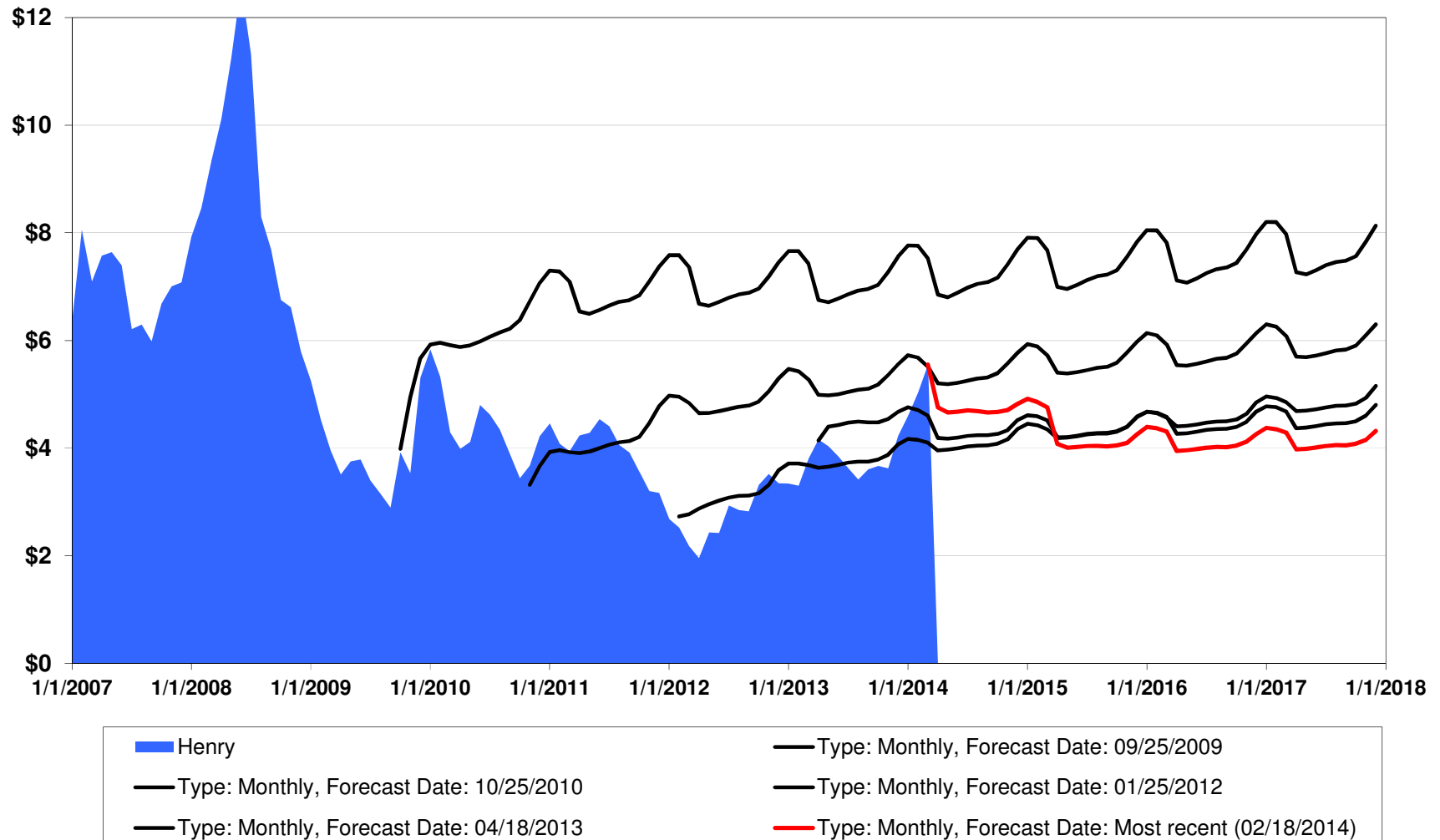
# Components of a Generation Price



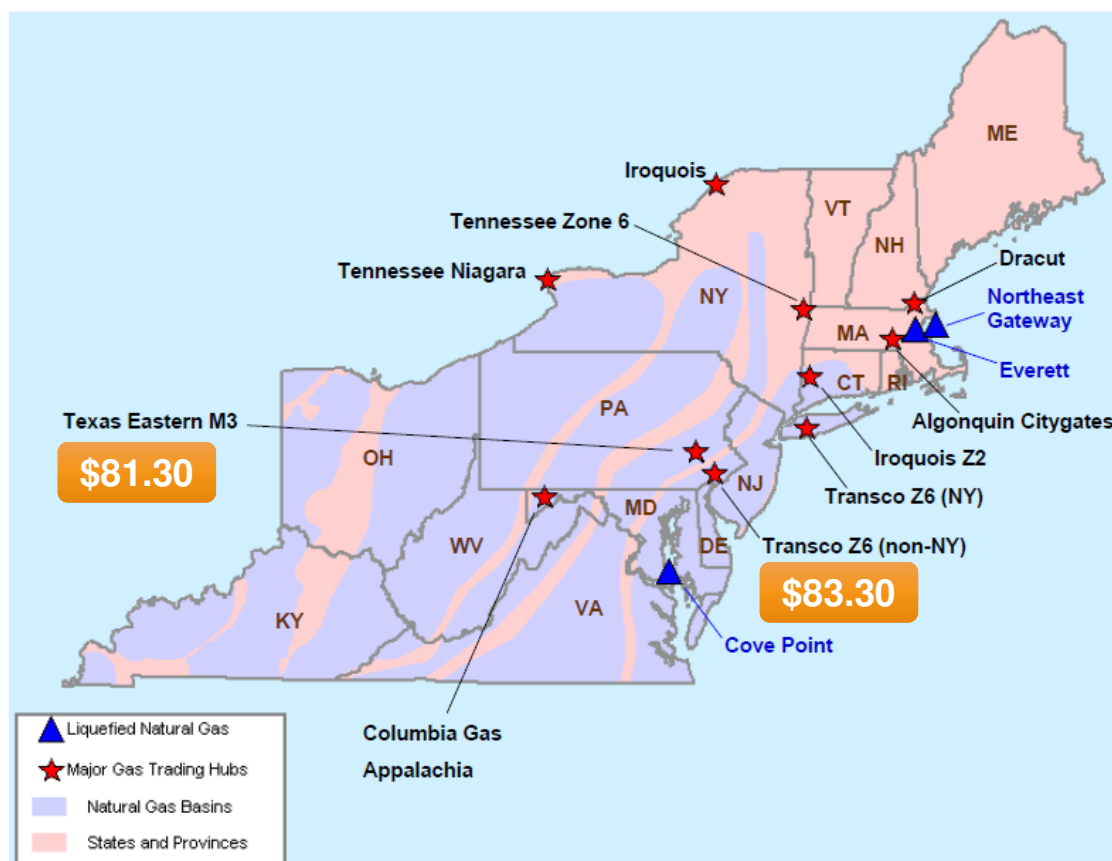


# Natural Gas Market

## Henry Hub Settle and Futures Prices



# Jan. 28 Natural Gas Operational Constraints and Prices (\$/MMBtu)



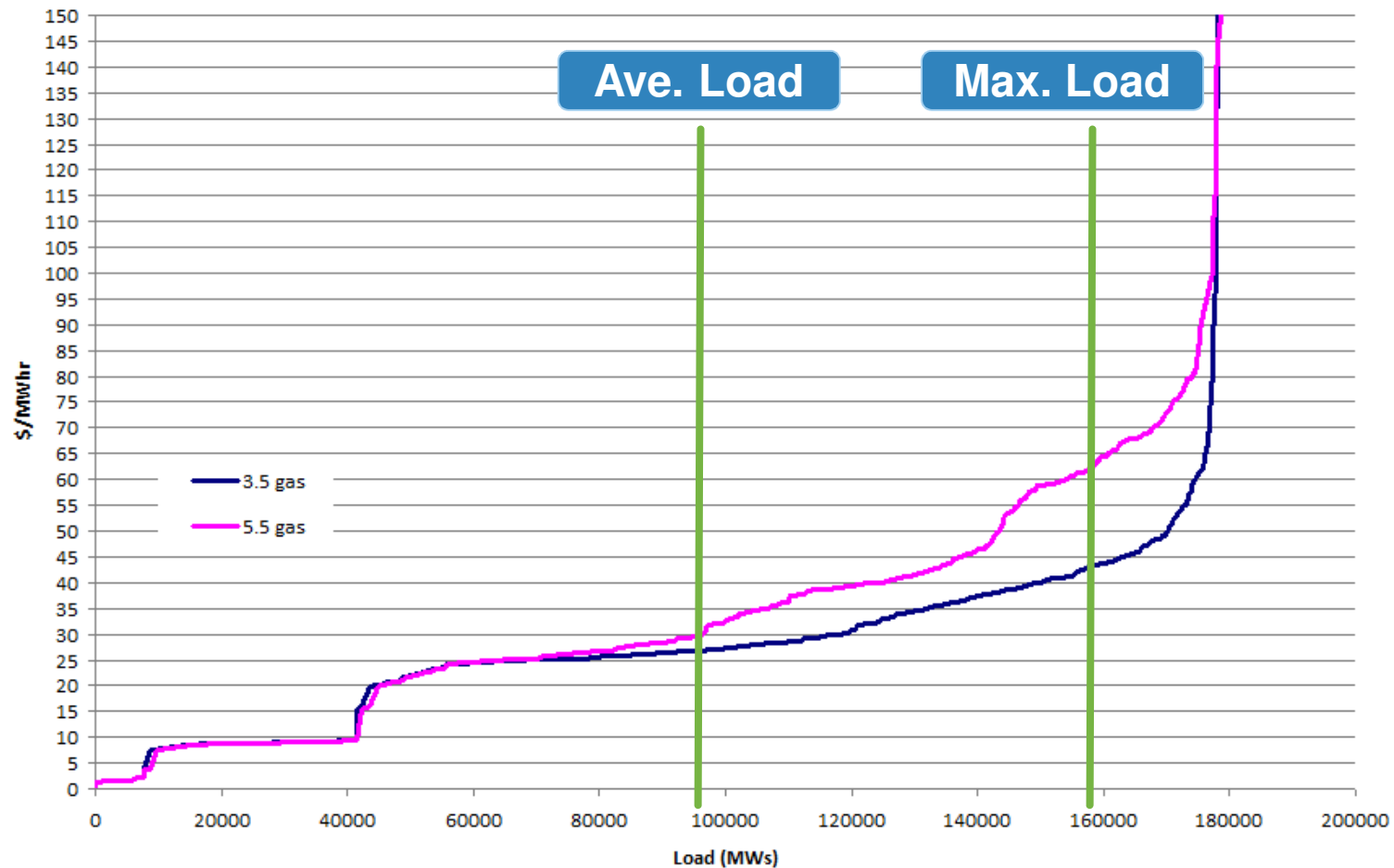
- On Jan. 28, gas constraints caused high generator costs in east
- Depending on heat rate of the unit, dispatch costs could range from \$600 - \$1500/MWh
- These two zones supply ~ 12k MW of gas generation in PJM
- Jan. 28 on peak DA LMP was over \$600 across the RTO
- Operating reserve charges for reliability soared (\$71M paid out to generators by PJM – allocated to RTO)
- Gas constraints were also evident on Jan. 22 and 23. Impacted primarily the east reliability (FES ~ 3% load ratio share)

\$/ MMBtu	22-Jan	23-Jan
Tx. Eastern, M-3	\$72.58	\$74.25
Transco, zone 6 non-NY	\$123.49	\$3.02



# Natural Gas Price Impacts on Supply Curve

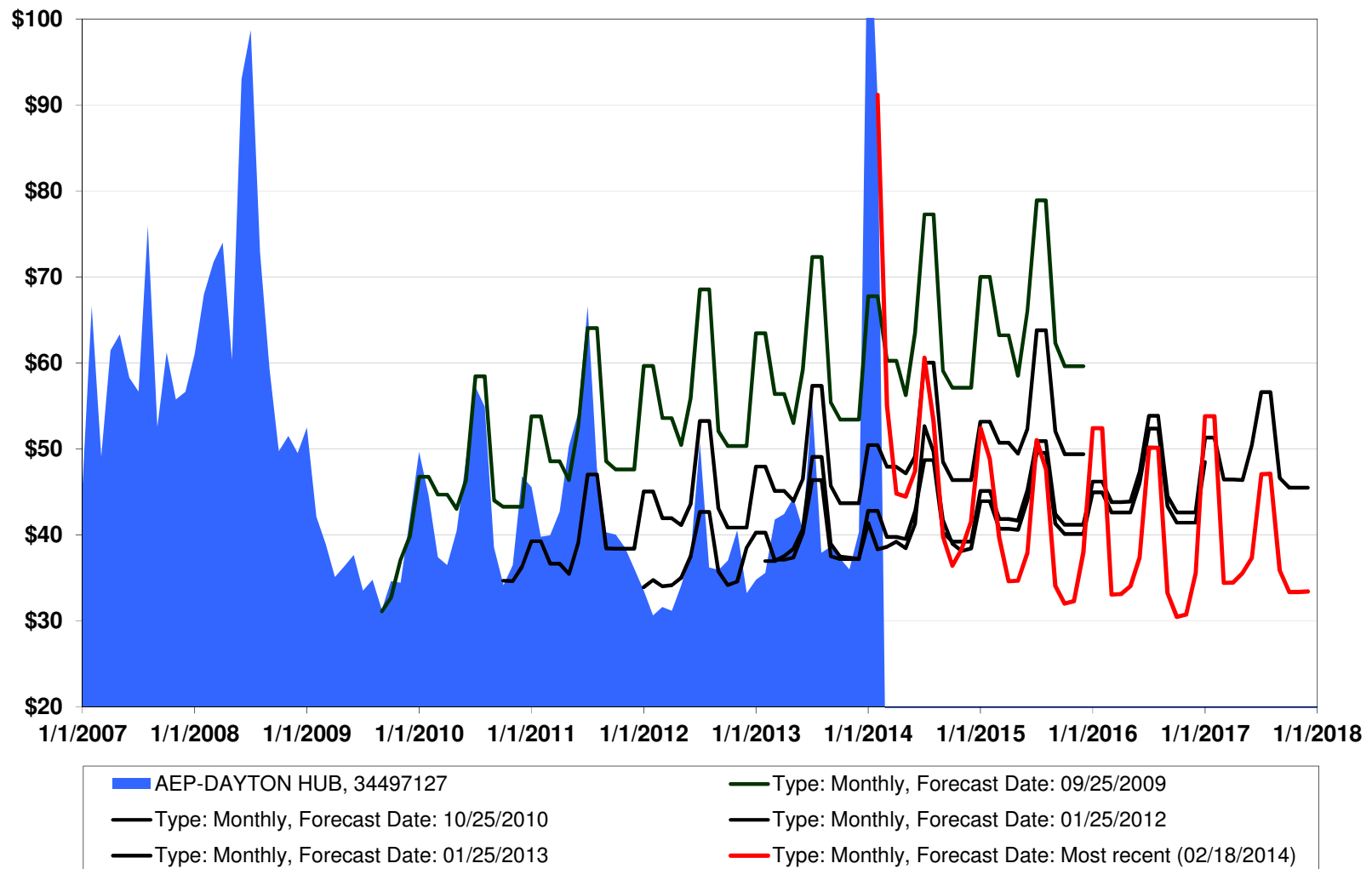
2013 supply curves \$3.50 gas and \$5.50 gas



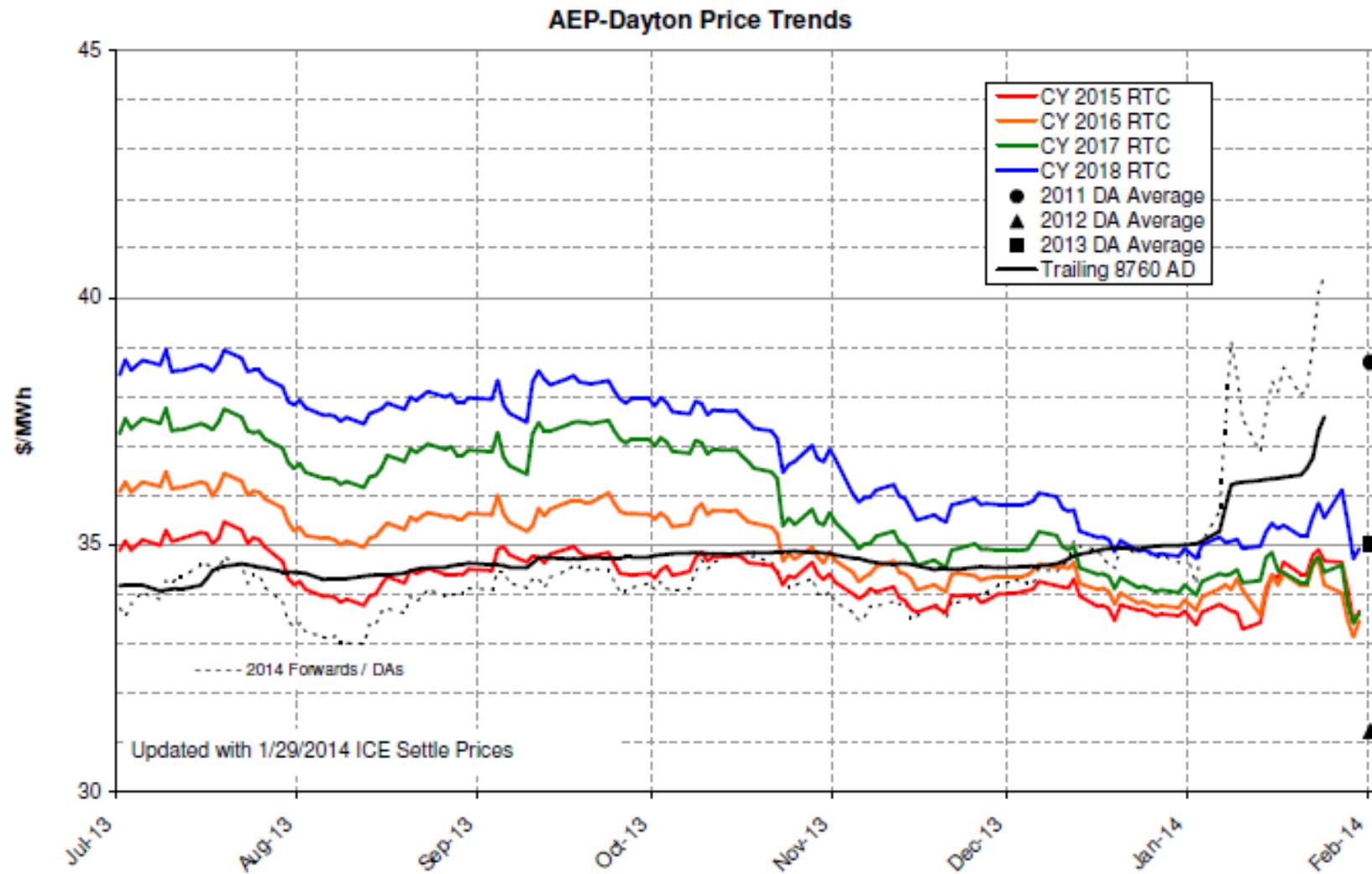
- ❑ Expect a \$2/MCF change in gas would move on-peak energy prices \$5 to \$20/MWhr
- ❑ More so as coal units are replaced by natural gas units in future years

# Energy Market Forwards

## AD Hub Settle and Futures Prices

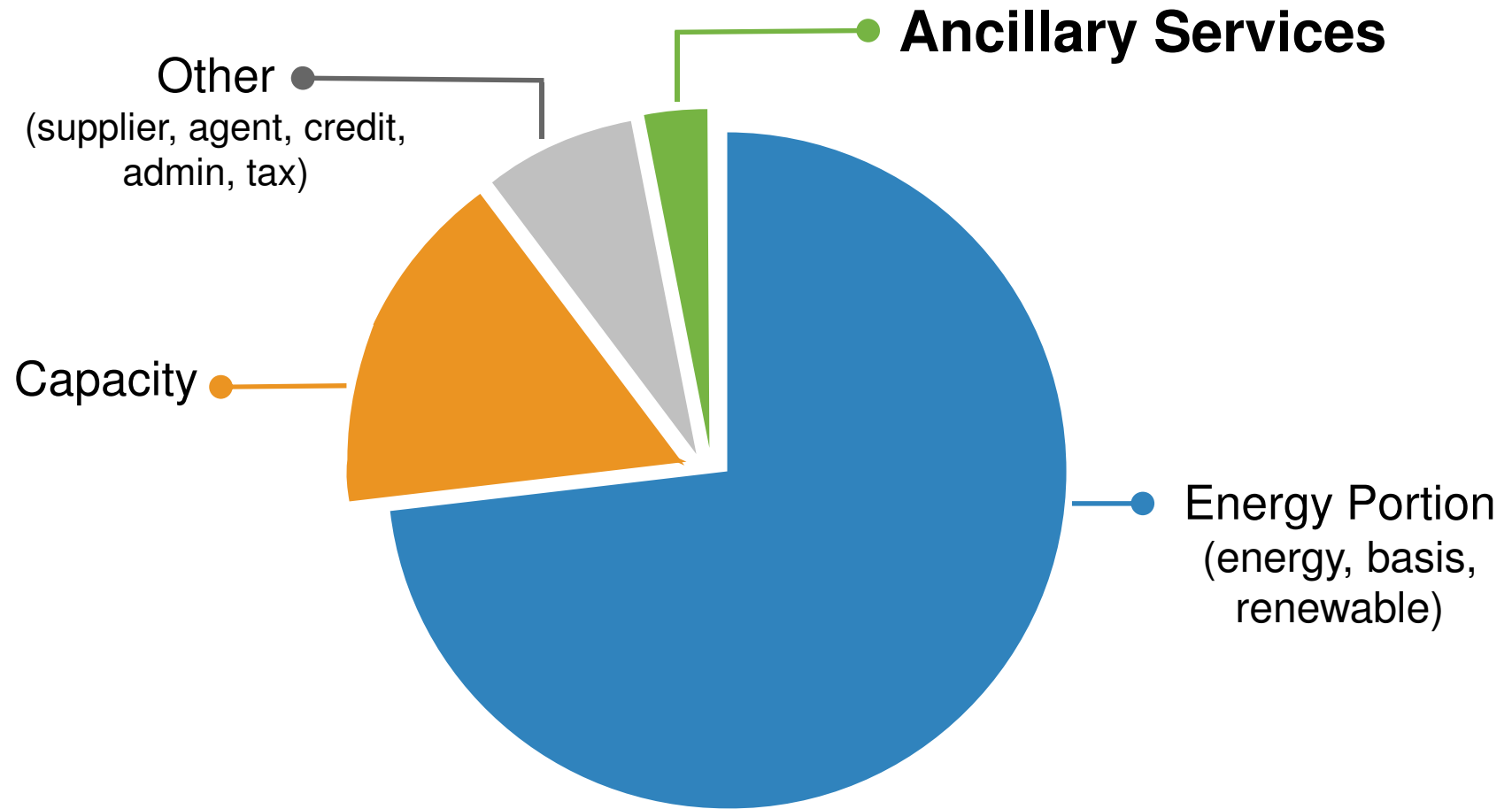


# Converging Forwards



2014 Forwards / DAs after January 1st are a weighted average of Day-Ahead prices and the remaining forwards

# Components of a Generation Price



# Ancillary Service Charges

- ❑ **Market-based ancillary charges determined by the Load Serving Entity's (LSE) load ratio share:**
  - Regulation – Necessary to maintain system frequency
  - Synchronized Reserve – Additional generating capacity above expected load and able to increase output in 10 minutes
- ❑ **Operating reserves associated with:**
  - Deviation from Day Ahead schedule (allocated to generators and load)
  - Reliability of the system (allocated to LSEs based on load ratio share)

# Market Summary

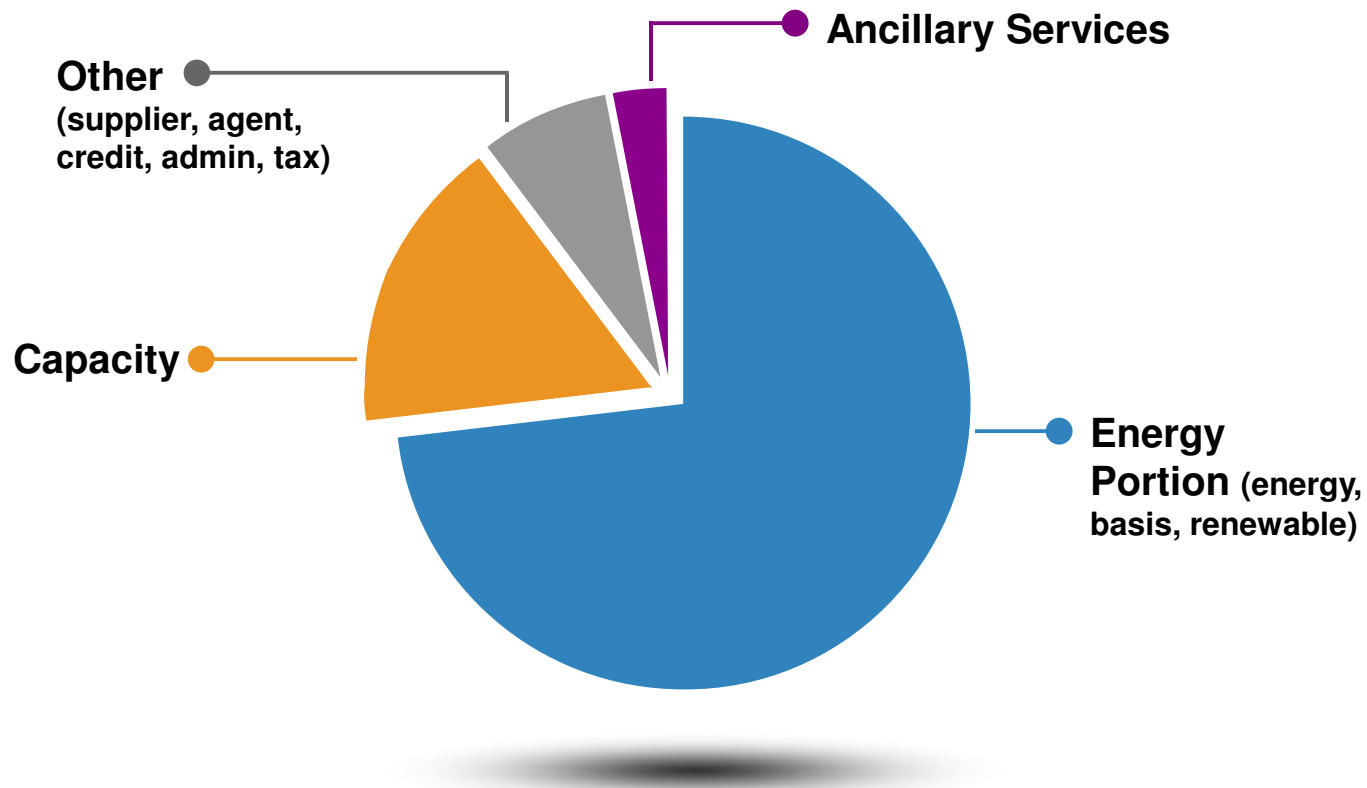
- ❑ **Energy prices are low, driven by increased natural gas production; going forward, natural gas prices will impact energy prices more than ever**
  - Will natural gas production keep pace with growing demand?
- ❑ **Capacity prices are low, driven by DR, imports and proposed new generation**
  - Is the proposed generation economically justified under current market conditions, and will it get built? Will market prices rise to justify new construction?
  - Will increased reliance on DR and imports be as reliable as existing plants?
  - With more DR and imports setting the energy price when resources are scarce, will peak prices become more volatile?
- ❑ **Ancillary Service Risk**



# Agenda

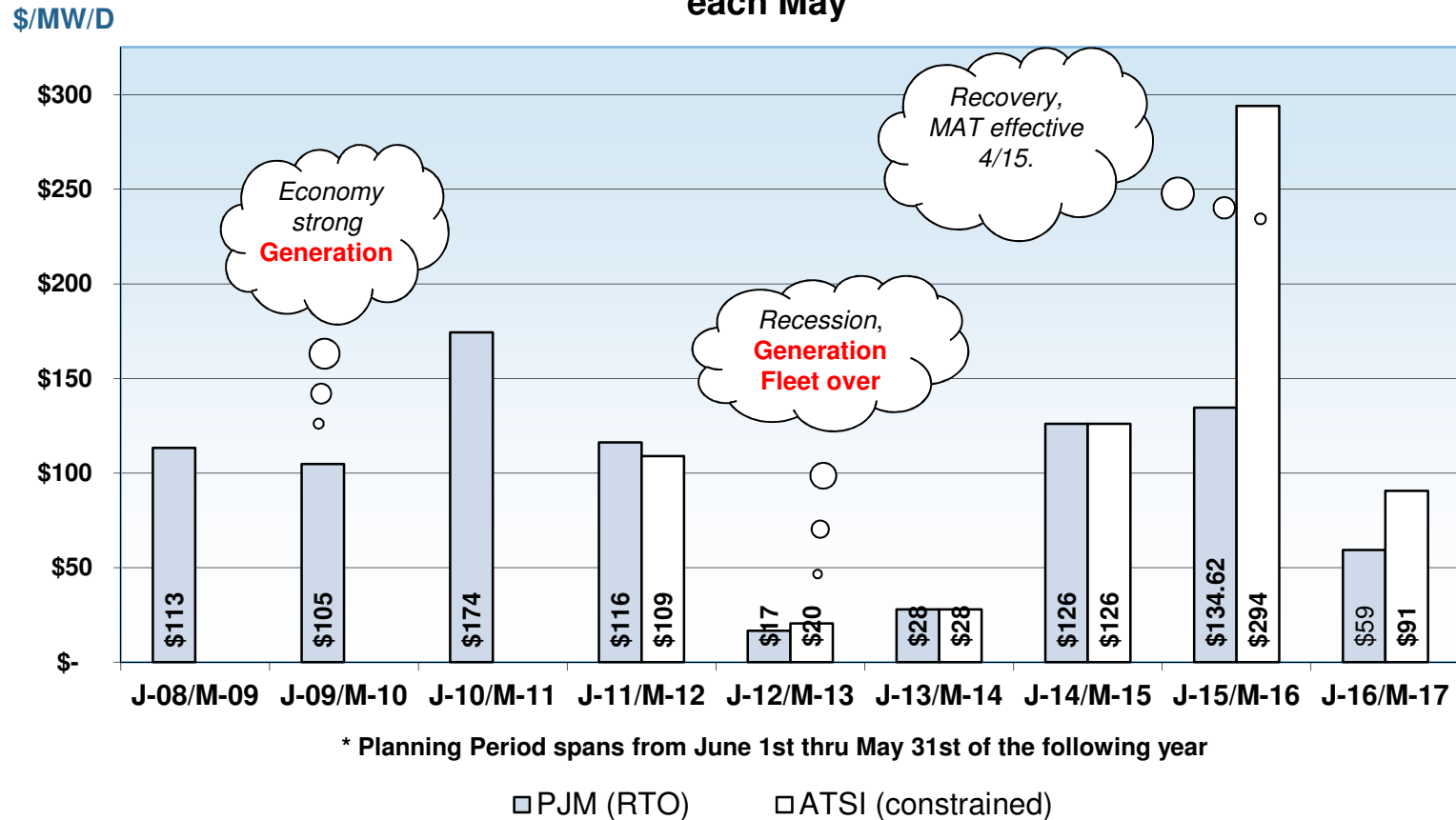
- ❑ **Background: Why is Capacity Important?**
- ❑ **Peak Load Management vs. Demand Response**
- ❑ **Case Study Example – Analyzing how you might manage your peak**
- ❑ **FirstEnergy Solutions Power Management Platform**

# Components of a Generation Price



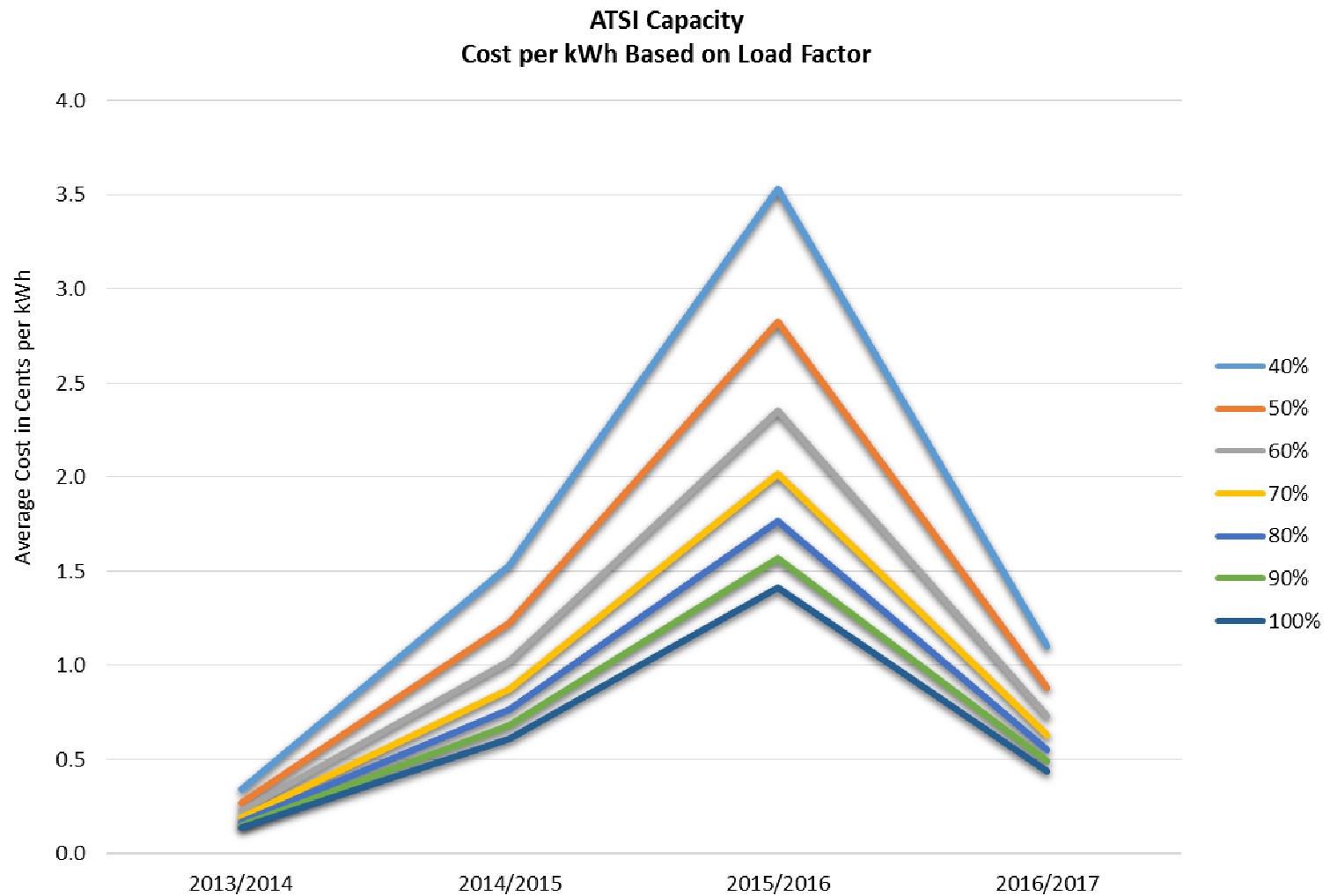
# Rising Capacity Costs

**PJM Reliability Pricing Model (RPM) Prices set three years in advance each May**



Note: Several plant retirements in the ATSI LDA were announced in 2012. The ATSI LDA was considered constrained and as a result, import capability plus remaining resources were not deemed sufficient to maintain reliability within the ATSI LDA.

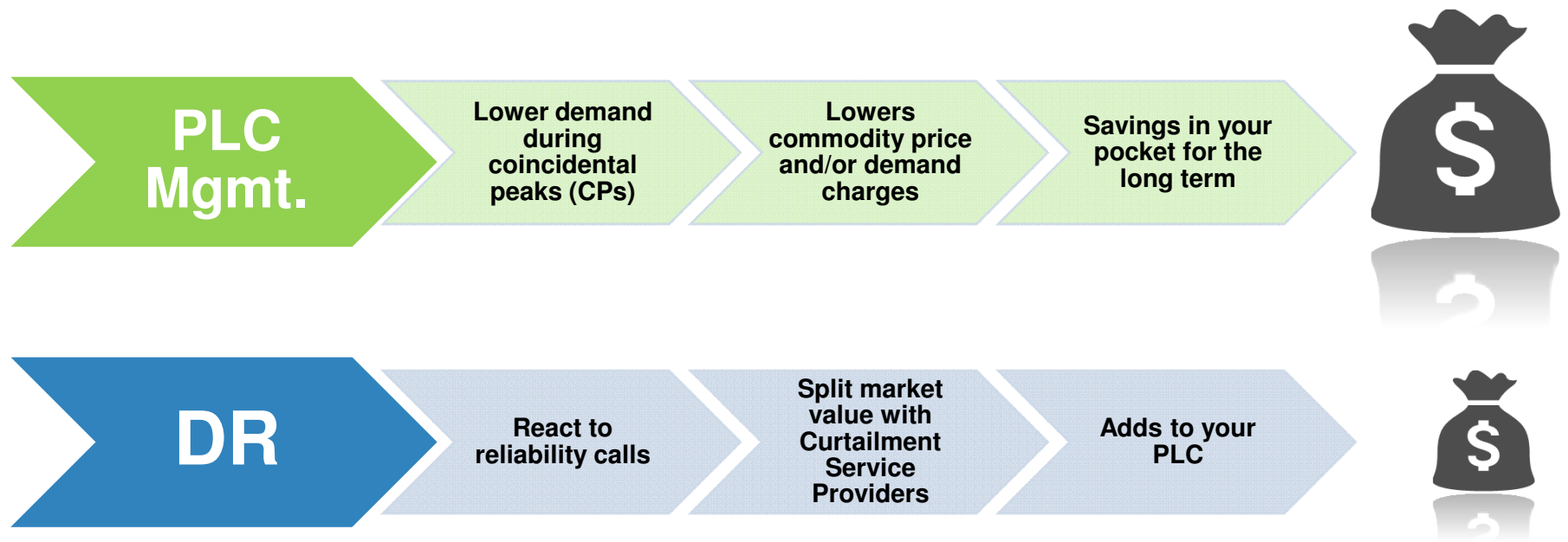
# PJM Capacity in Ohio



# Peak Load Management vs. Demand Response



# The secret about demand response...



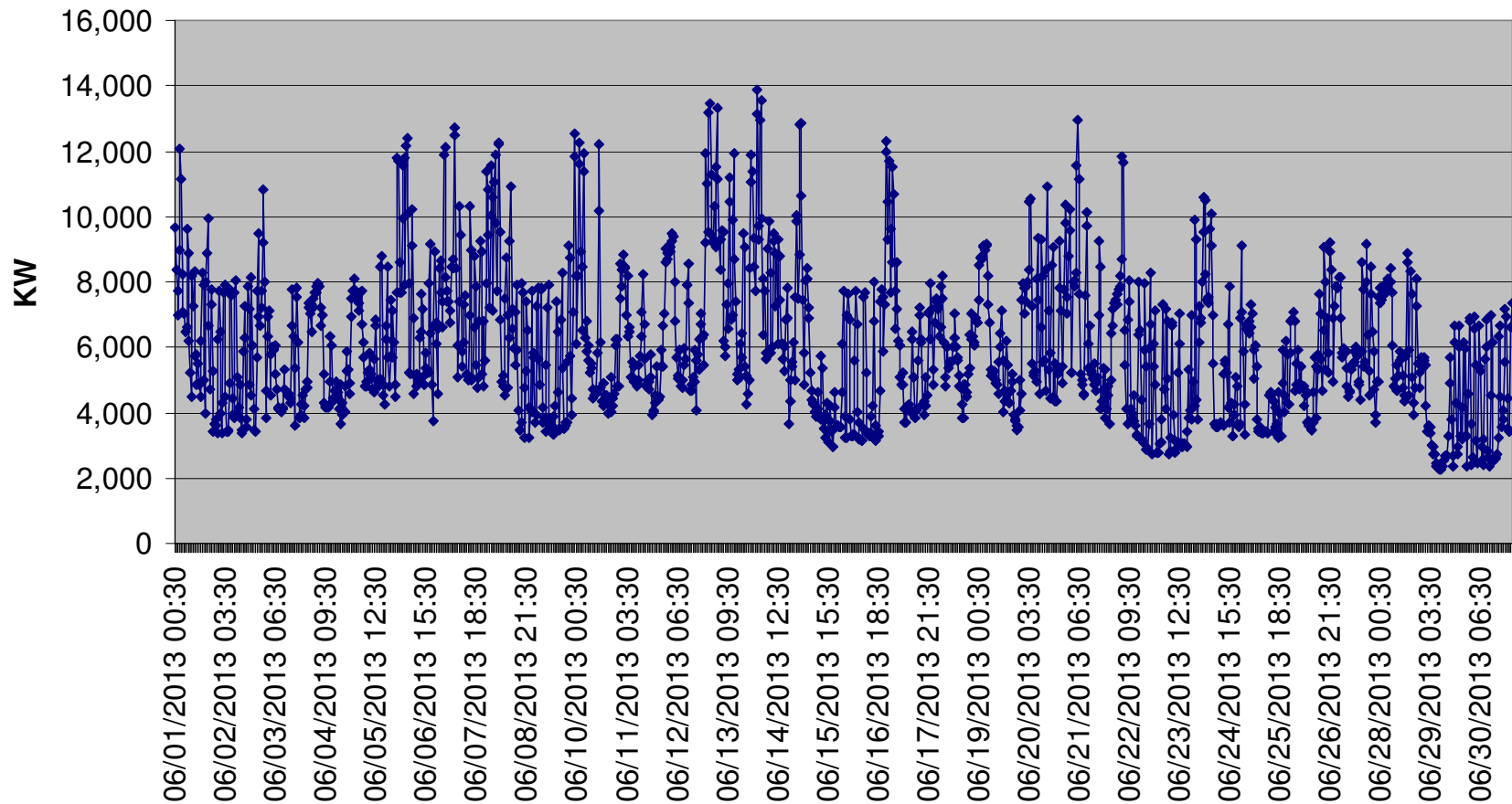
**Plan and act this summer to influence capacity costs in PY 14-15**

# Peak Management Considerations

## How do you determine whether you can manage your peak?

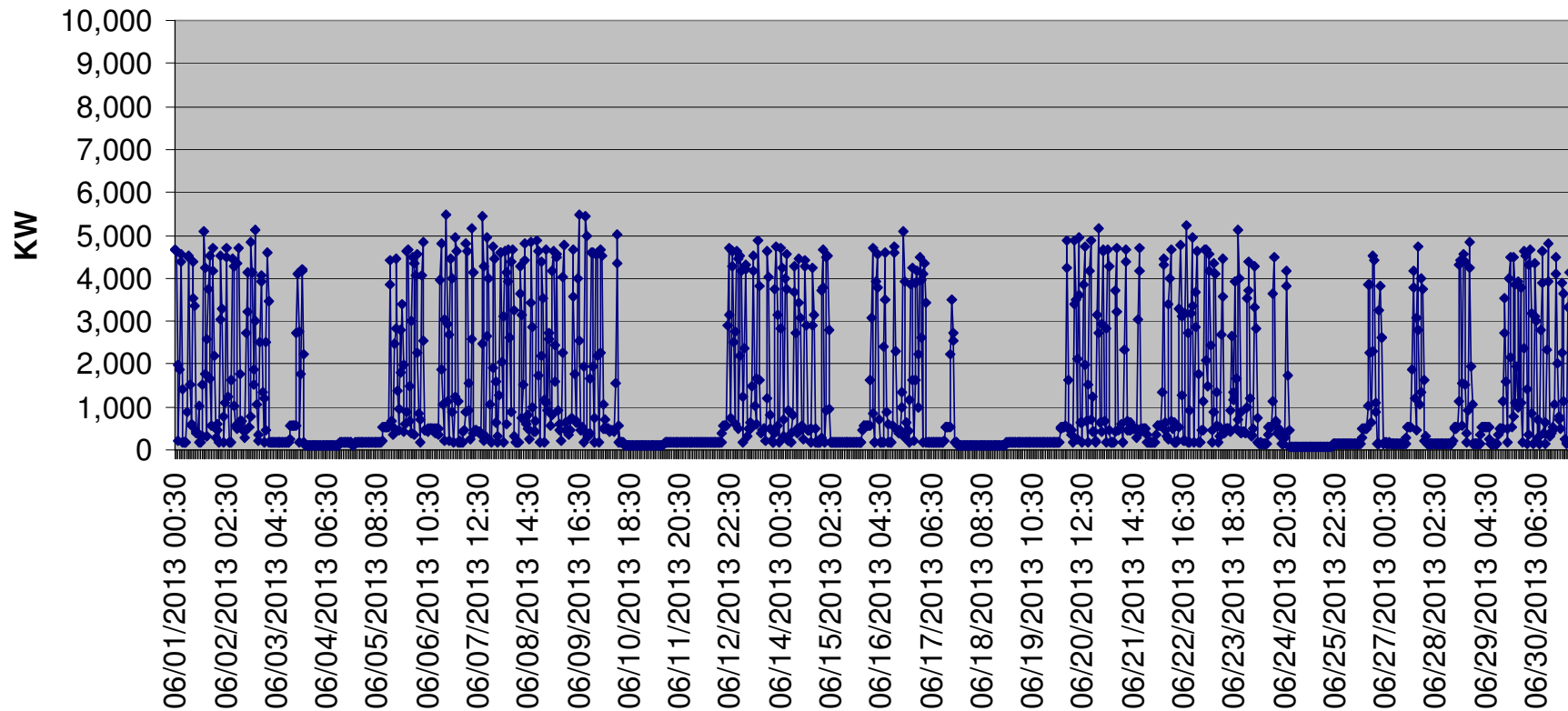
1. Analyze historical interval meter data
  - Annual, monthly and daily data, include meter specific view
2. Determine facility loads and operations. Create facility layout.
3. Create a load reduction plan

# Interval Data – One Month, Entire Facility



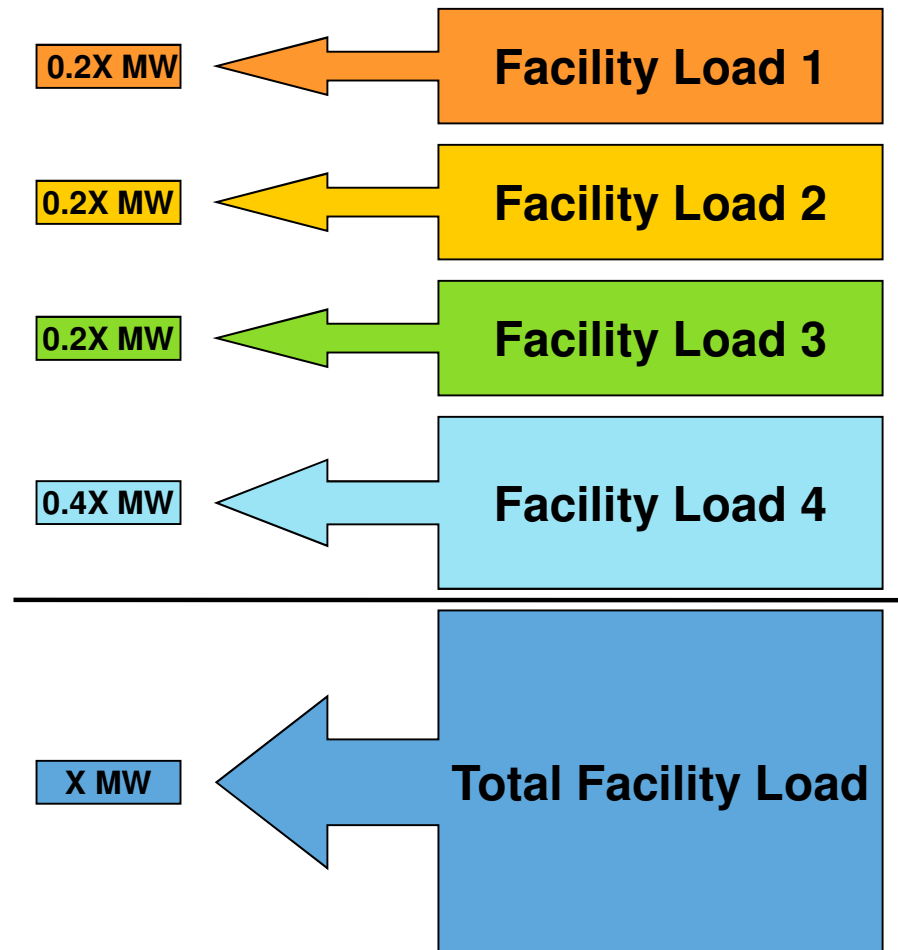


# Meter Specific Interval Data

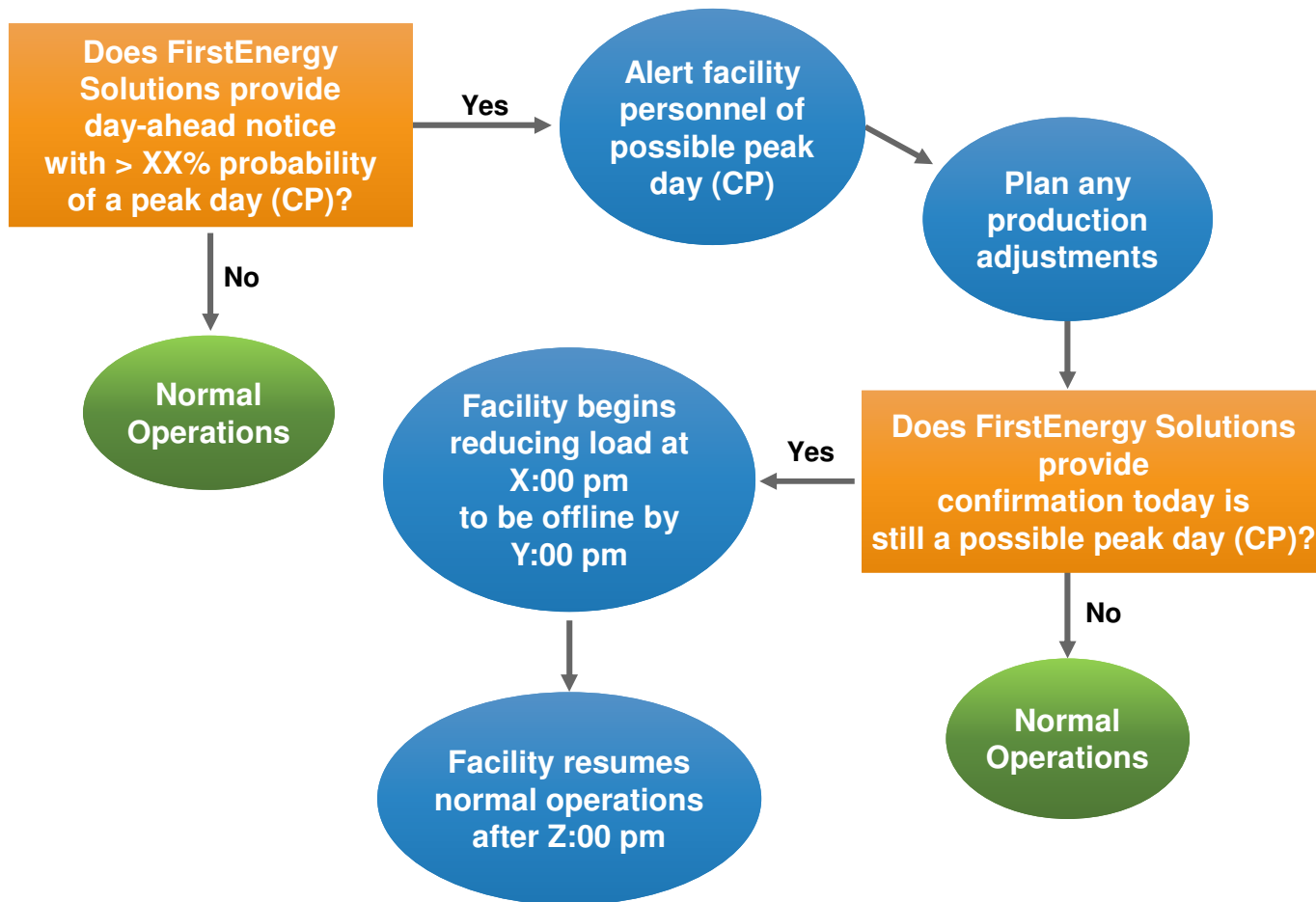


# Determine Facility Loads & Operations

(Average MW)



# Create a Load Reduction Plan



# FirstEnergy Solutions Power Management Platform

## Hosted add-on web service to your commodity contract

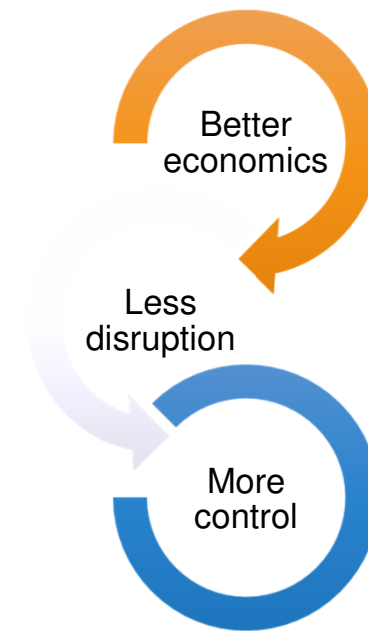
### Provides:

- ❑ **Timely information:** Real-time view of usage and demand (updated every 15 minutes)
- ❑ **Trends:** Historical views of usage
- ❑ **Peak management:** Prediction and notification of peak hours, calculation of new PLC and estimated savings
- ❑ **Reports:** Ability to export graphs and data for analysis

### Why it is right for your business:

- ❑ **Helps you see how much energy your operation uses and when**
- ❑ **Provides insight for potential operational efficiency**
- ❑ **Alerts you when to reduce load to achieve PLC savings next year**
- ❑ **Calculates new PLC and estimated savings if you reduce usage**

# PLC Management vs. Traditional DR



**Power Management Platform is:**  
**Voluntary. Without penalty. Offers more precise window for action.**

# Energy Profile Analysis



## Energy Profile Analysis

PREPARED FOR	PREPARED BY
Contact Name	FES Rep
Customer Name	Title
Street Address	Phone
City, State, ZIP	Email
Utility: Toledo Edison	PJM Load Zone: ATSI

### Executive Summary

#### Analysis

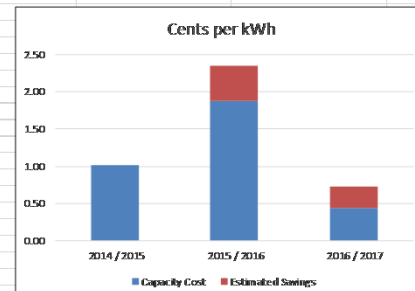
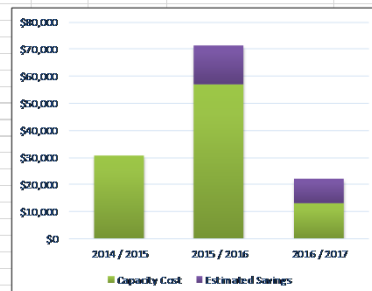
- The school has a typical commercial load shape as evidenced by the 7am ramp up and 6pm ramp down.
- The school peaks in the summer, the highest peak this year occurred on September 11th at 2:00pm.
- The night time load at this location is more than half of the day time load.

#### Recommendation

- Control (reduce or shift) load on forecasted PLC days and on peak days to reduce capacity and demand charges.
- Identify loads that are on overnight and target non-essential equipment for energy reduction.
- Investigate optimization opportunities with building automation systems.
- Type of Load to control: HVAC, possibly lighting.

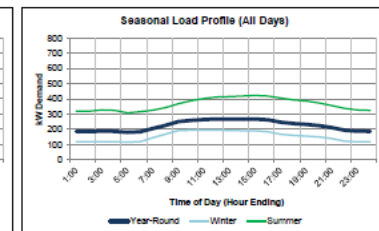
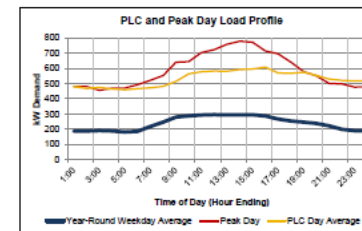
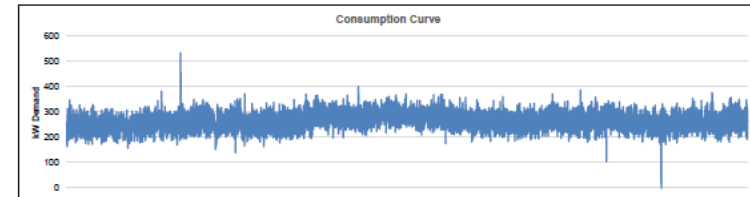
### Potential Savings

	Annual kWh	PLC (kW)	Forecast Pool	Zonal Scaling Factor	Capacity Obligation (kW)
	3,030,000	576	1.0889	1.04522	656
		Capacity Obligation (kW)	RPM Rate	Capacity Cost	Estimated Savings
	2014 / 2015	656	\$129.28	\$30,934	
20% reduction	2015 / 2016	660	\$295.97	\$71,258	
	2015 / 2016	528	\$295.97	\$57,006	\$14,252
40% reduction	2016 / 2017	671	\$80.54	\$22,191	
	2016 / 2017	403	\$80.54	\$13,315	\$8,876



This analysis identifies opportunities to shape load and reduce peaks to drive economic savings for FES customers.

Energy Profile Analysis  
January 2014  
Sample Company



### Monthly Energy Usage

Month	Energy Use (kWh)	Peak Demand (kW)	Monthly Load Factor
October 2012	94,852	384	0.45
November 2012	100,650	277	0.50
December 2012	100,255	275	0.45
January 2013	120,453	326	0.50
February 2013	103,408	291	0.53
March 2013	112,310	384	0.53
April 2013	105,079	317	0.47
May 2013	149,388	512	0.39
June 2013	214,082	503	0.59
July 2013	292,149	670	0.59
August 2013	264,479	697	0.51
September 2013	275,618	778	0.50

### Peak Load Contribution

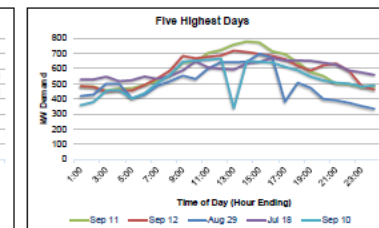
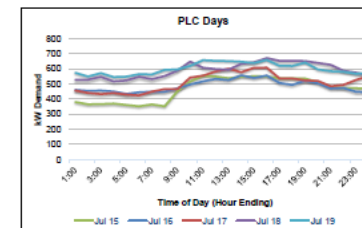
Contribution Period Date and Time	kW Demand
7/15/2013 15:00	656
7/16/2013 17:00	506
7/17/2013 17:00	536
7/18/2013 17:00	654
7/19/2013 15:00	636
Average = PLC	678

Total Annual kWh 1,937,703

Annual Peak Demand 778

Annual Peak Date and Time 9/11/2013 14:00

Annual Load Factor 0.28



March 20, 2014

# FirstEnergy Solutions Power Management Platform:

## Peak Notification

### Differentiation:

#### □ Day of Notification

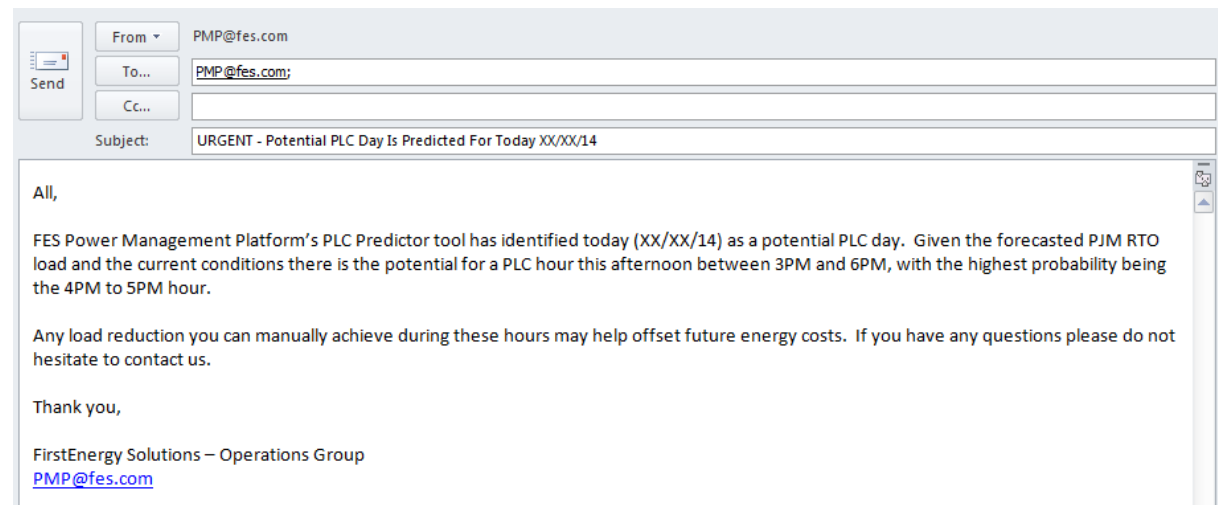
- Shorter window of time enabling you to better manage peak with fewer disruptions

#### □ How is it calculated?

- Each day a variety of factors and proprietary algorithms accurately predict if and when a PLC hour may occur

#### □ Notification:

- At 12:30 p.m. each day, a PLC hour is predicted, the Power Management Platform is updated, and an email is sent

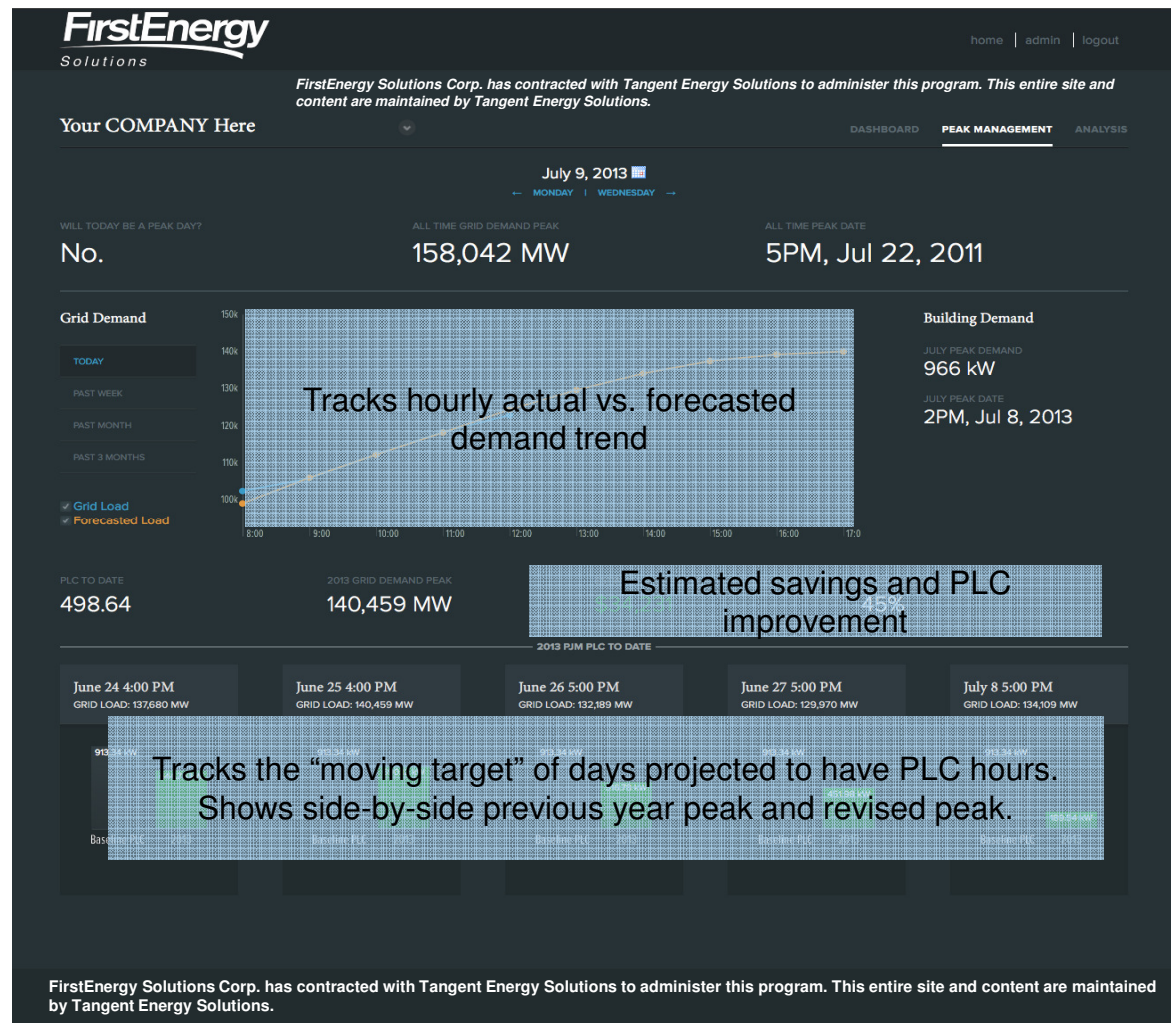


# Power Management Platform: Dashboard

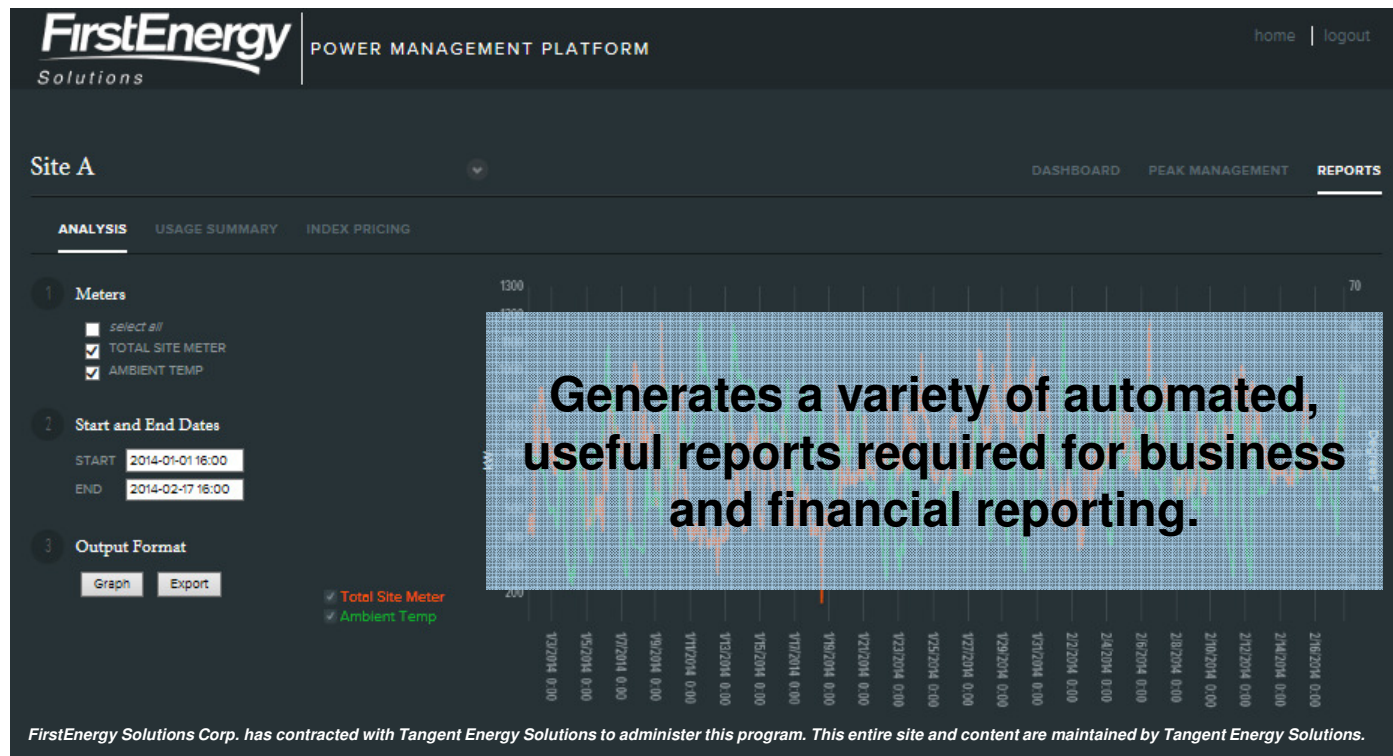




# Power Management Platform: Peak Management



# Power Management Platform: Reporting



# Power Management Platform

## □ How it works

- For a monthly subscription fee, you get access to the tool
- An interval meter is required
- FirstEnergy Solutions will cover the one-time installation and equipment costs
- Webinars from our experienced energy engineers are available at no cost
- Unique consulting and recommendations are provided by our team

# Key Takeaways

- ❑ Rising capacity costs are **avoidable** in today's energy market
- ❑ You can mitigate these rising capacity costs by understanding your peak demand and the impact to your energy price
- ❑ FirstEnergy Solutions is here to help you manage your peak demand now and into the future
- ❑ Contact your Sales Rep. to learn more



# Thank You

20  
ENERGY  
SUMMIT  
14



## Questions & Answers