



Innovation Change & Challenge: 20 Years of Electricity Competition & Customer Choice in PA

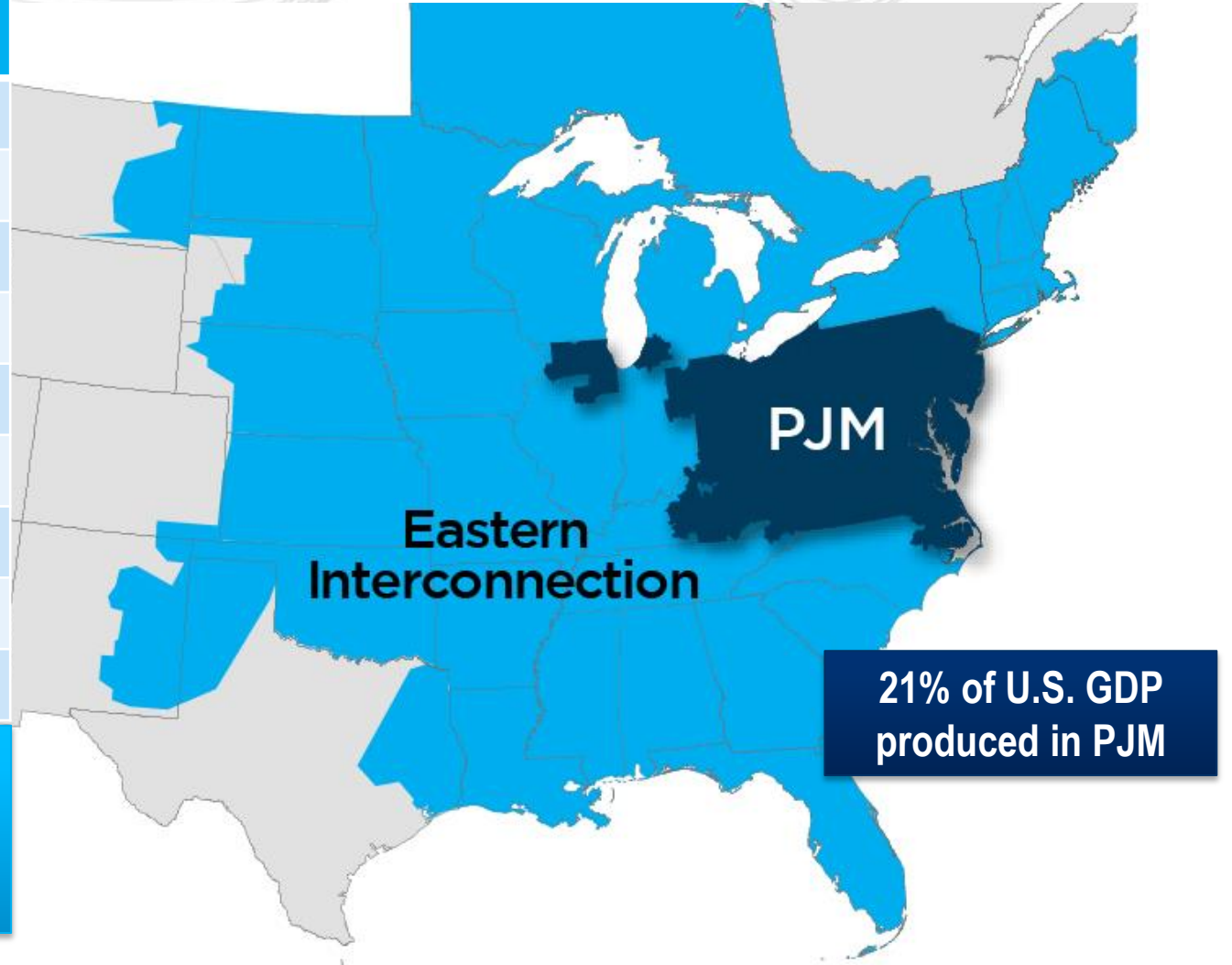
Andrew L. Ott
President & CEO

October 27, 2016

Key Statistics

Member companies	960+
Millions of people served	61
Peak load in megawatts	165,492
MW of generating capacity	171,648
Miles of transmission lines	81,736
2014 GWh of annual energy	792,580
Generation sources	1,304
Square miles of territory	243,417
States served	13 + DC

- 27% of generation in Eastern Interconnection
- 28% of load in Eastern Interconnection
- 20% of transmission assets in Eastern Interconnection

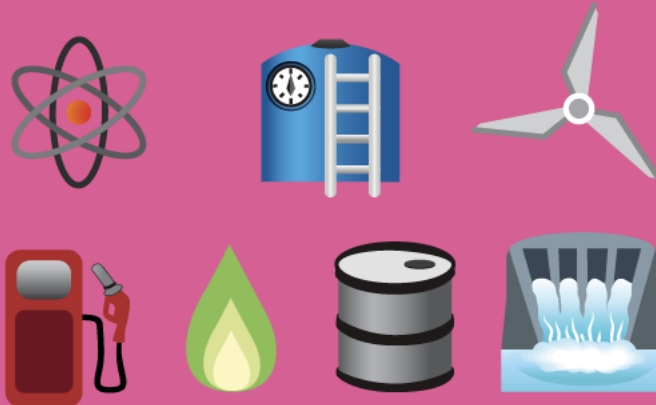


As of 5/2016

**Delivers Robust
Reliability**



**Delivers
Operational
Diversity**



**Delivers Regional
Infrastructure
Planning**



Sustained Reliability at Least Cost

... However, we must look at future trends.

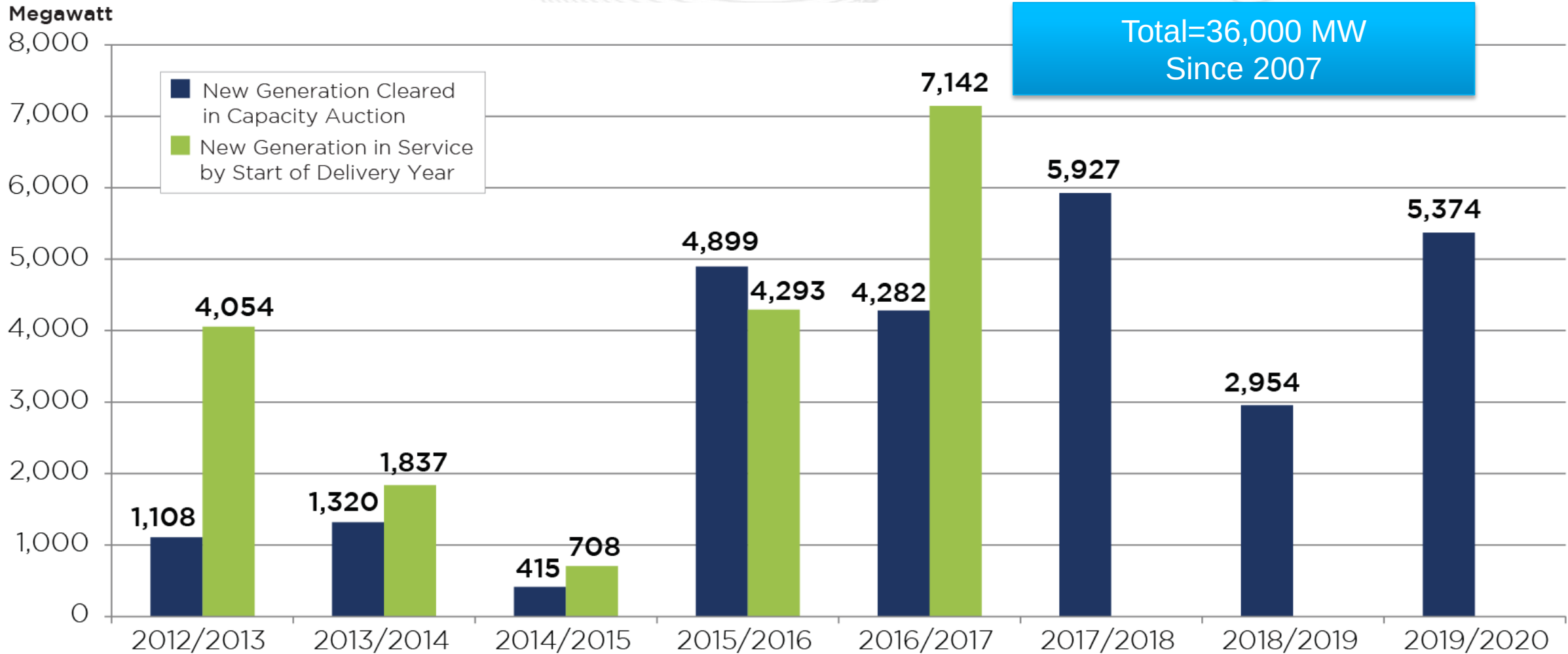
August 11, 2016 Peak to Date

Average temperatures in June, July and above average in August

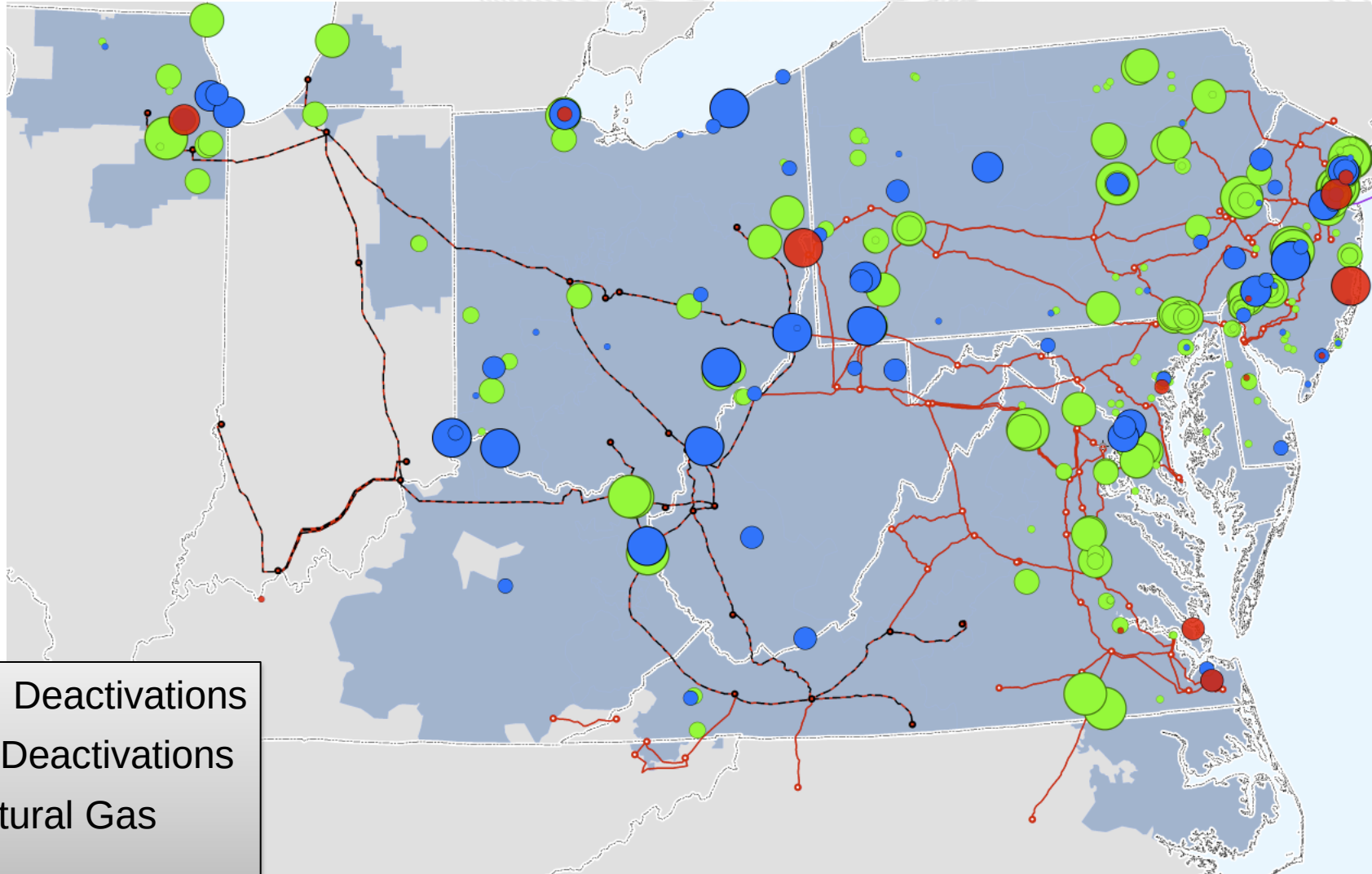
RTO Peak	152,890 MW @ 1700
Mid Atlantic	56,351 MW @ 1700
Dominion	18,632 MW @ 1700
Generation Outages	10,197 MW
Generation Reserves (Economic)	7,000+ MW
Generation Reductions	4,620 MW
RTO Net Scheduled Interchange	2,042 MW (Exporting)
Economic Demand Response	0 MW
Strong Voltage Profile, Minimal Transmission Limitations	



Competitive Generation Investment



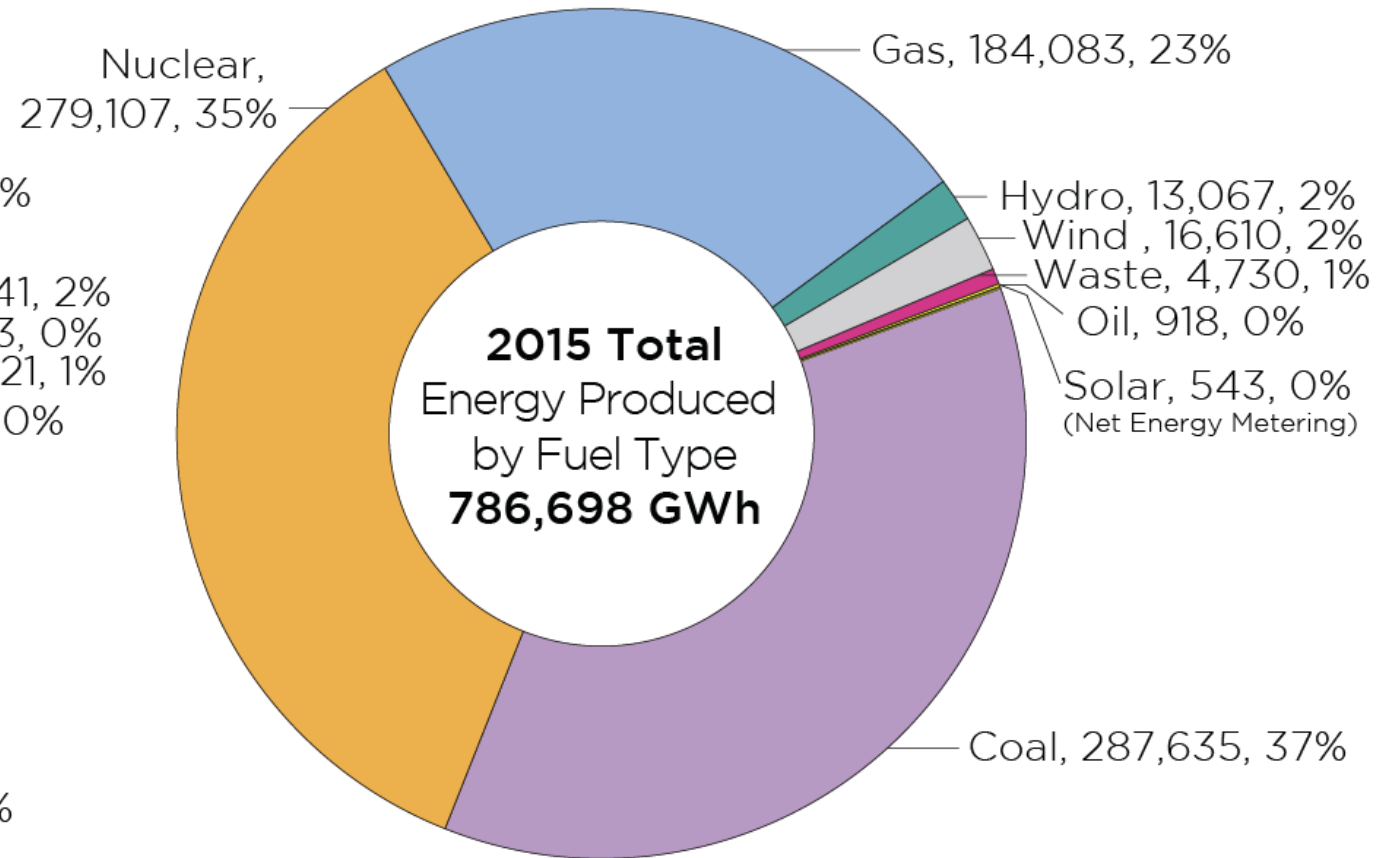
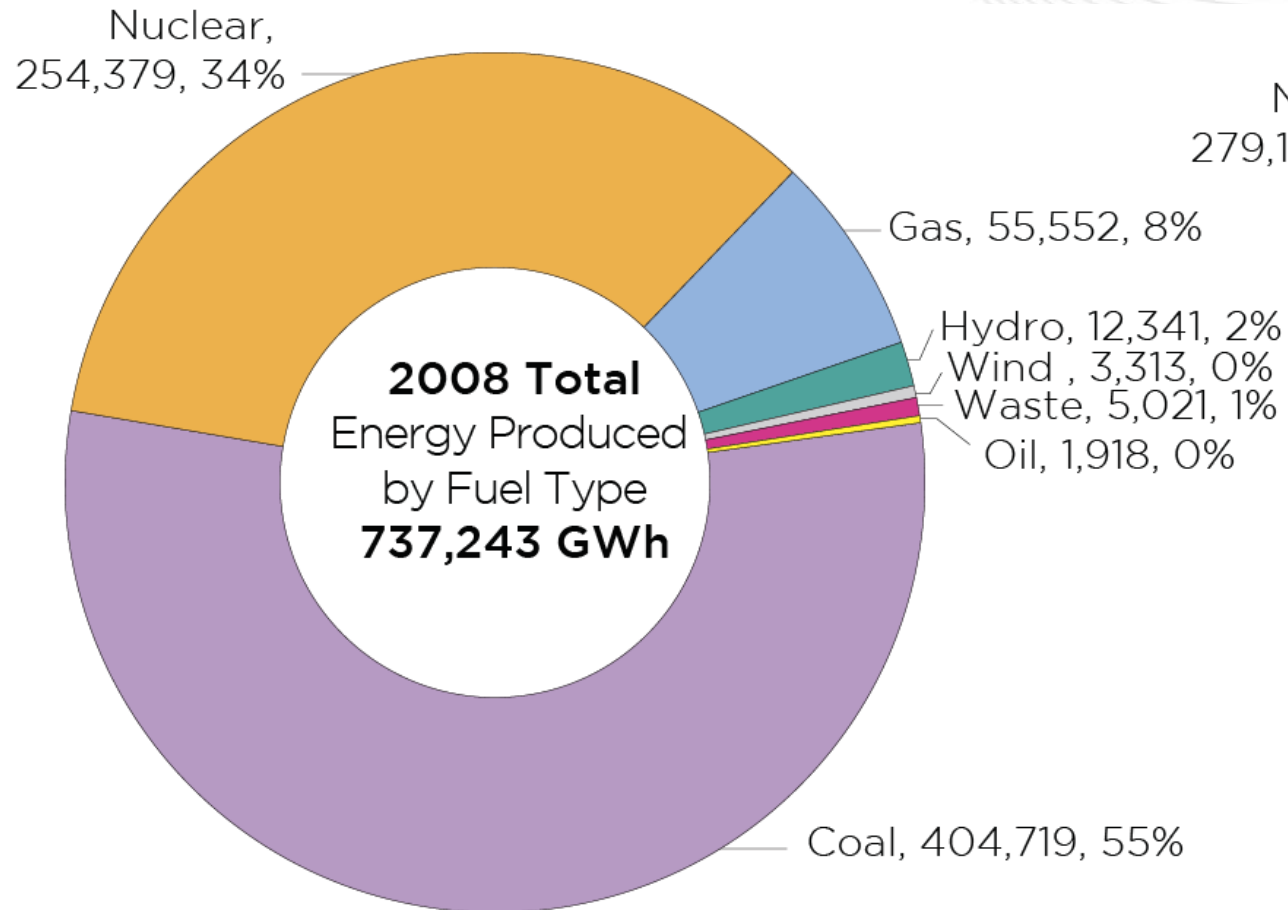
Competition Drives Efficient Entry and Exit



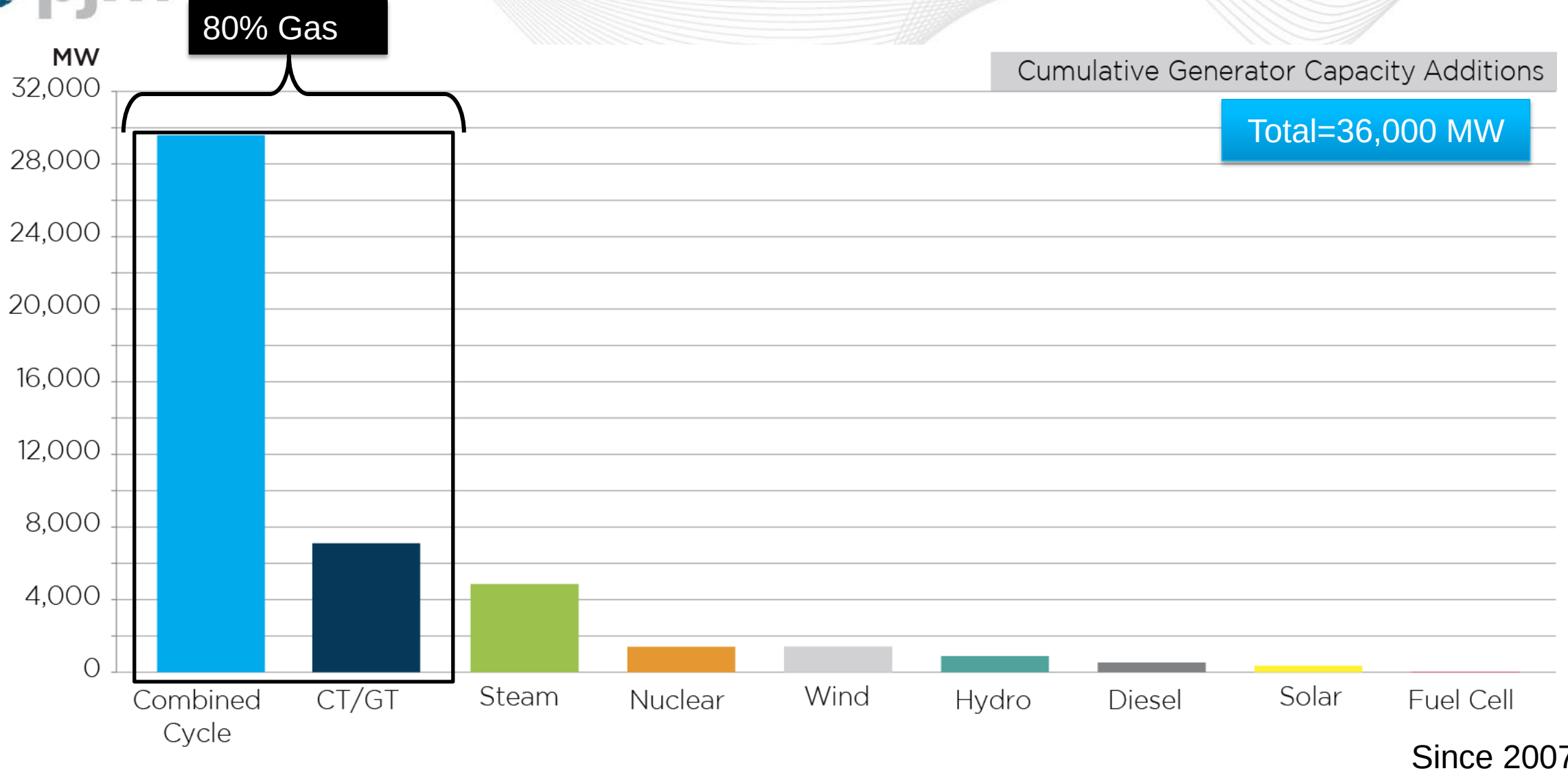
- Pending Deactivations
- Current Deactivations
- New Natural Gas Projects

**Retired: 21,000
MW (2010-2016)**
**Pending
Retirements:**
 5,100+ MW
 (through 2020)
**New Nameplate
Capacity:**
 22,700+ MW
 (2010-2016)

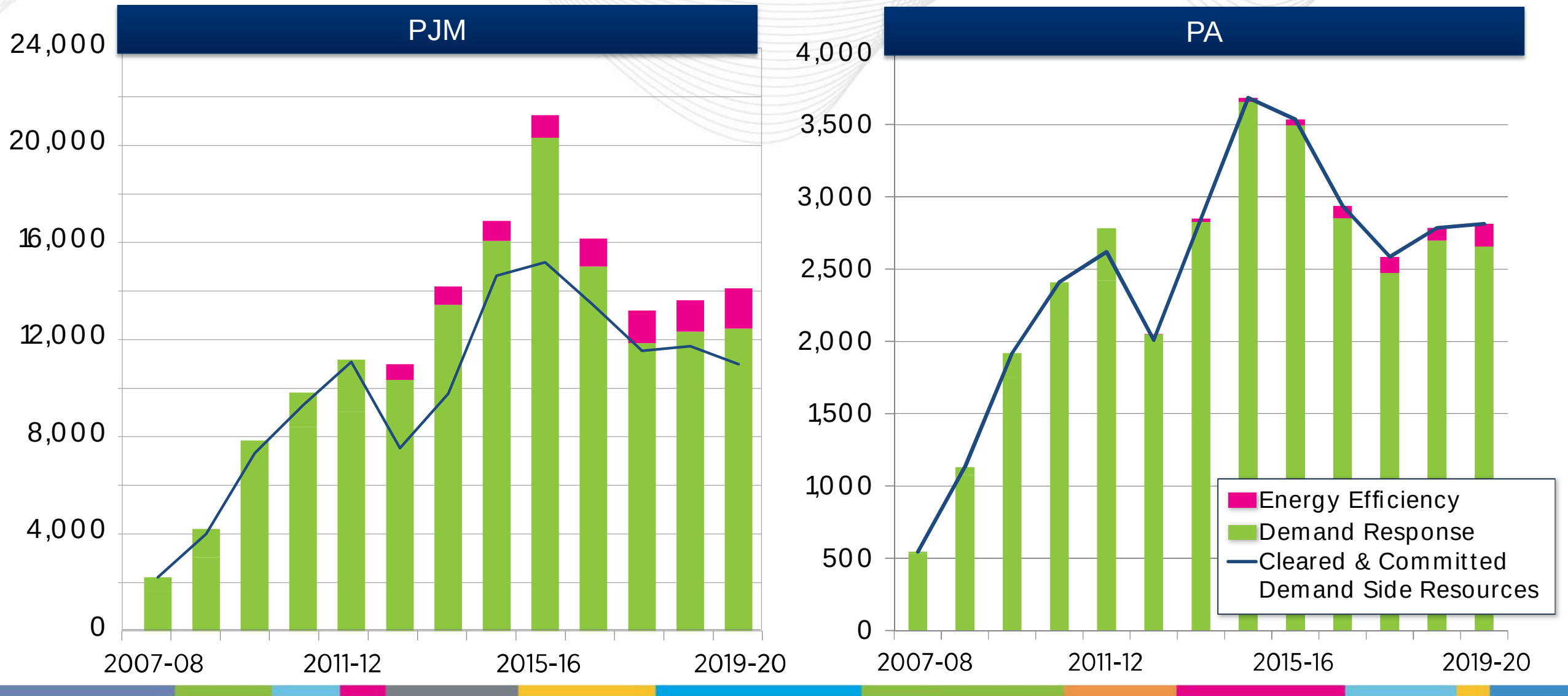
Electricity Production by Fuel Type



Cumulative Generator Capacity Additions



Increasing Investment in Demand Response Technology



Frequency Regulation

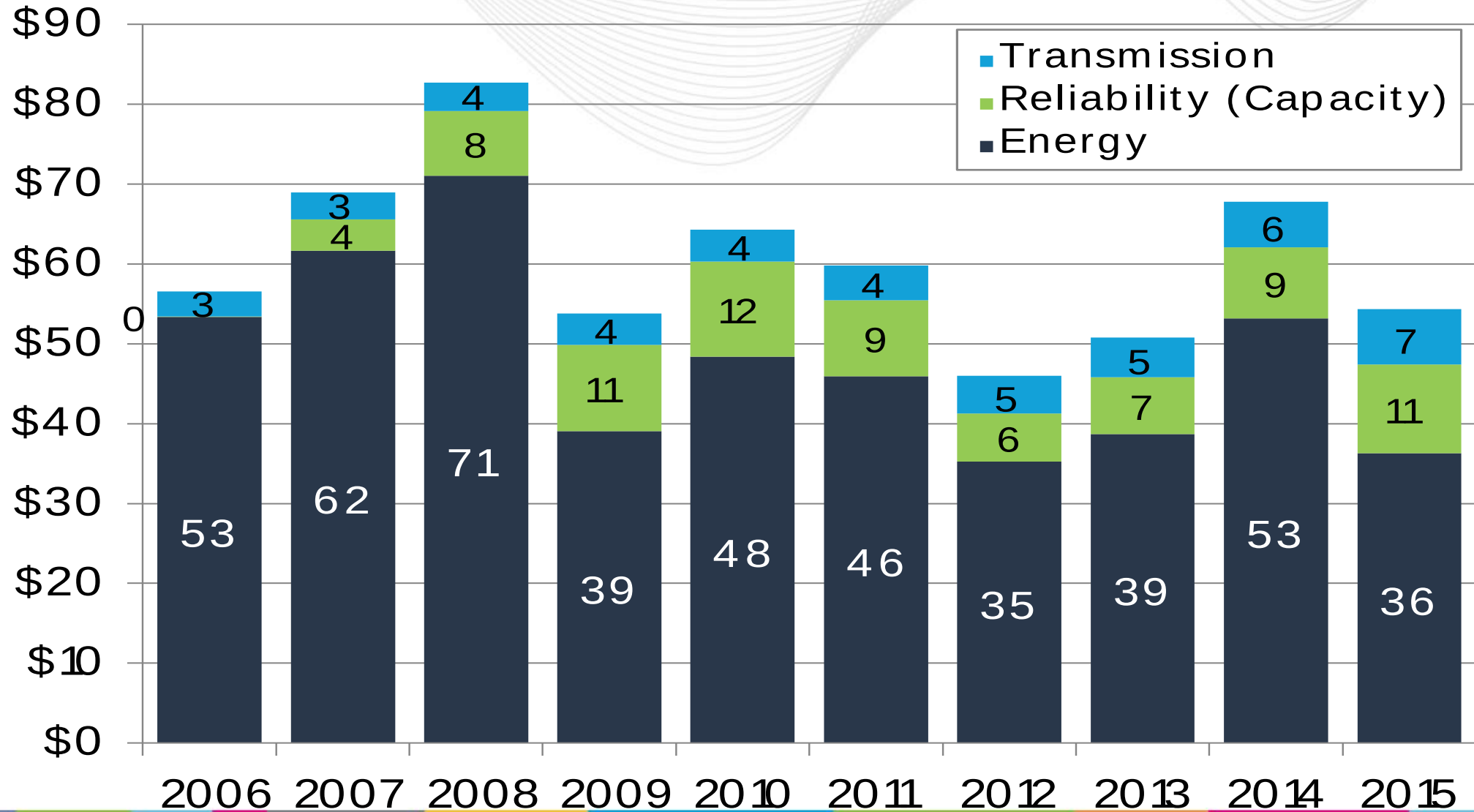
296 MW of Batteries
29 MW of Demand Side
Resources

~ **44%** of our regulation
requirement is provided by
alternative technologies

Synchronized Reserves

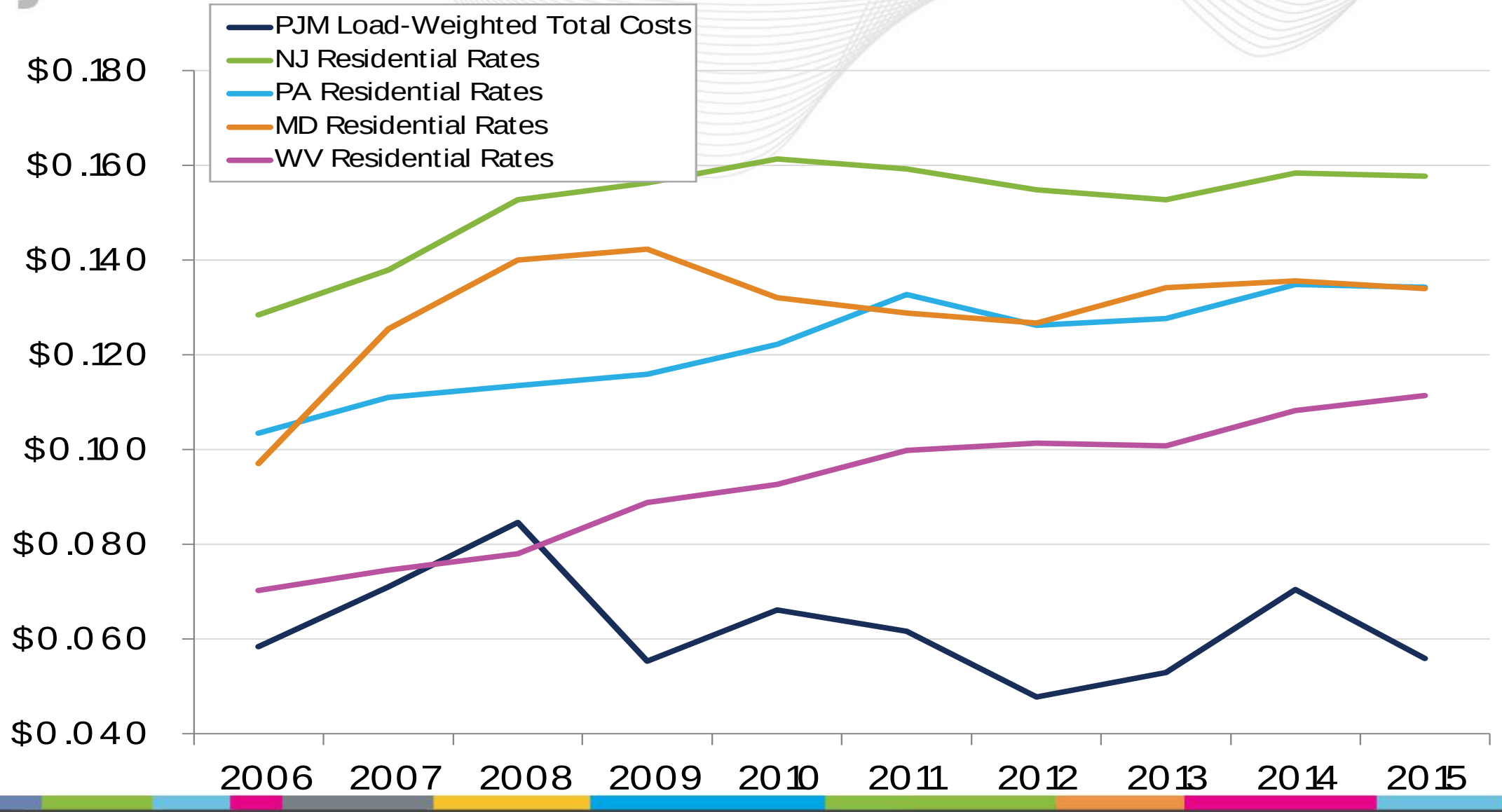
496 MW of Demand Side
Resources capable of
providing synch reserve in
2016 YTD

19.5% of synch reserve
actually provided by Demand
Side Resources in 2016 YTD

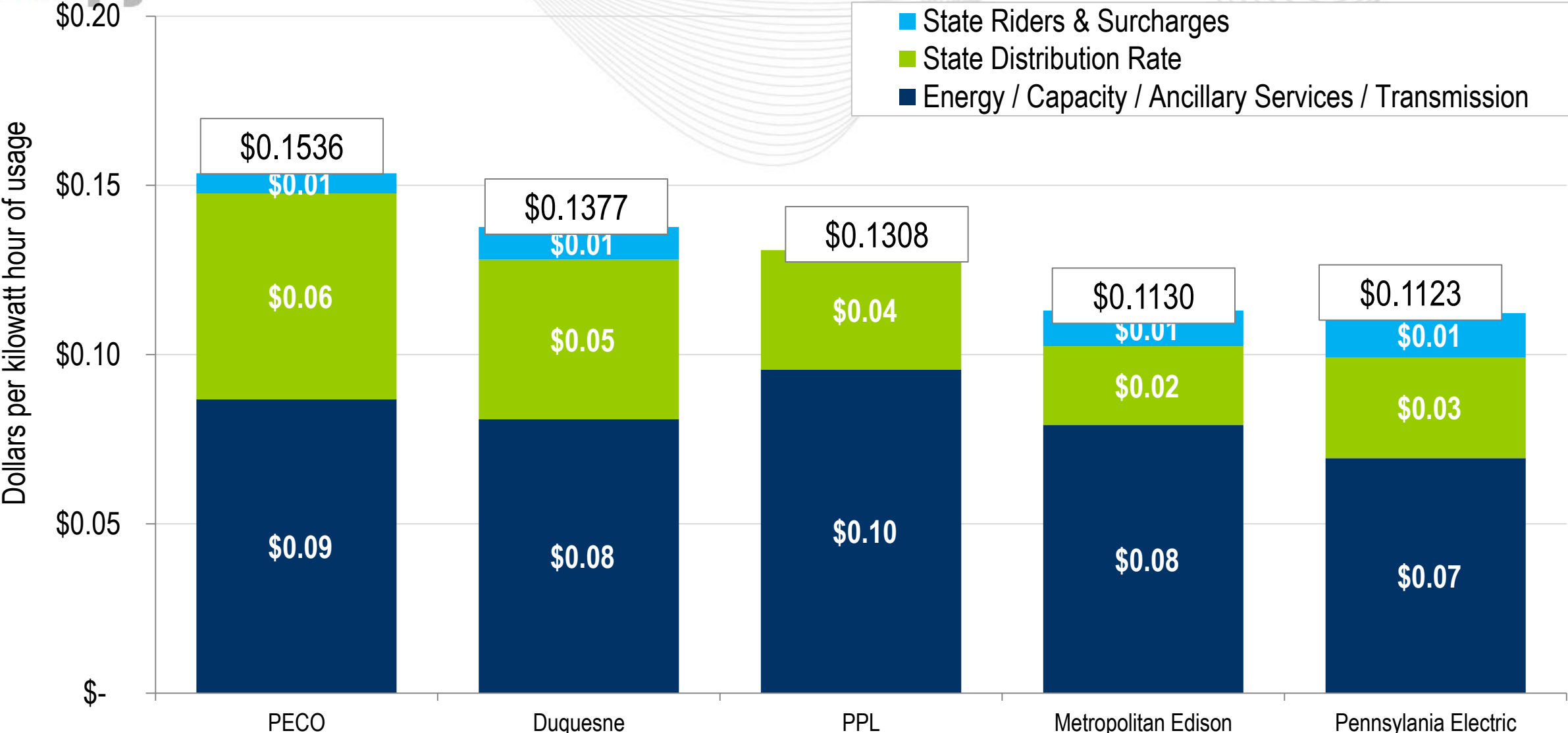




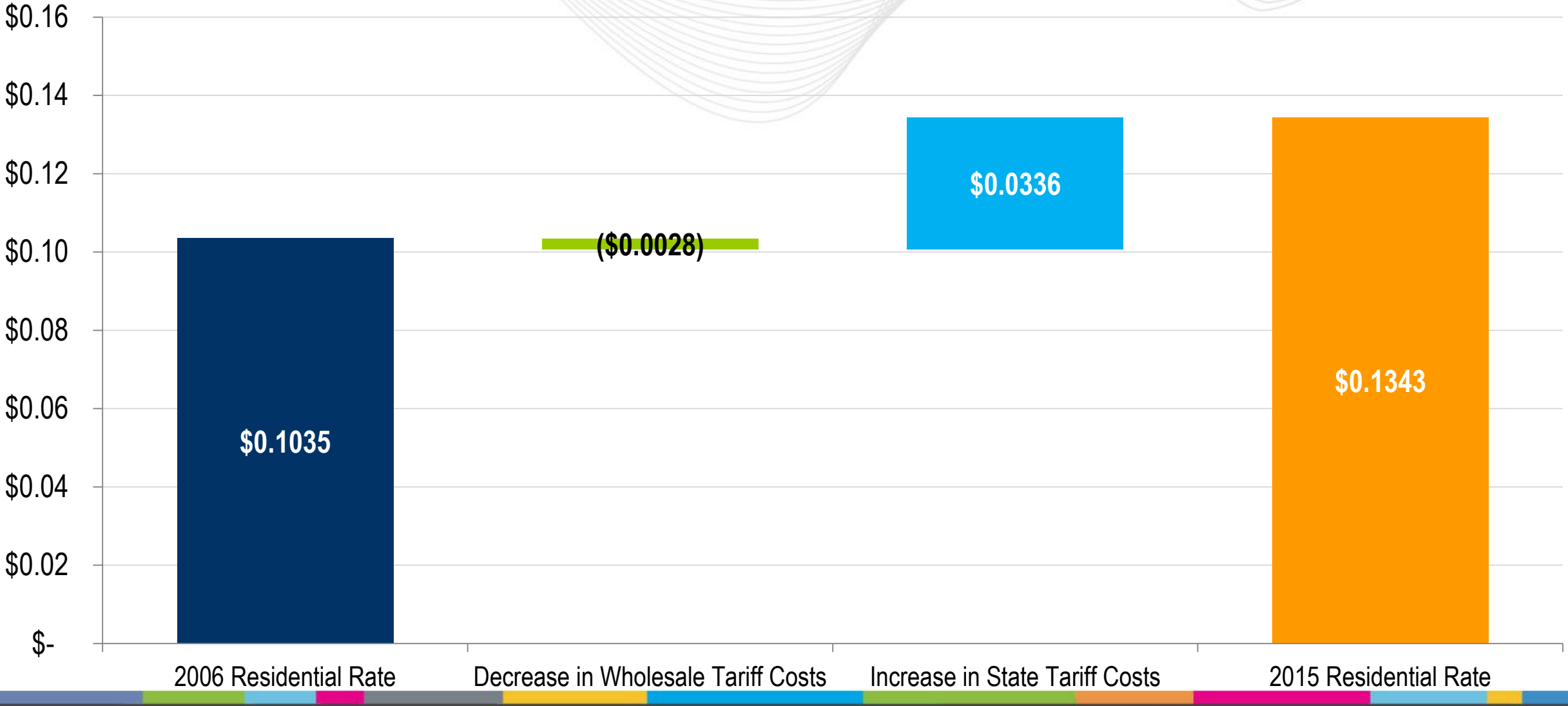
Residential Rates Compared to Wholesale Power Costs

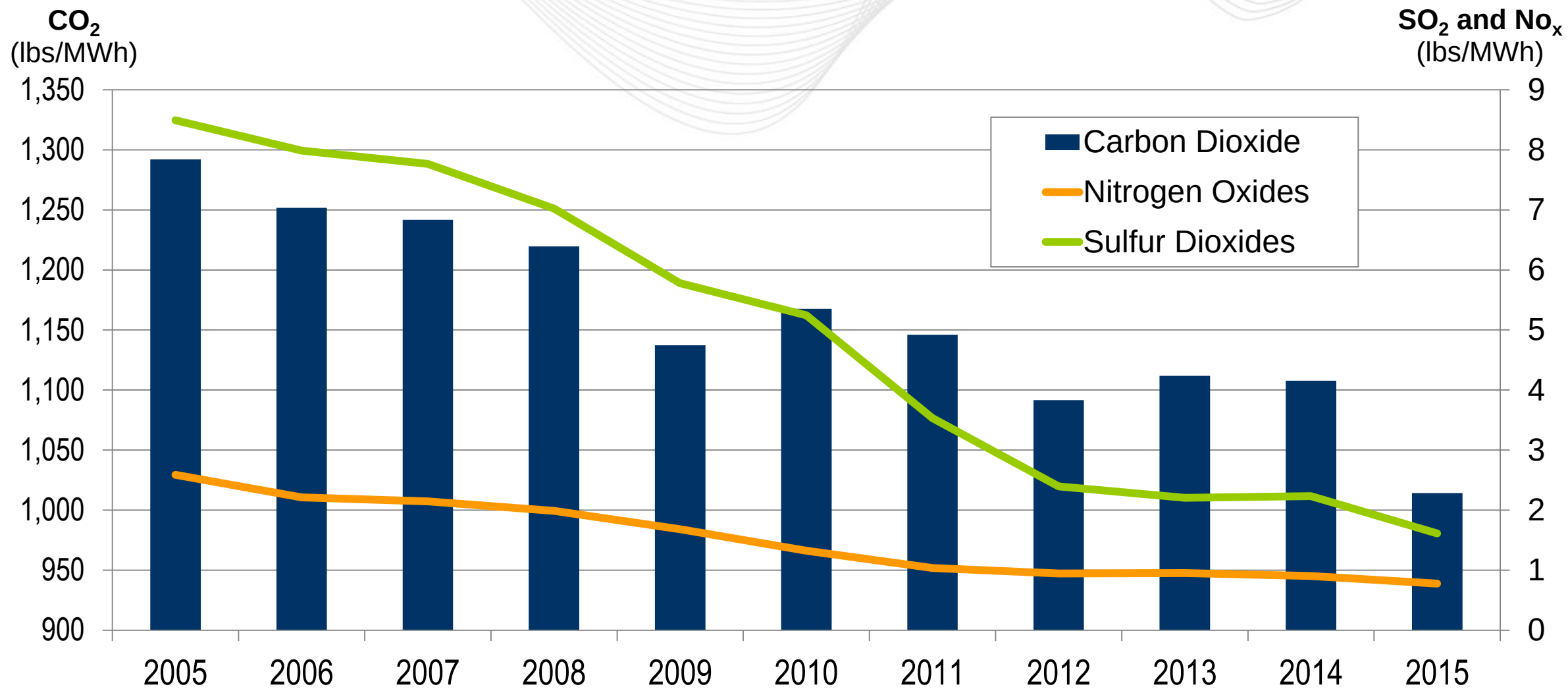


Pennsylvania Retail Residential Rates (2015)



Drivers of ~30% Increase in Average PA Residential Rate from 2006 to 2015





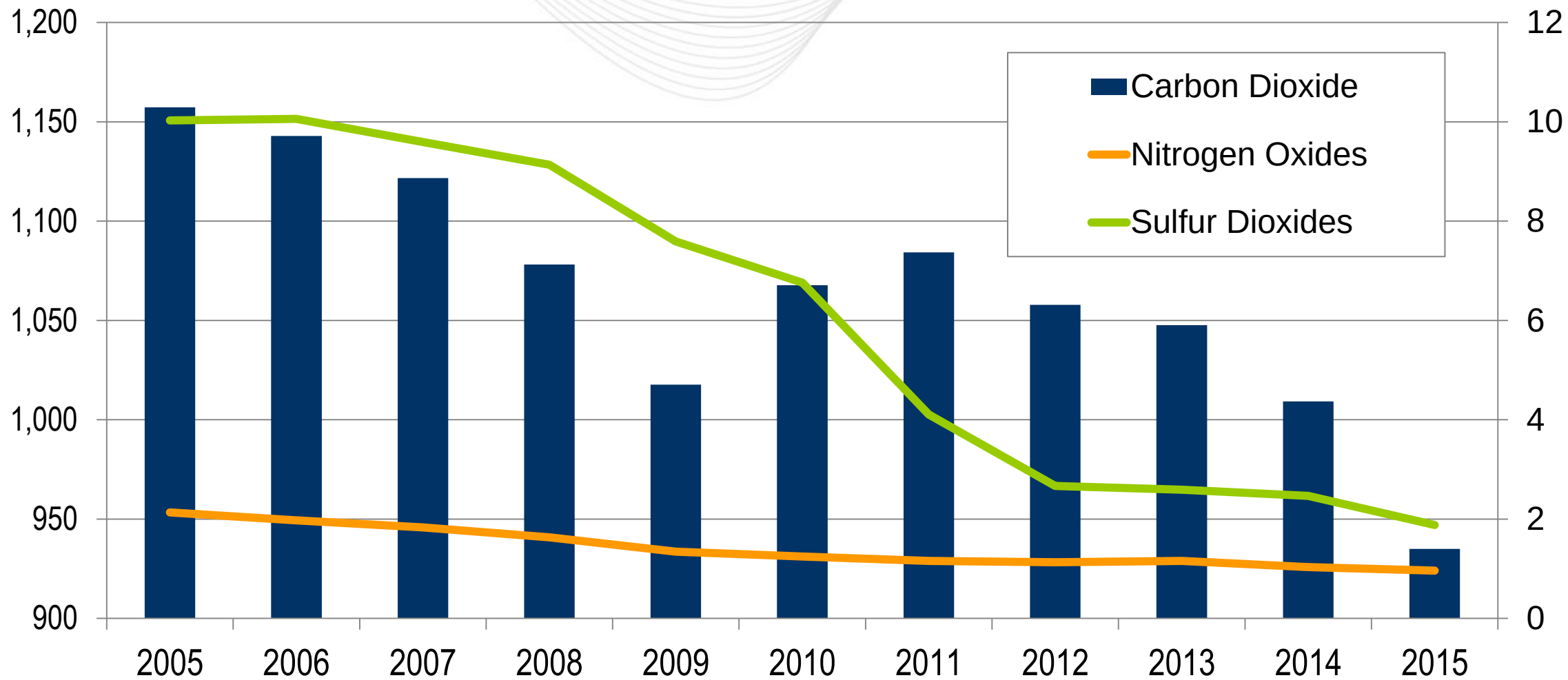


Pennsylvania - Average Emissions (lbs/MWh)

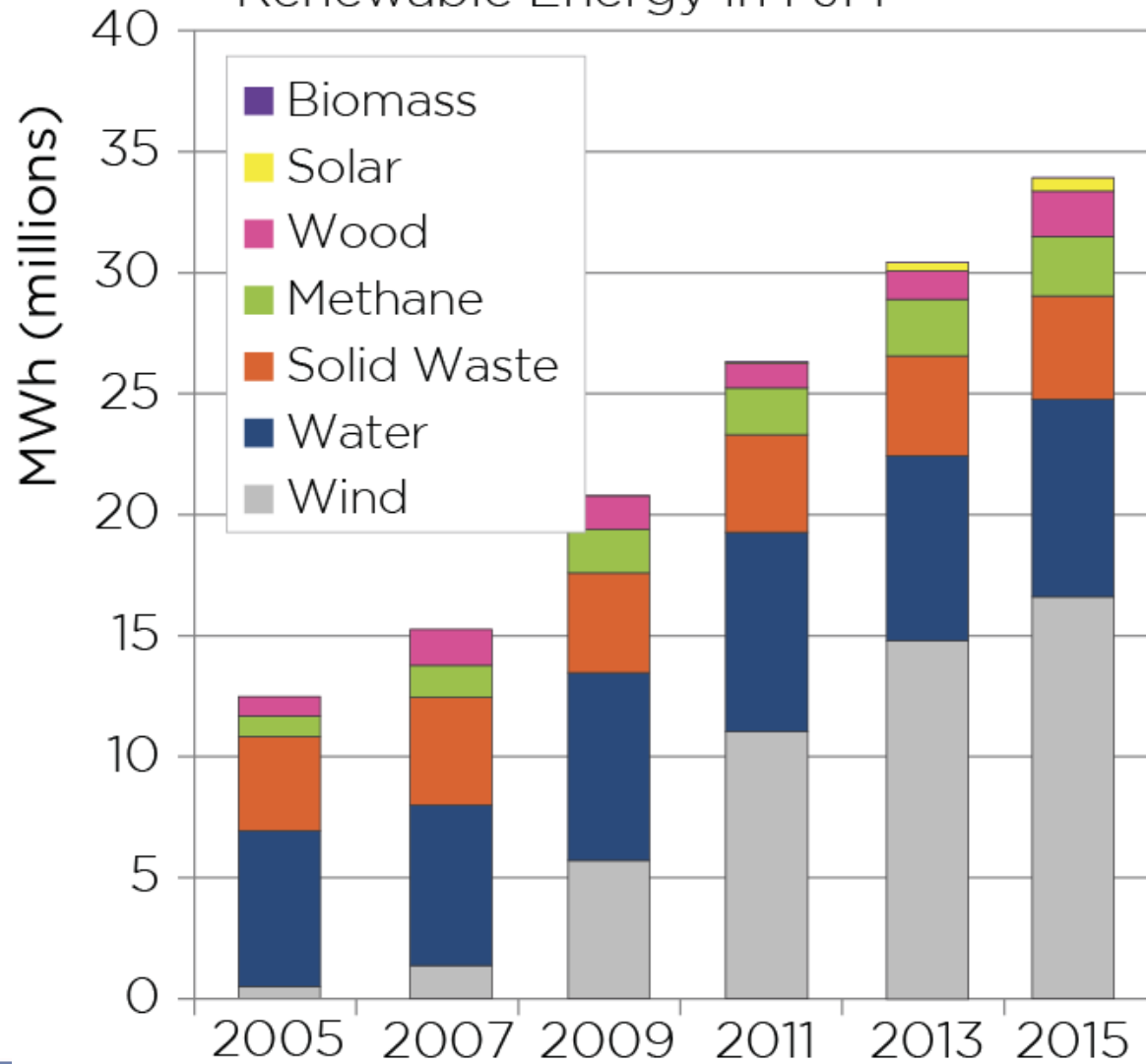
(December 31, 2015)

CO₂
(lbs/MWh)

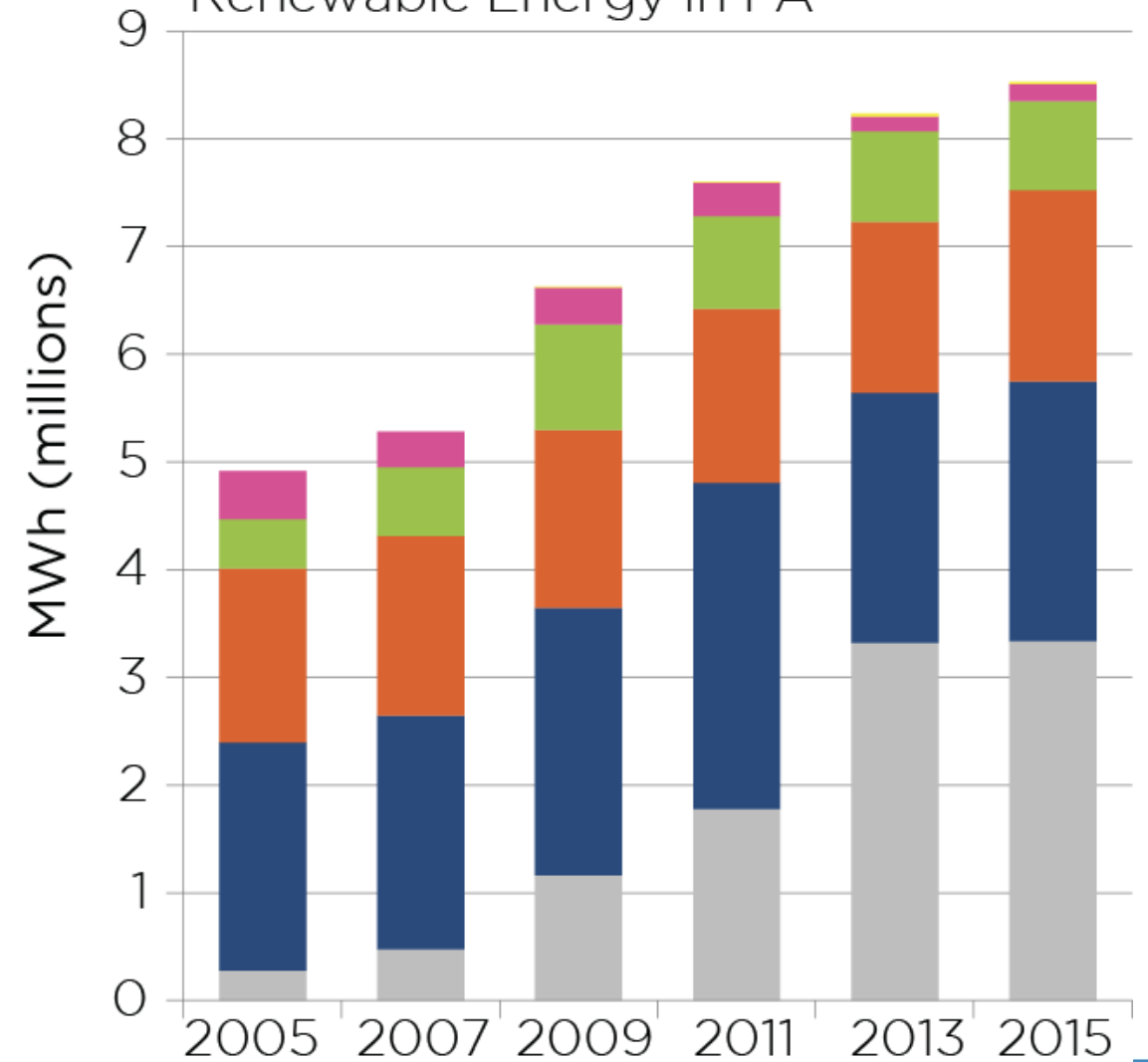
SO₂ and NO_x
(lbs/MWh)



Renewable Energy in PJM



Renewable Energy in PA



Unprecedented number of changes in the power industry



Storage technologies



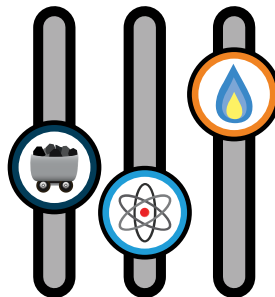
Distributed energy resources



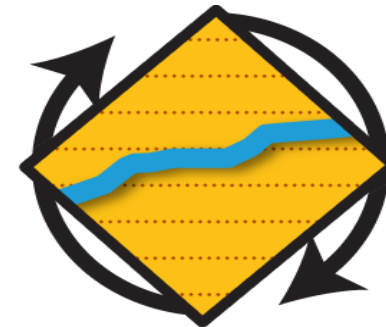
Intermittent renewables



Alternative technologies



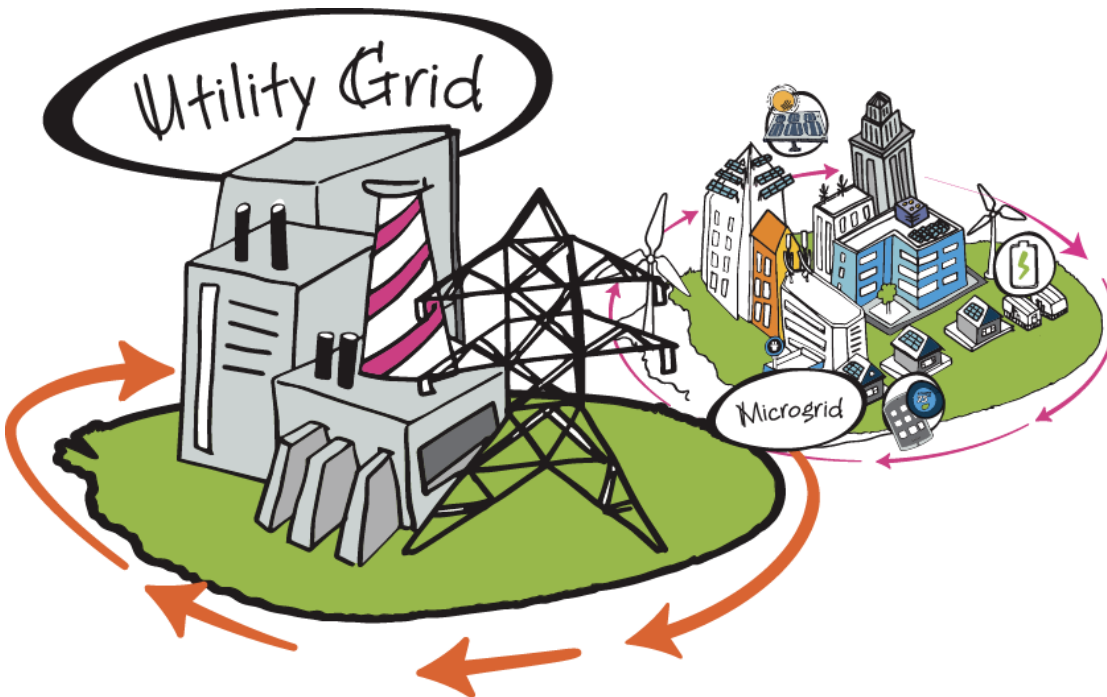
Fuel Swap



Changes in customer expectations

Drivers for Change: Distributed Resources and Alternative Technology Interacting through Markets

- Enhanced Control Systems
- Distributed Storage Technology
- Flexible Consumption



Dispatch Interactive Map Application (DIMA)

Current Capabilities

- Real-Time Weather
- Real-Time Transmission Line Status
- Load Management by Zip Code

Work in Progress

- Multi-Search
- Advanced Substation Panel
- Gas Layer
- Generation Layer
- Behind the Meter Generation

