Coal Plant Retirements:

Potential Impacts of Reduced Energy Demand, Low Natural Gas Prices and the Mercury & Air Toxics Standards Rule

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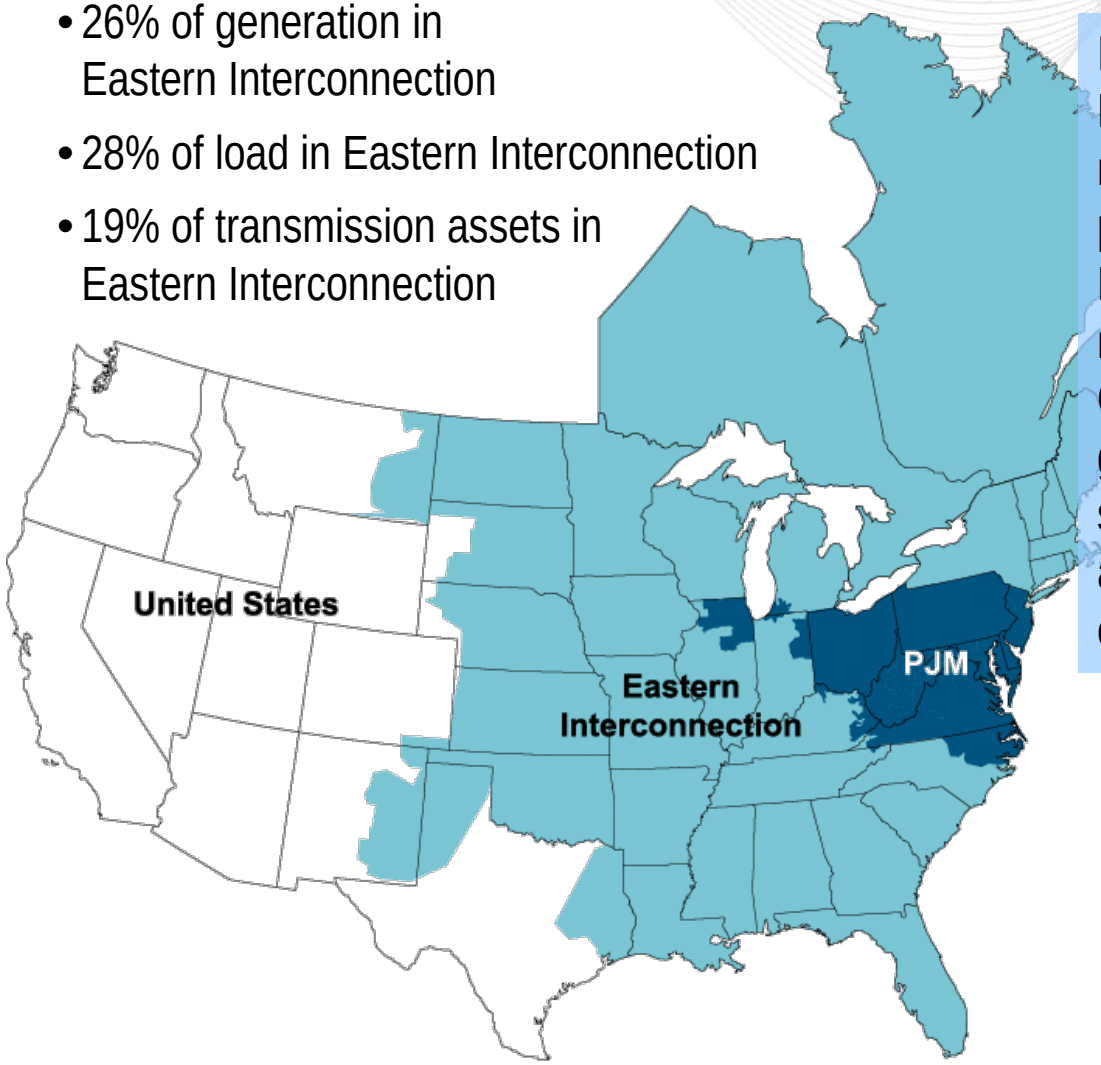
CERF - November 08, 2012

PJM as Part of the Eastern Interconnection

- 26% of generation in Eastern Interconnection
- 28% of load in Eastern Interconnection
- 19% of transmission assets in Eastern Interconnection

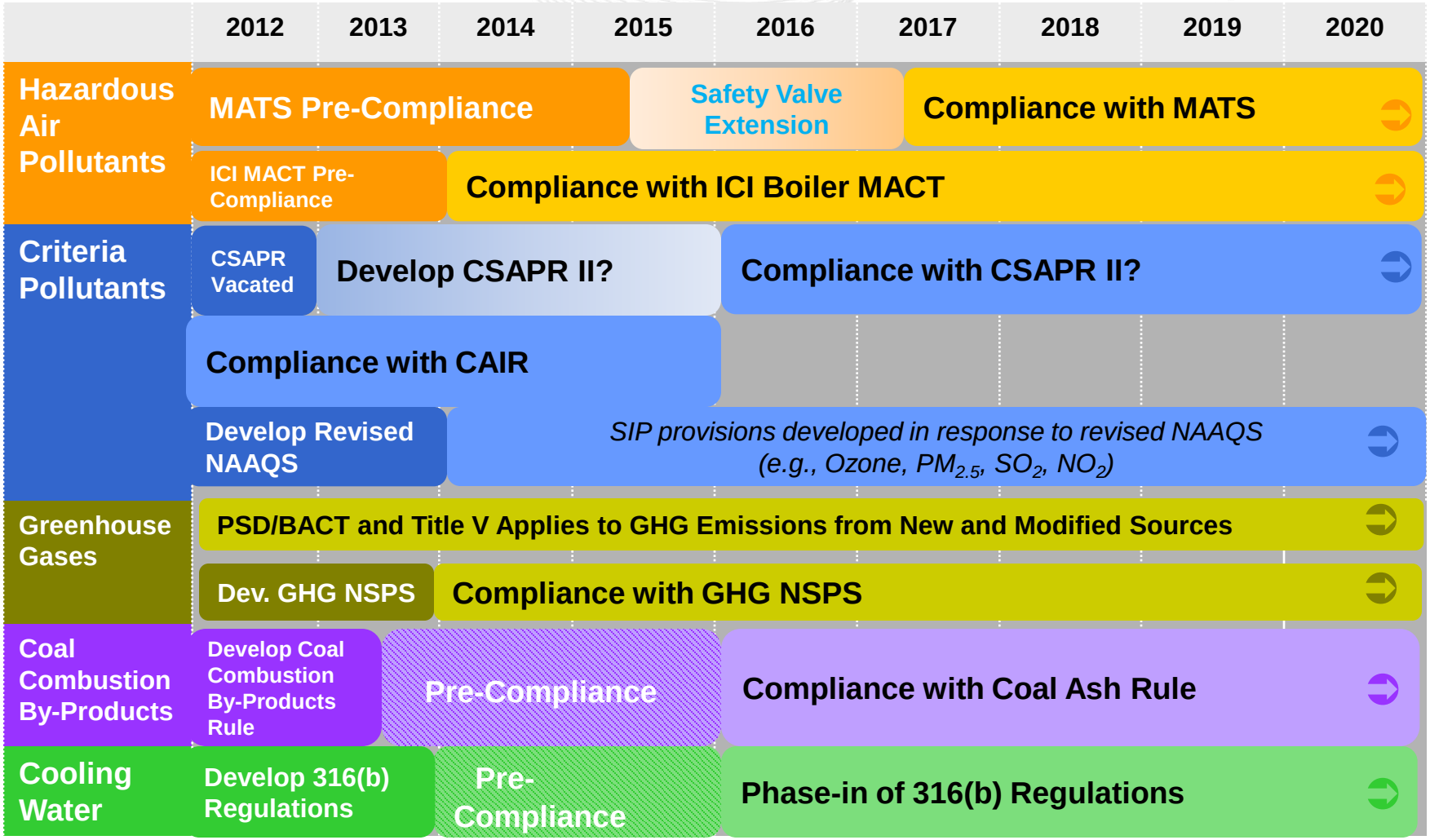


KEY STATISTICS	
PJM member companies	750+
millions of people served	60
peak load in megawatts	163,848
MWs of generating capacity	185,600
miles of transmission lines	59,750
GWh of annual energy	832,331
generation sources	1,365
square miles of territory	214,000
area served	13 states + DC
externally facing tie lines	142

21% of U.S. GDP produced in PJM

As of 9/7/2012

Environmental Regulation Timeframe



Adapted from M. J. Bradley & Associates LLC

Reliability Implications of CSAPR and MATS

- Retrofit, Retire or Repower
- Resource adequacy
  - Will there be sufficient resources to meet peak loads plus the installed reserve margin?
- Local transmission reliability
  - Will transmission upgrades be necessary to allow units to retire?
  - Can retrofit outages be managed reliably?

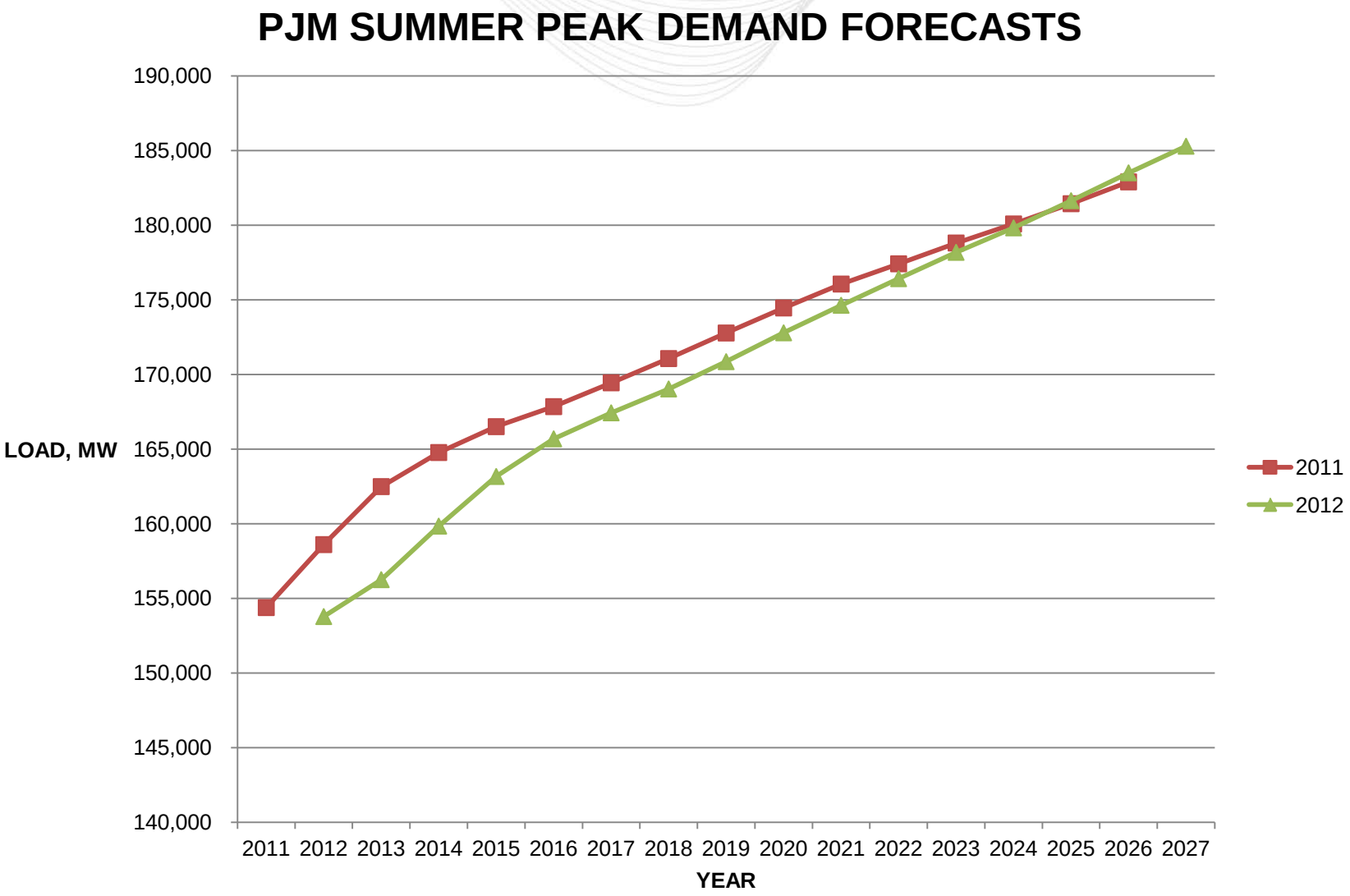
Nearly 25 GW coal generation at risk based on economic analysis

Capacity Revenue Needed	PJM RTO	MAAC	Rest of PJM
< ½ Net CONE	38,334	12,634	25,700
½ Net CONE – Net CONE	14,147	2,908	11,239
> Net CONE	11,051	3,194	7,857

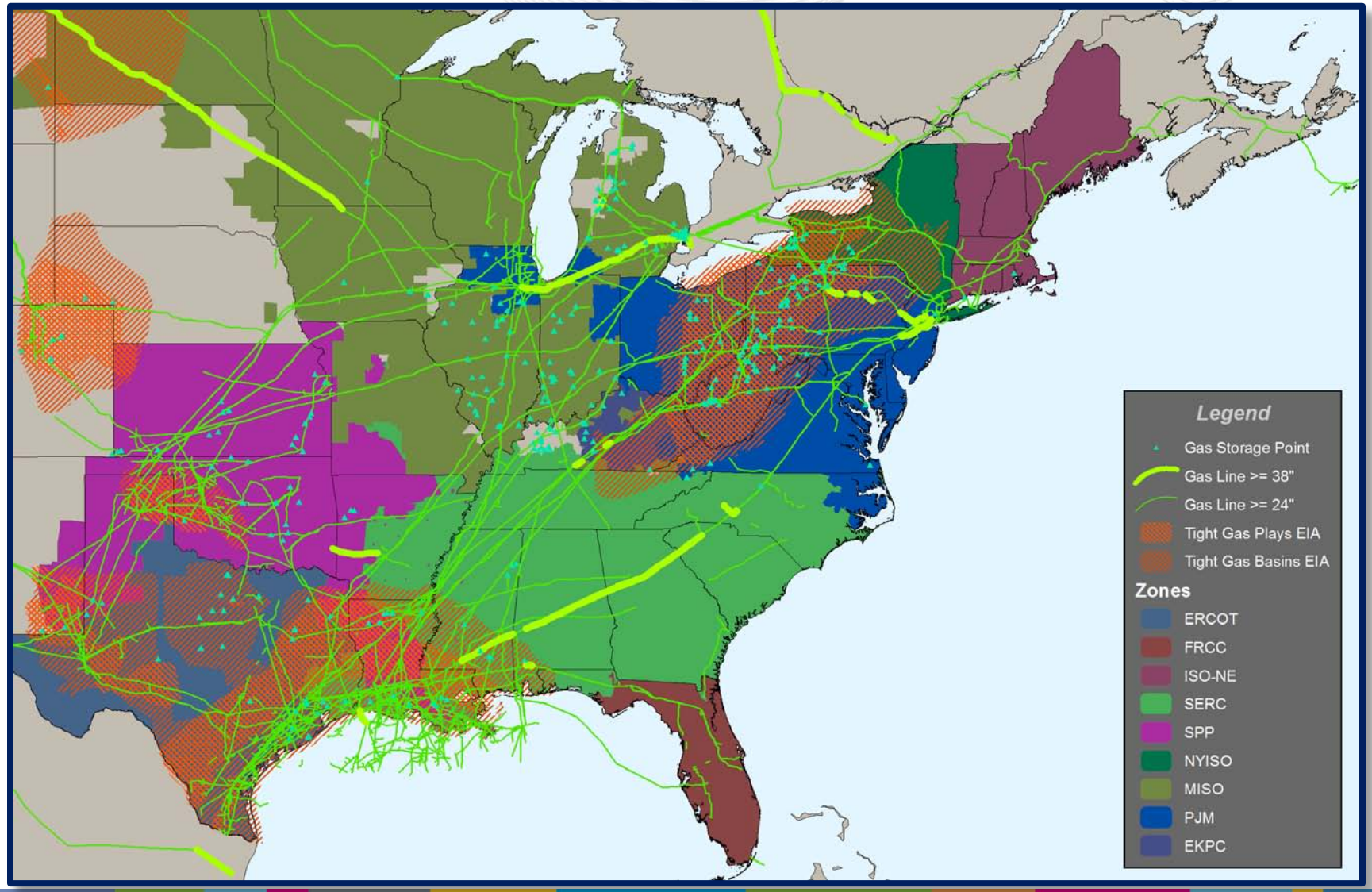
Note: CONE is the Cost of New Entry (Simple Cycle Combustion Turbine)

Source: PJM Report, *Coal Capacity At-Risk for Retirement in PJM: Potential Impacts of the Finalized EPA Cross State Air Pollution Rule and Proposed National Emissions Standards for Hazardous Air Pollutants*, August 2011

Decreased Electricity Demand



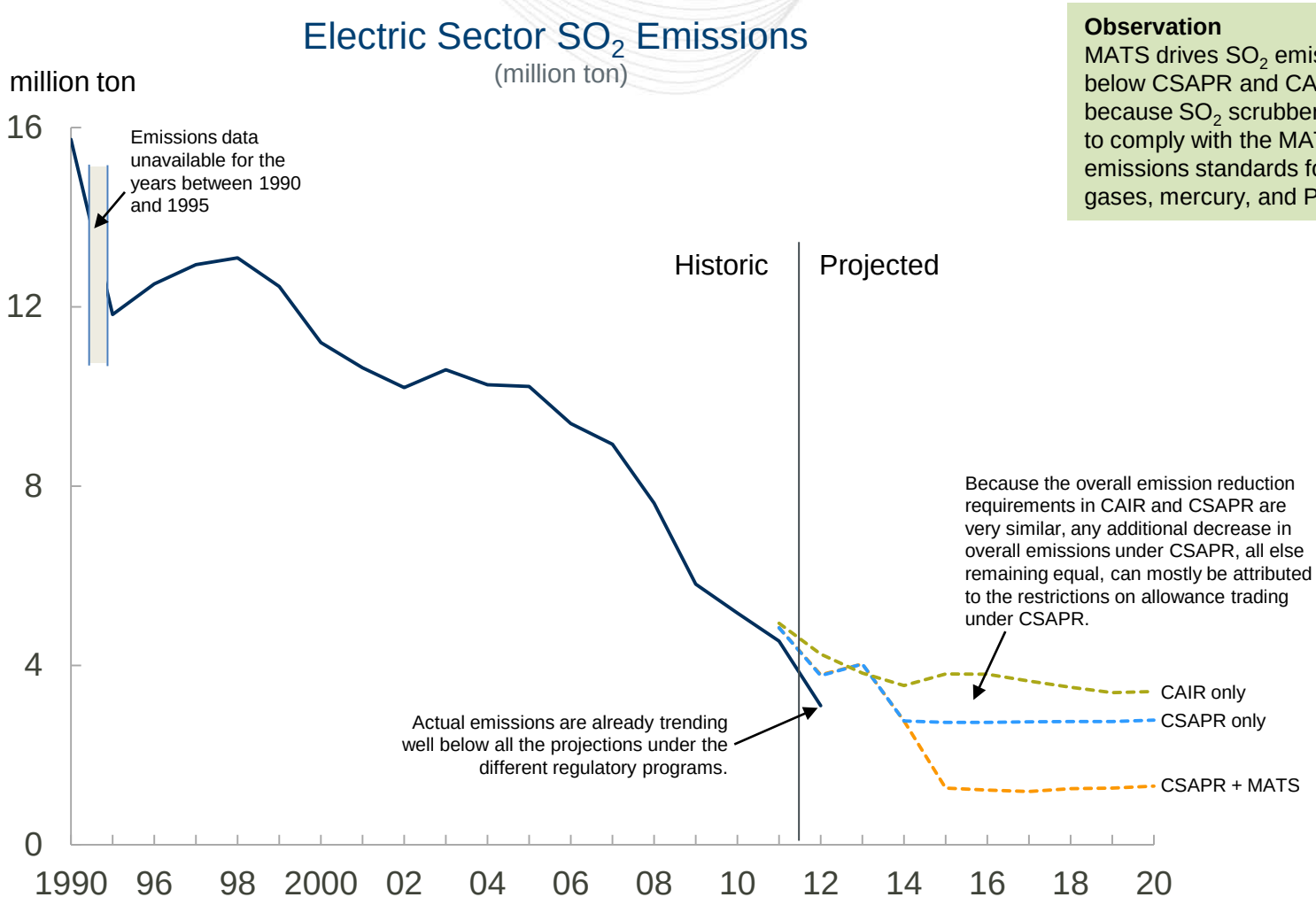
Natural Gas System & Resources in Eastern Interconnection



Environmental Rules

- MATS finalized with “Reliability Safety Valve”
  - State permitting agency may grant 4th year (until April 2016)
  - EPA Administrative Orders for 5th year (until April 2017)
- CSAPR vacated
- 316(b) delayed
- Coal ash ruling delayed
- Ozone NAAQS review delayed
- GHG NSPS proposed

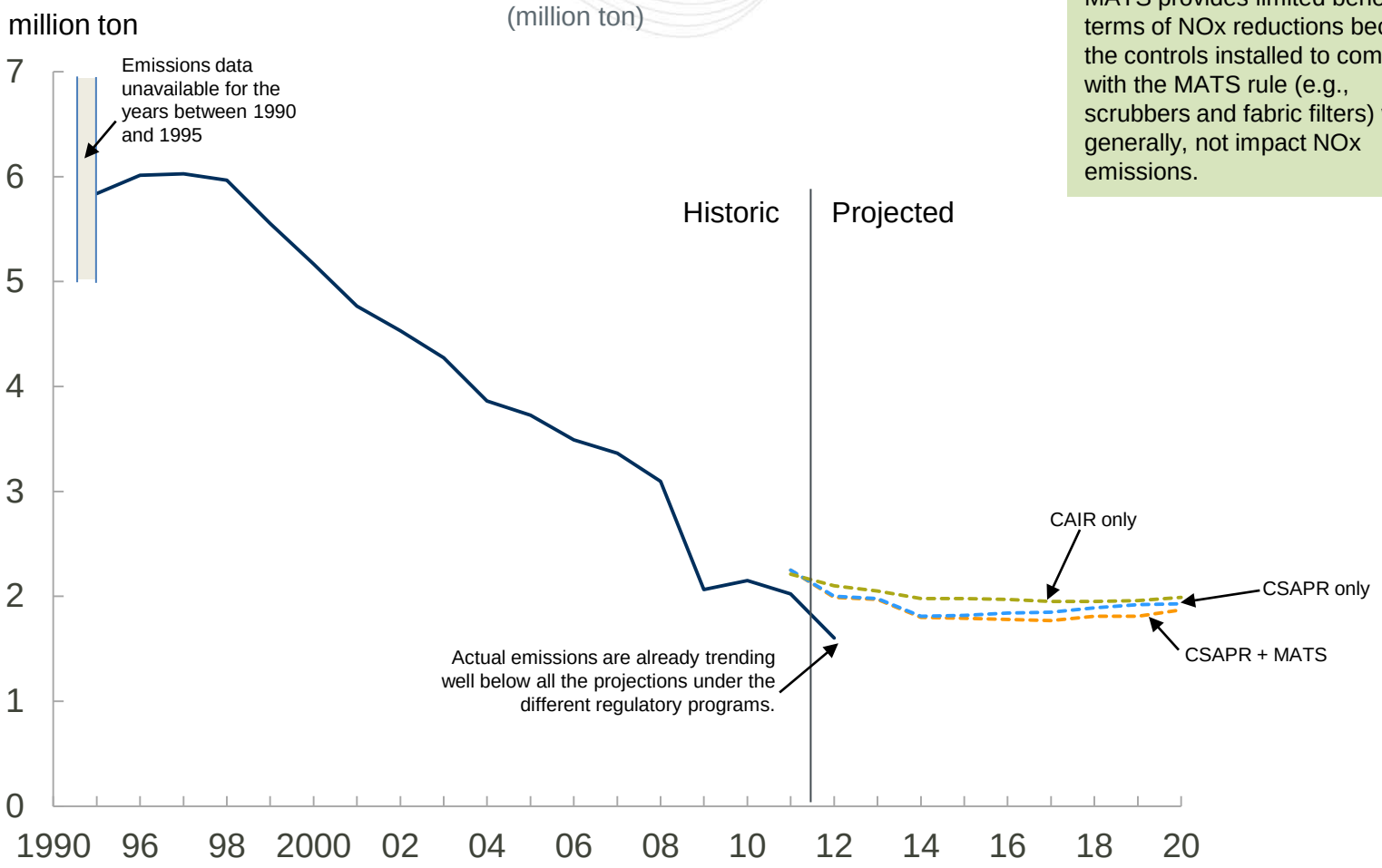
SO_2 Emissions Under CAIR, CSAPR, and MATS



Observation
MATS drives SO_2 emissions well below CSAPR and CAIR because SO_2 scrubbers are used to comply with the MATS emissions standards for acid gases, mercury, and PM.

Source: MJB&A Analysis based on EIA data (AEO 2012, 2012 ER, 2011)

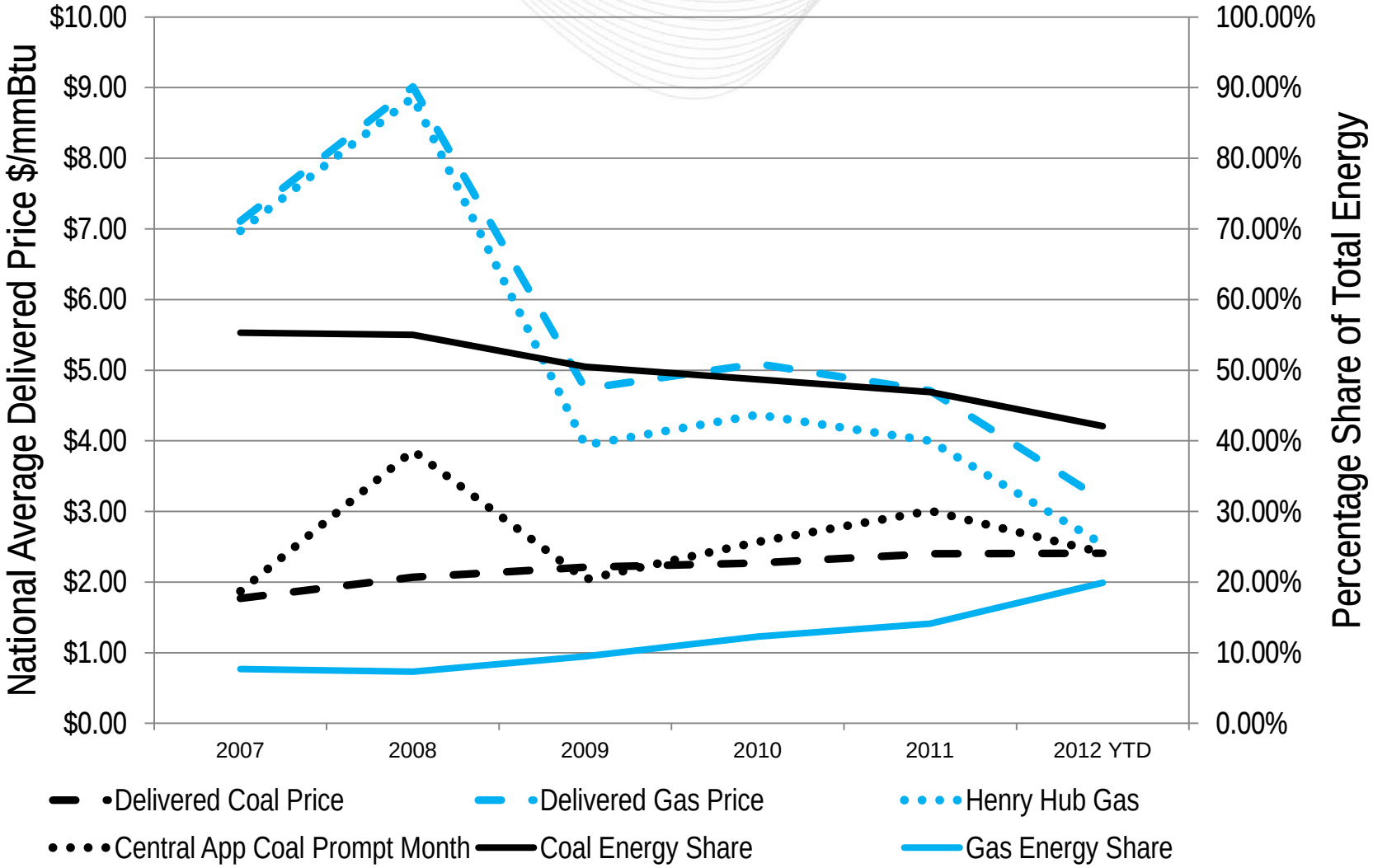
NOx Emissions Under CAIR, CSAPR, and MATS



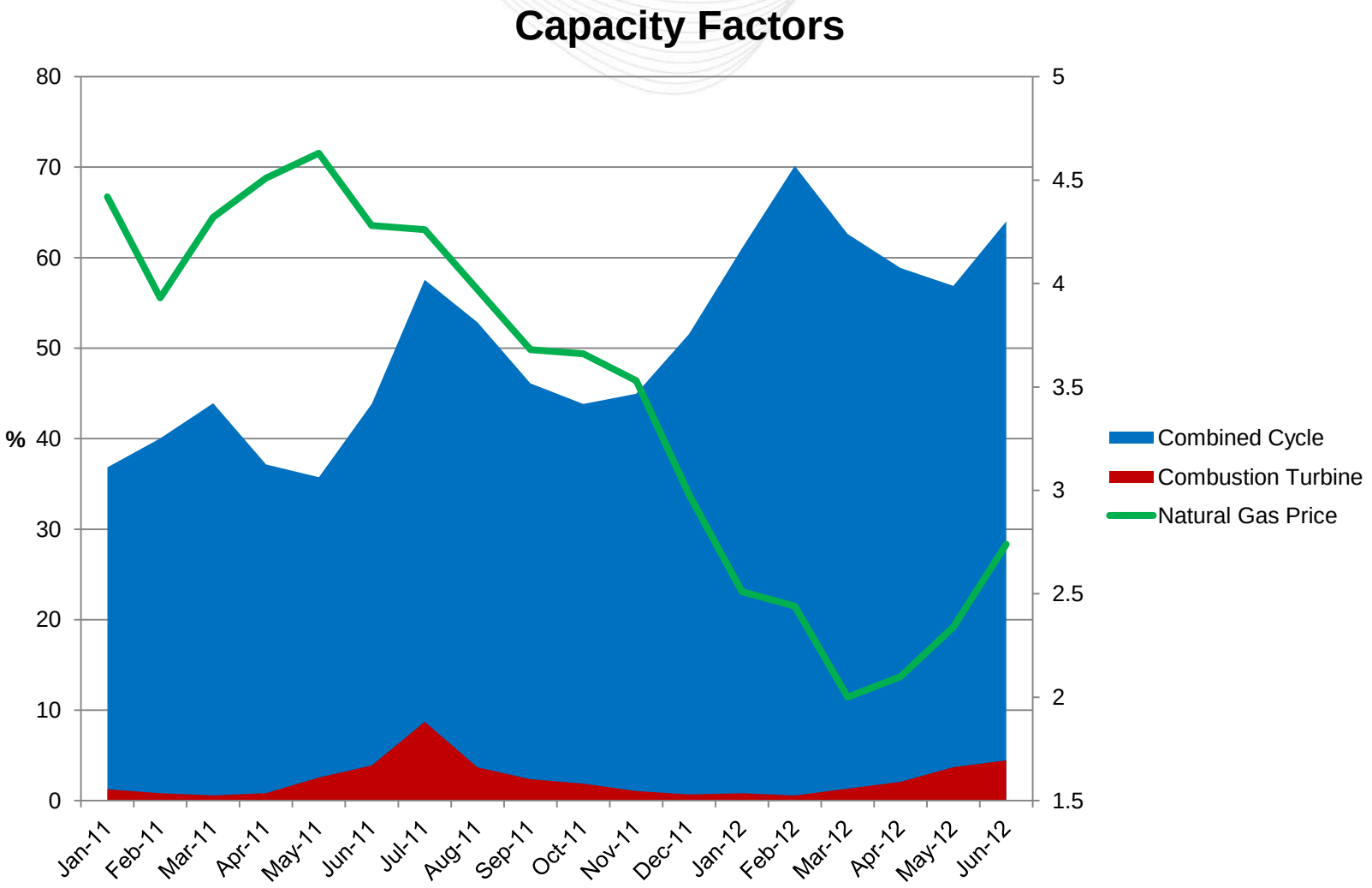
Observation
MATS provides limited benefits in terms of NOx reductions because the controls installed to comply with the MATS rule (e.g., scrubbers and fabric filters) will, generally, not impact NOx emissions.

Source: MJB&A Analysis based on EIA data (AEO 2012, 2012 ER, 2011)

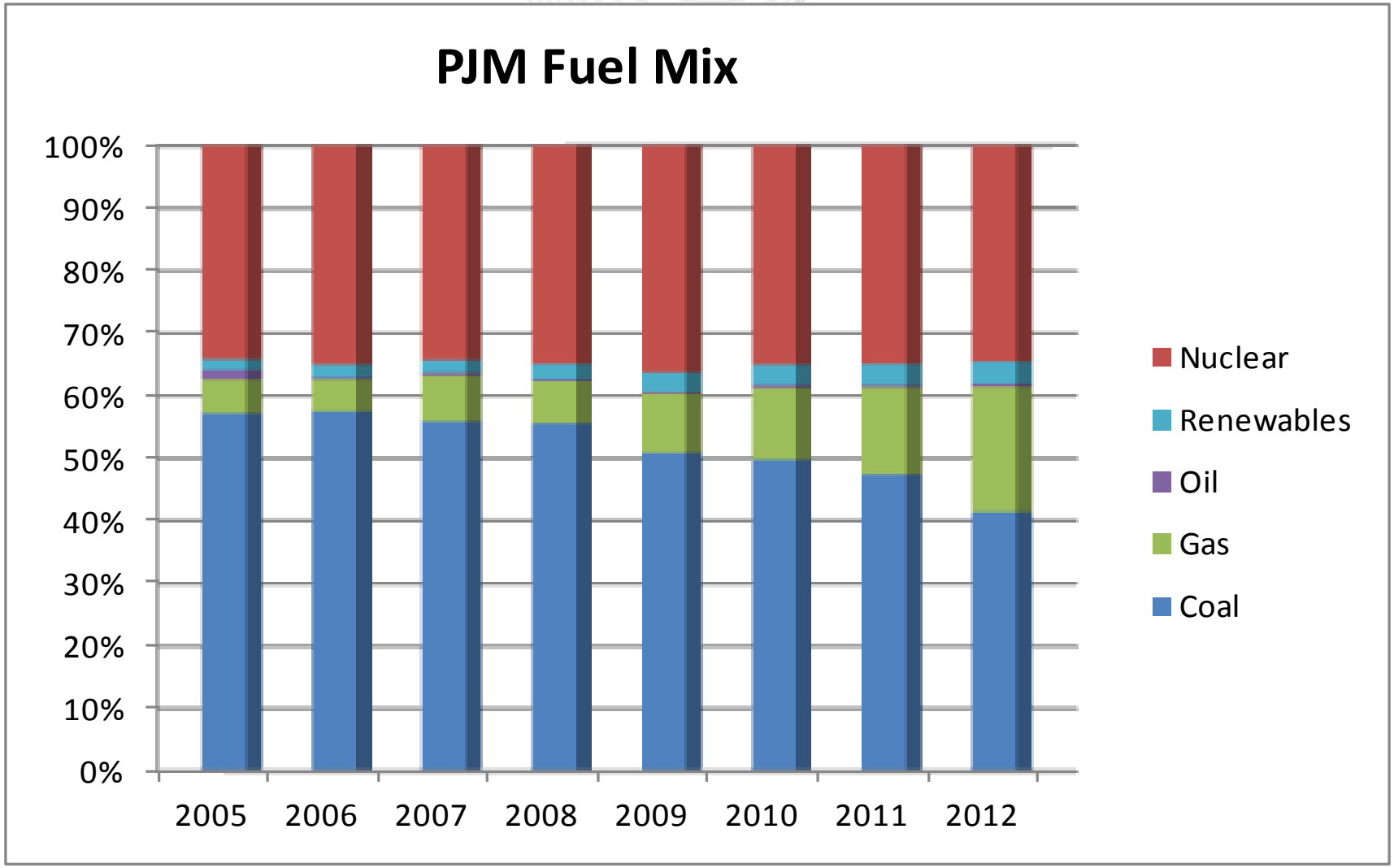
National Average Delivered Prices, Spot Prices, and Energy Shares of Coal and Natural Gas in PJM



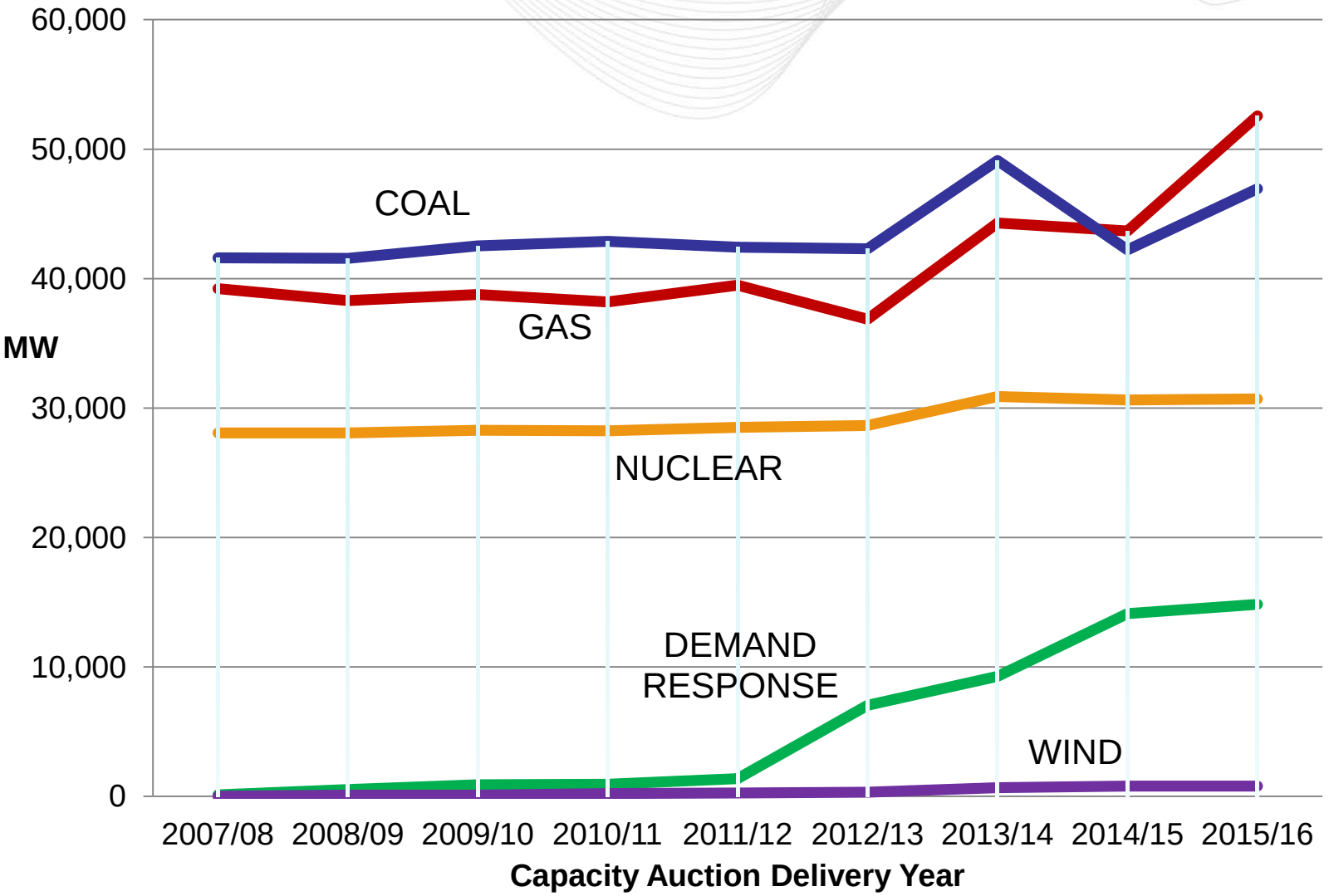
Increase in Natural Gas-Fired Generation



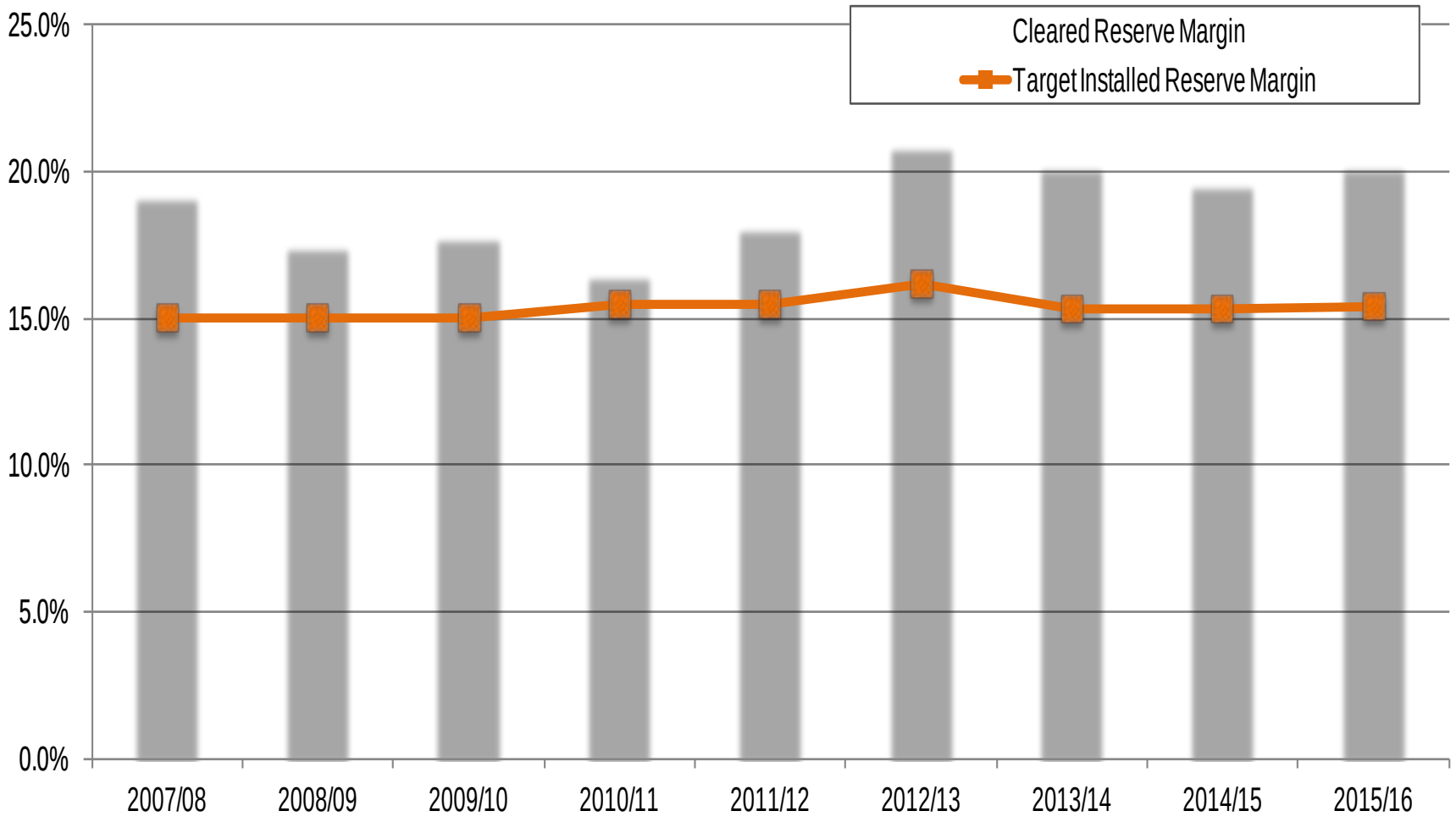
Evolving Fuel Mix in the Energy Market



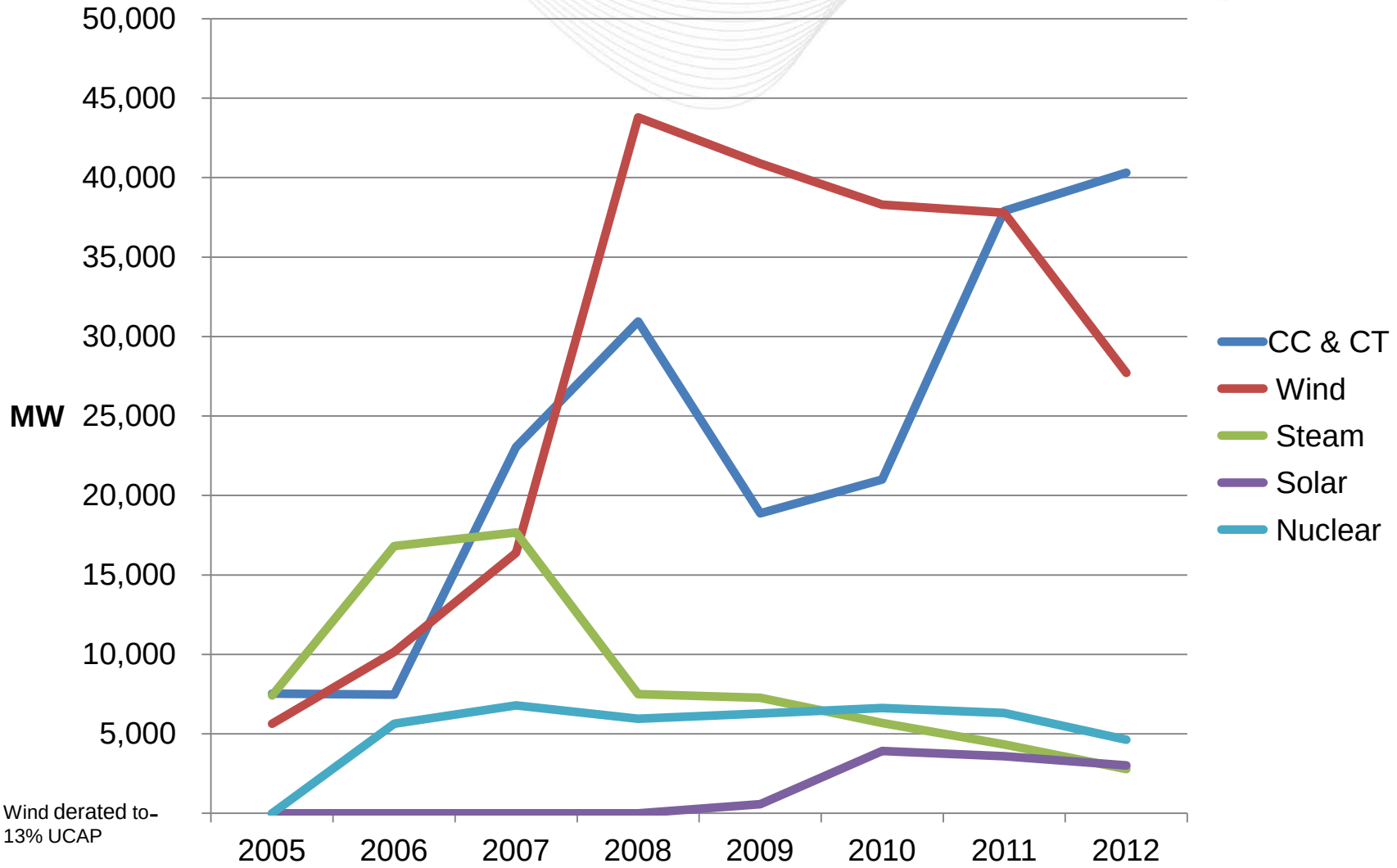
Evolving Resource Mix in the Capacity Market



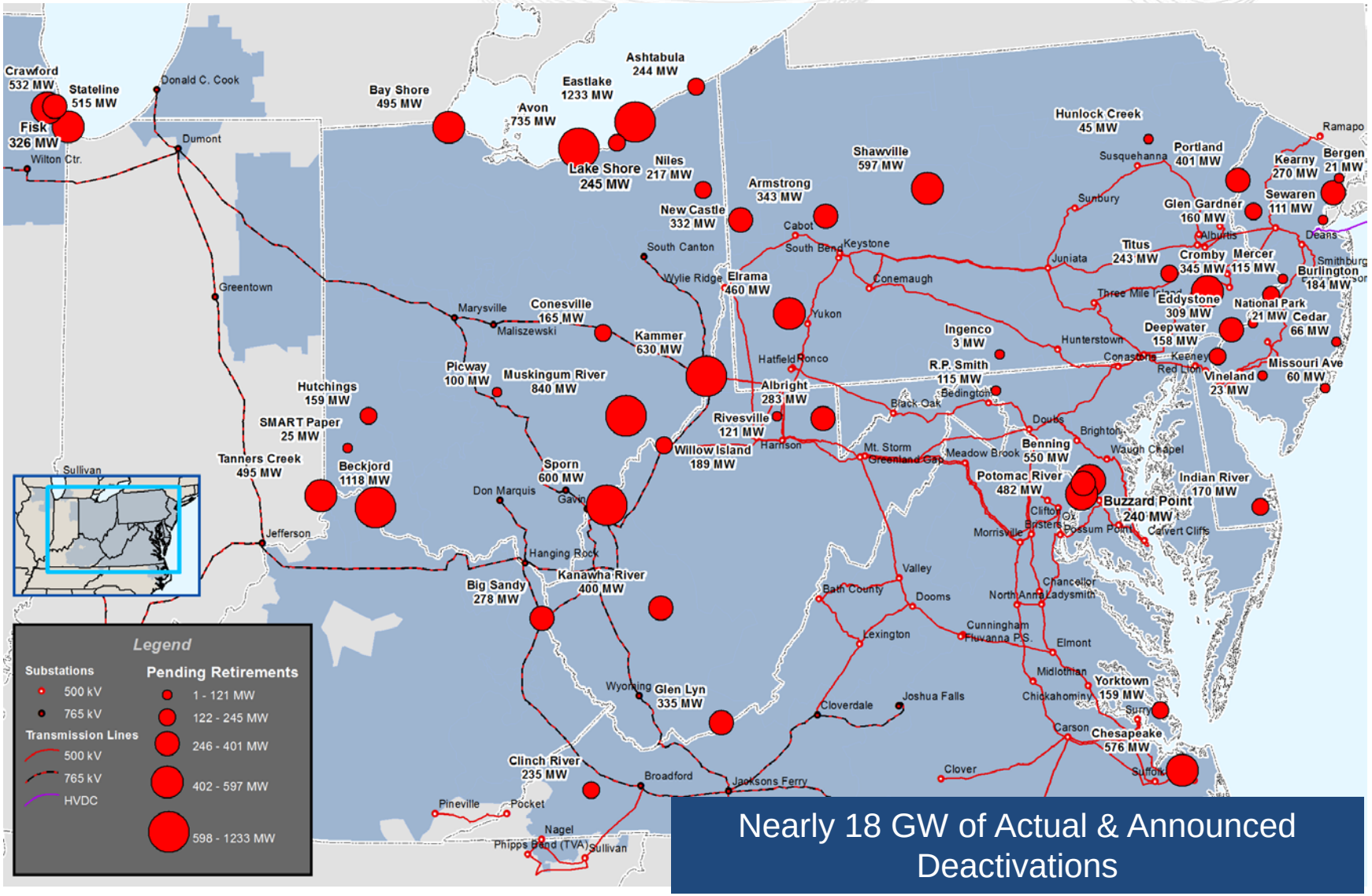
Maintaining Resource Adequacy



Evolving Generation Queue



Generation Resource Retirement Status



Nearly 18 GW of Actual & Announced Deactivations

PJM Operational Assessments / Activities

Fall 2011 Initial Assessments

- At Risk Generation
- Capacity Adequacy
- Near Term Transmission
- Transmission Planning
- Ancillary Services

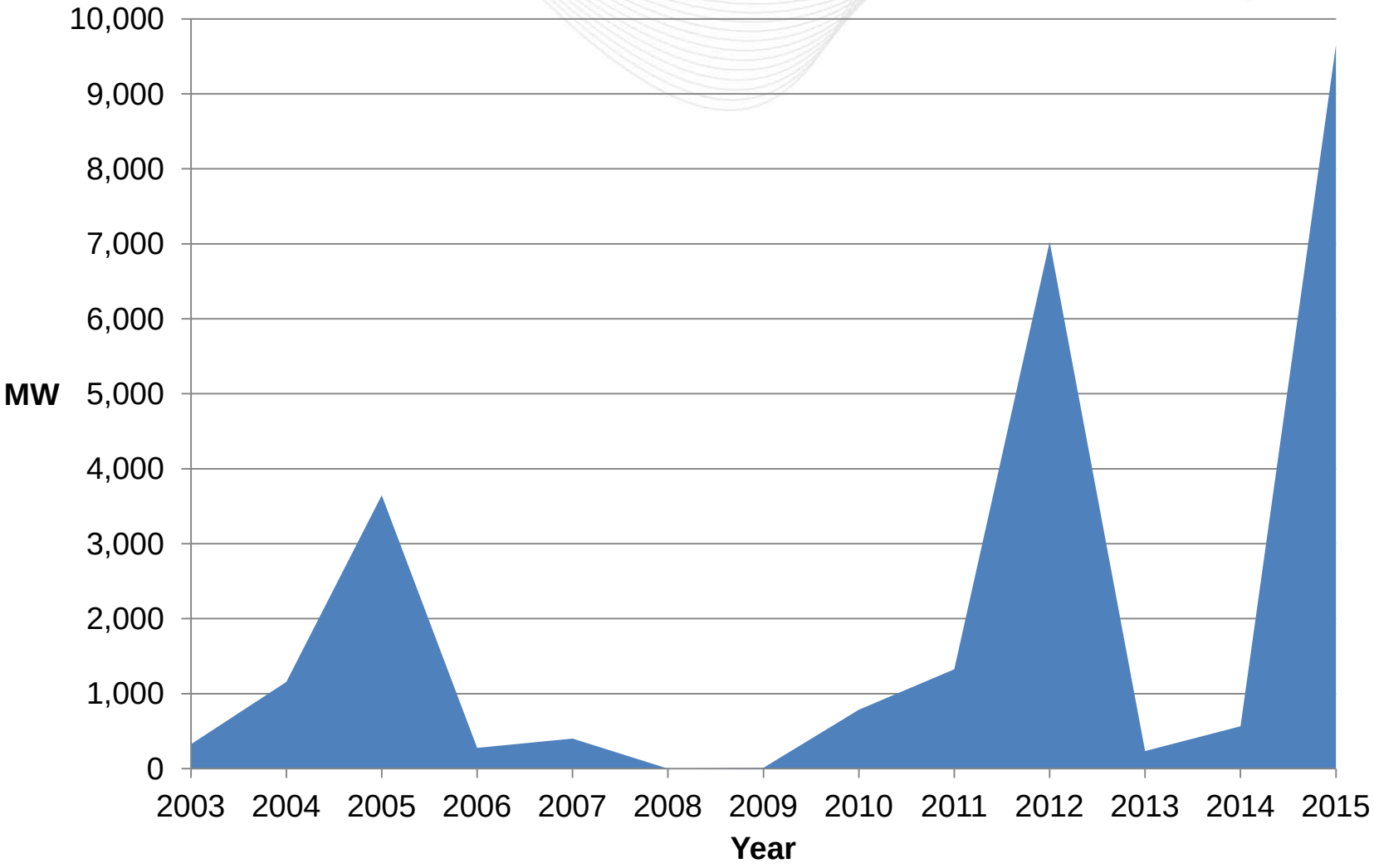
Generator Owner Response to PJM

- Retirements
- Retrofit Outages
- Derates
- Regulatory concerns

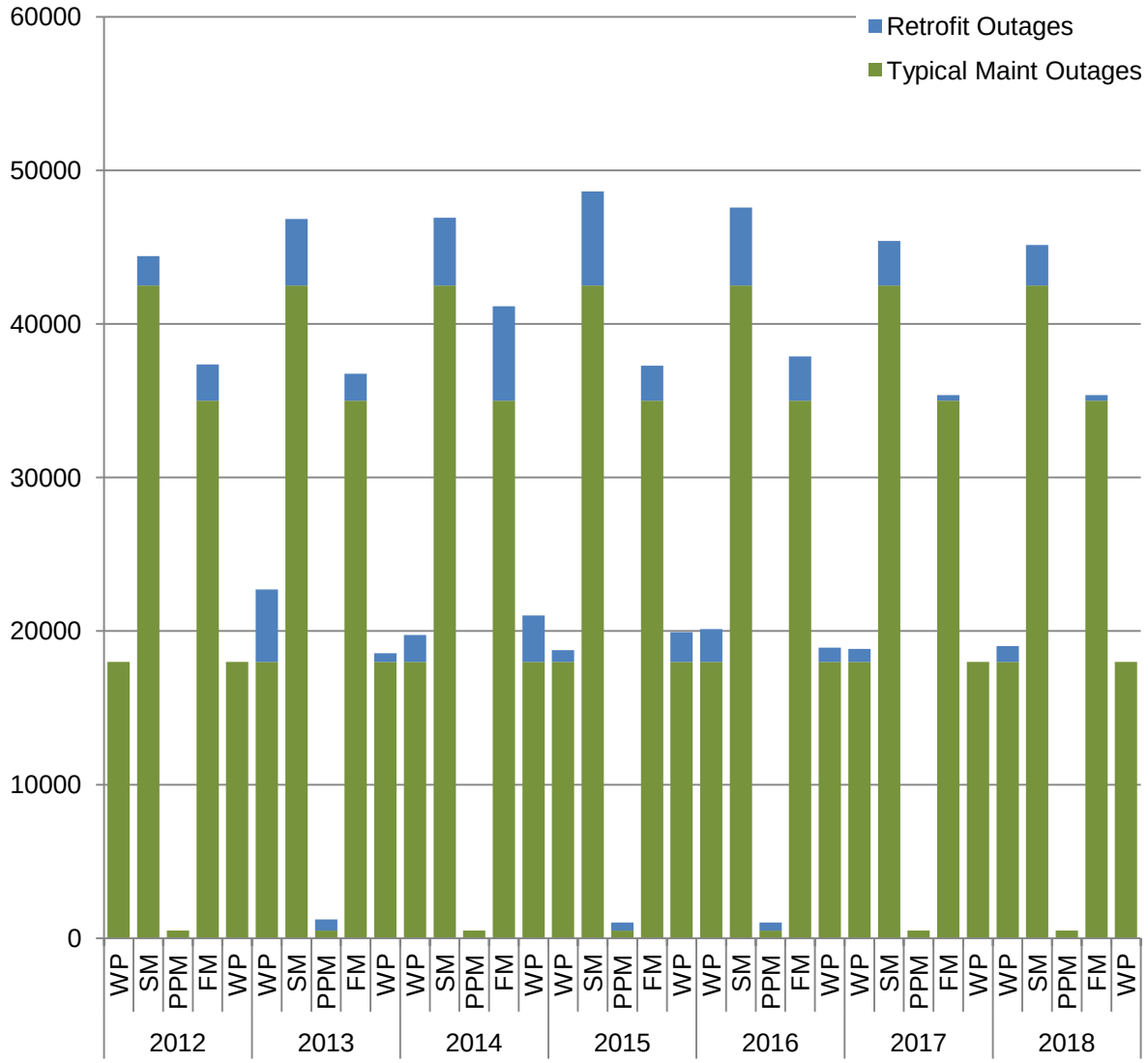
Continuing Assessments

- Announced vs. Potential Retirements
- Deactivation Analyses
- Retrofit Outages
- Capacity Adequacy
- Ancillary Services Impact
- Communications

Generation Retirement Timeline



Retrofit Outages and Typical Maintenance Outages



		Retrofit Outages	Typical Maint Outages
2012	WP	0	18000
	SM	1918	42500
	PPM	0	500
	FM	2370	35000
	WP	0	18000
2013	WP	4705	18000
	SM	4331	42500
	PPM	728	500
	FM	1751	35000
	WP	555	18000
2014	WP	1752	18000
	SM	4417	42500
	PPM	0	500
	FM	6433	35000
	WP	3260	18000
2015	WP	769	18000
	SM	6371	42500
	PPM	530	500
	FM	2281	35000
	WP	1920	18000
2016	WP	2120	18000
	SM	5088	42500
	PPM	530	500
	FM	2889	35000
	WP	929	18000
2017	WP	846	18000
	SM	2894	42500
	PPM	0	500
	FM	361	35000
	WP	0	18000
2018	WP	1028	18000
	SM	2635	42500
	PPM	0	500
	FM	361	35000
	WP	0	18000