

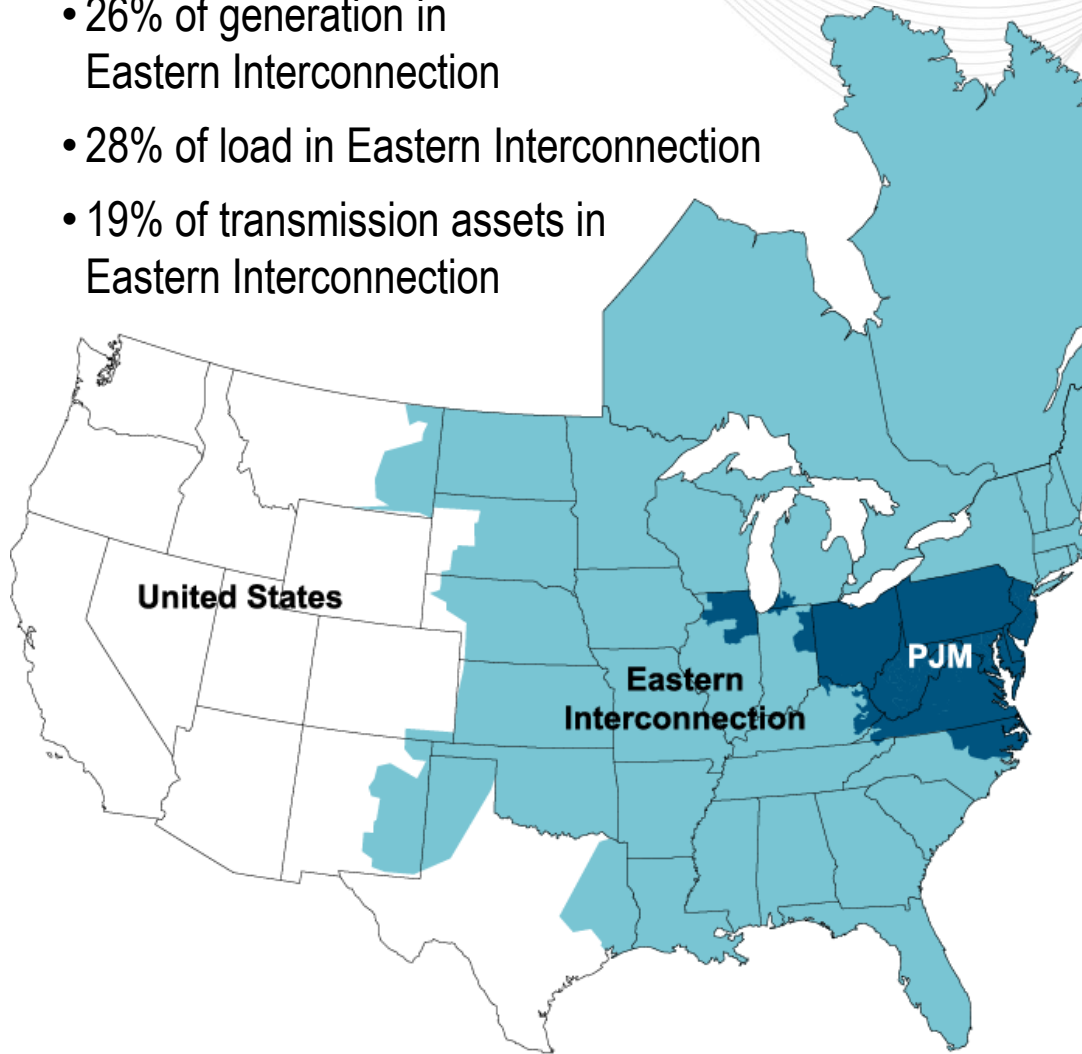
Demand, Fuel and Policy Trends Affecting the PJM Wholesale Market

Perspectives on Future Regulatory Policy
Institute for Regulatory Policy Studies
Springfield, IL
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PJM Interconnection

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 generation	832,331
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

PJM Wholesale Power Costs (\$/MWh): Total and Major Components 2005 - 2011

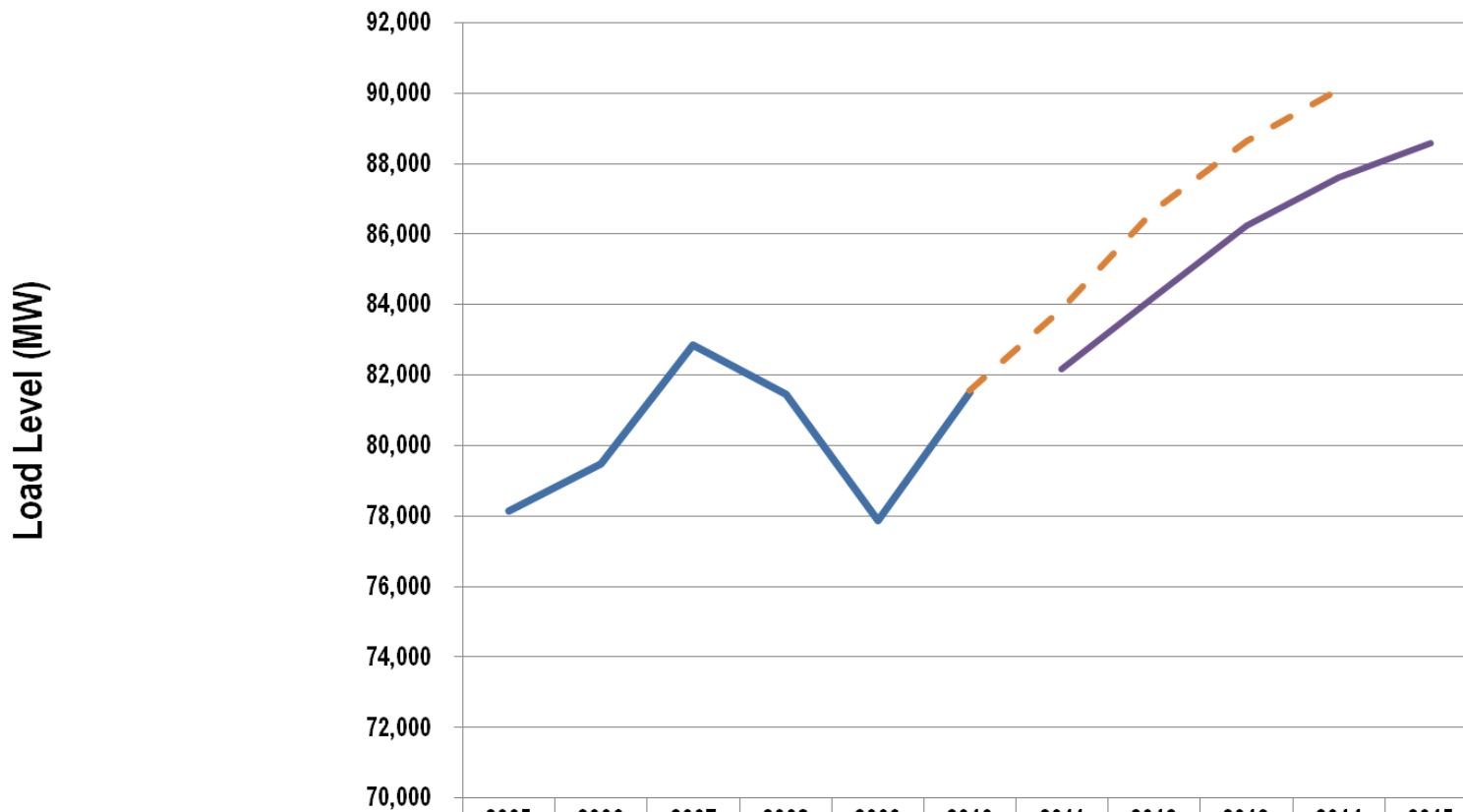


Trends in Energy Demand

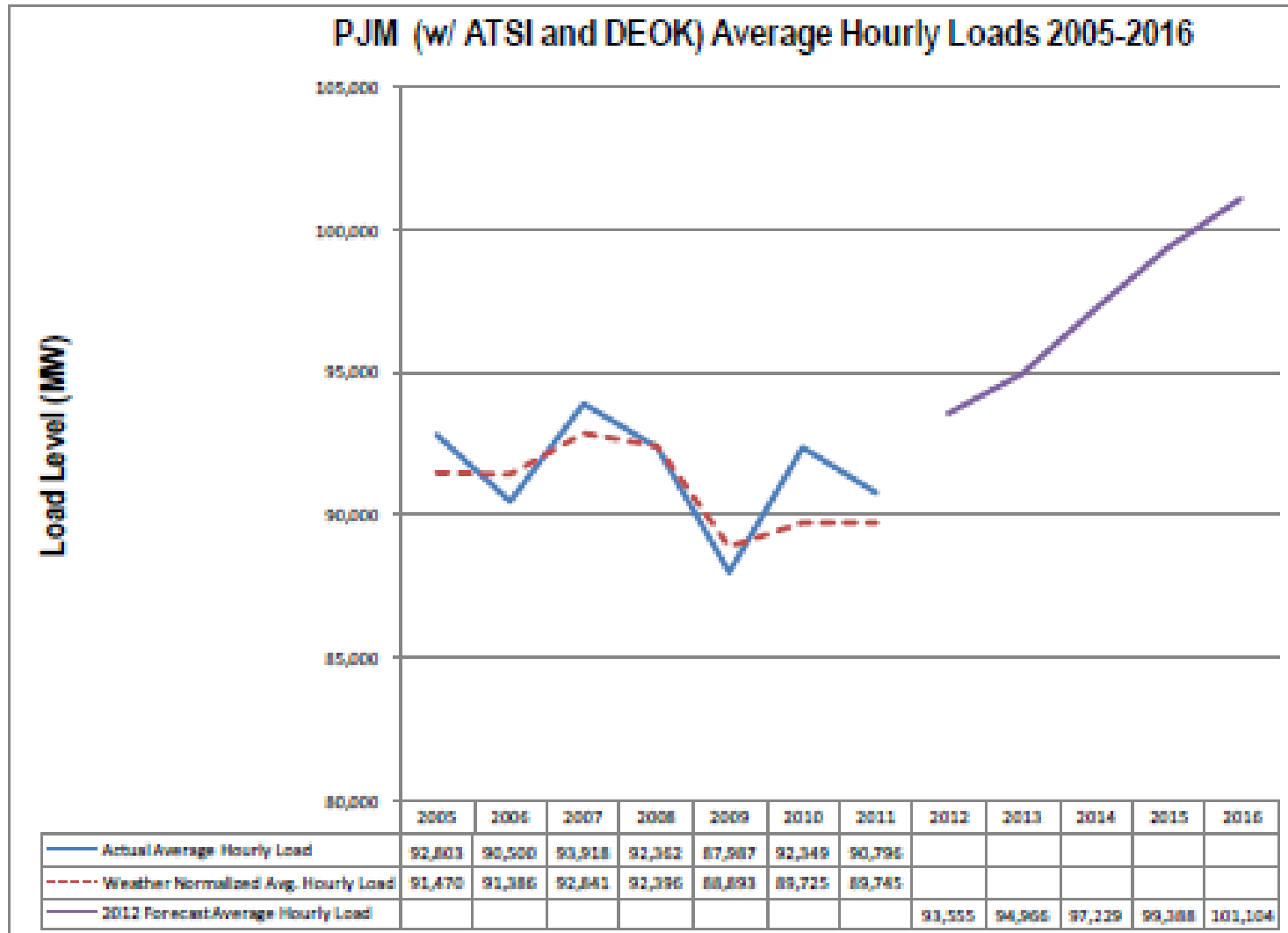
Actual and Forecast US Real GDP Growth Rates



PJM Average Hourly Loads 2005-2010 and Forecasts to 2015

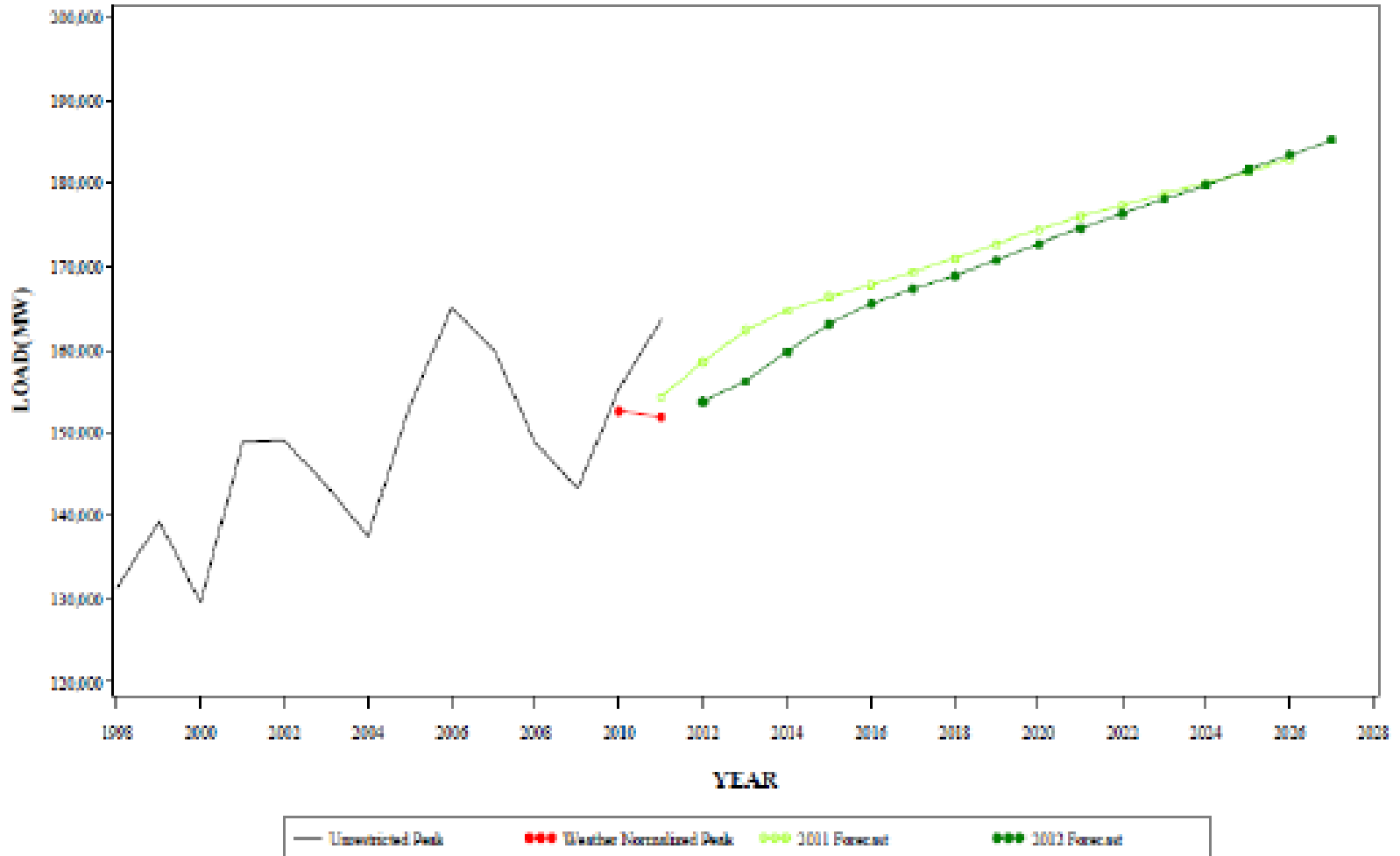


	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
— Actual Average Hourly Load	78,150	79,471	82,857	81,442	77,862	81,510					
— 2011 Forecast Average Hourly Load							82,167	84,206	86,240	87,596	88,564
— 2010 Forecast Average Hourly Load						81,557	83,874	86,676	88,632	90,106	



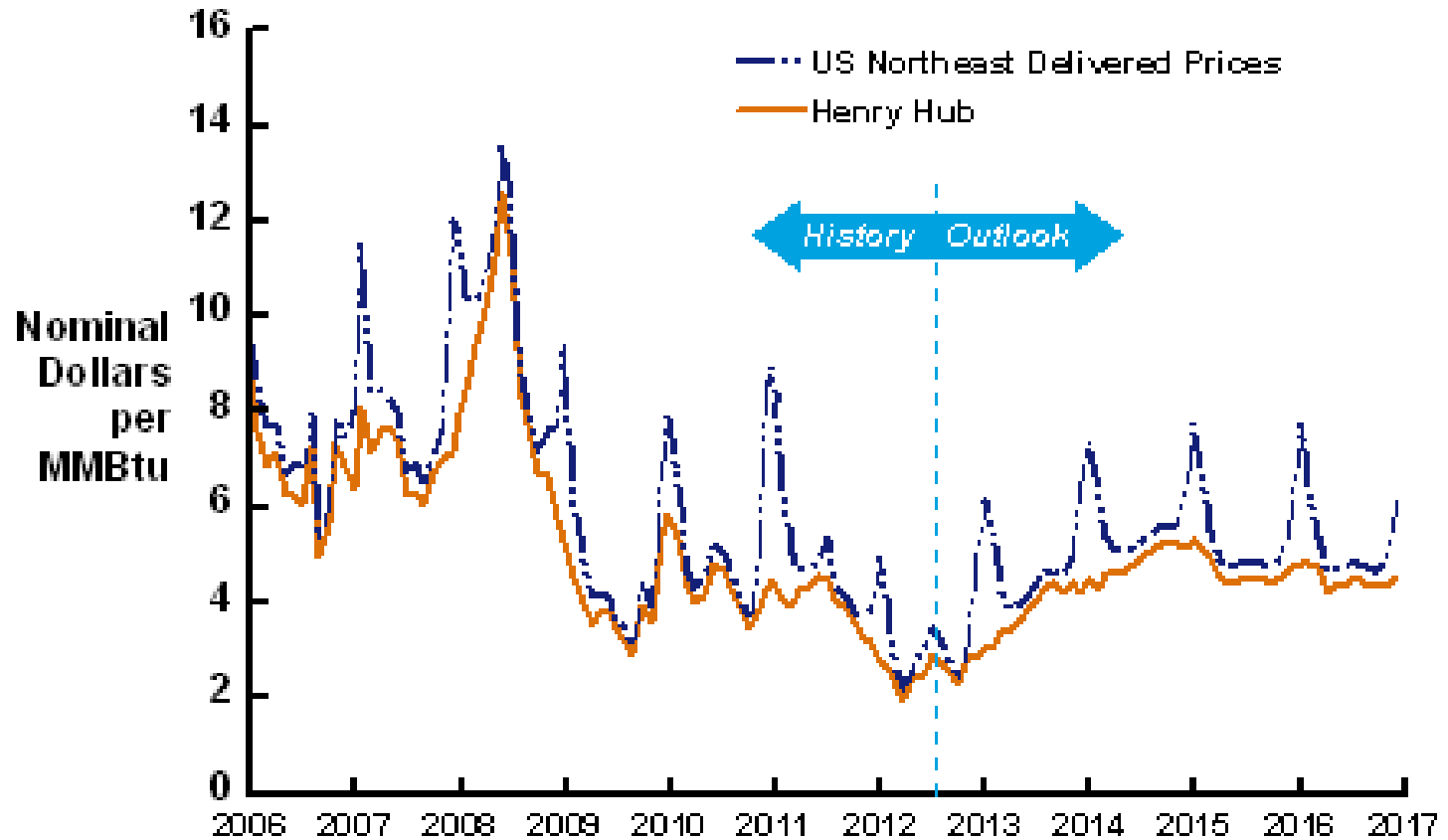
Peak Load Forecasts Adjusted Down Near-term

**SUMMER PEAK DEMAND FOR PJM RTO
GEOGRAPHIC ZONE**



Trends in Primary Fuel Costs and Energy Share by Fuel

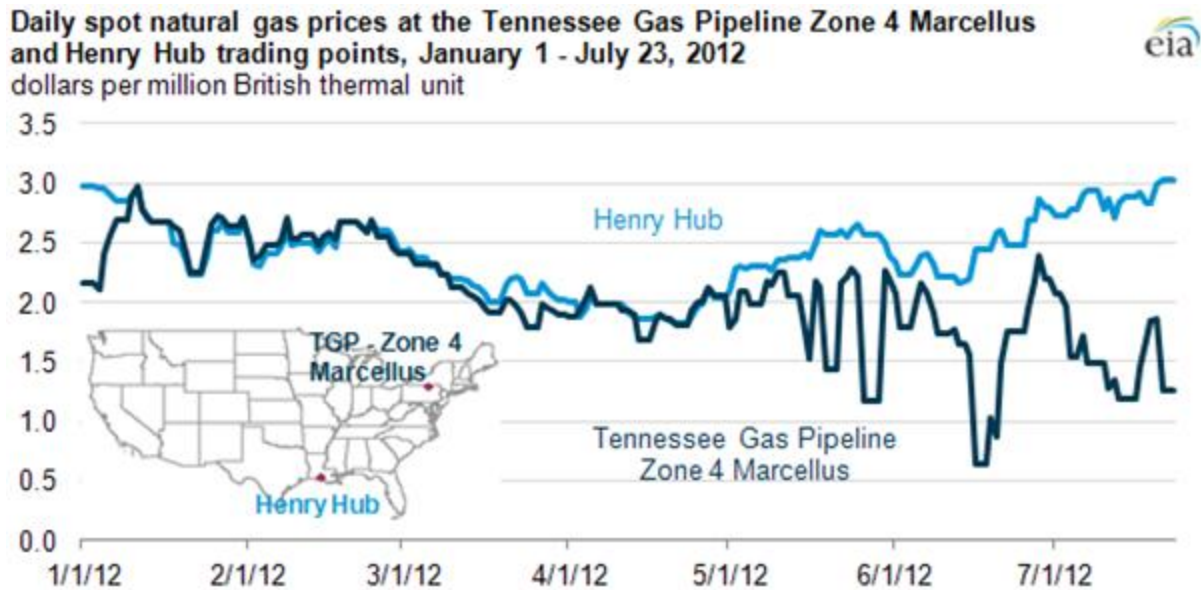
Average Monthly Natural Gas Prices, 2006–16

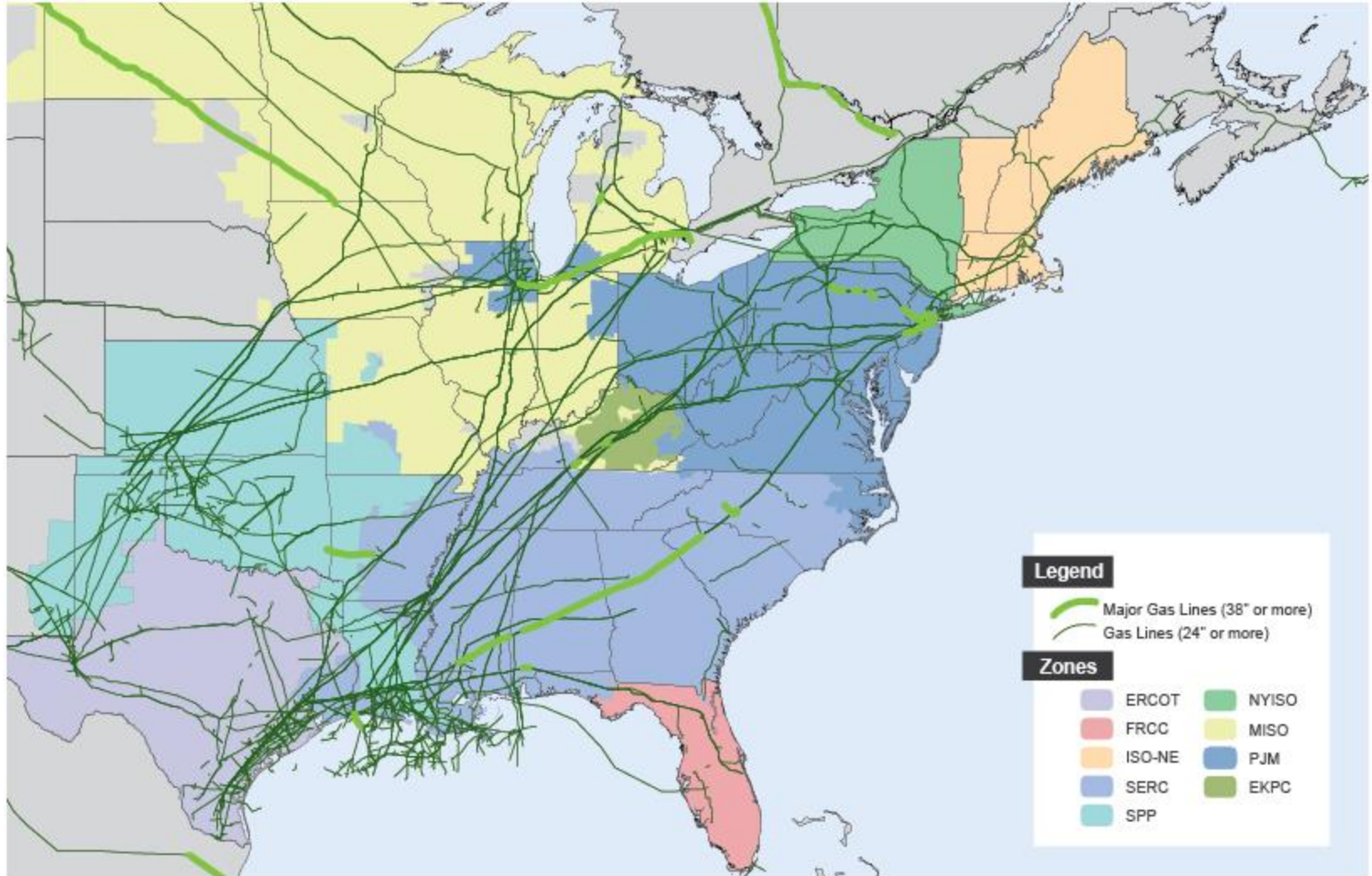


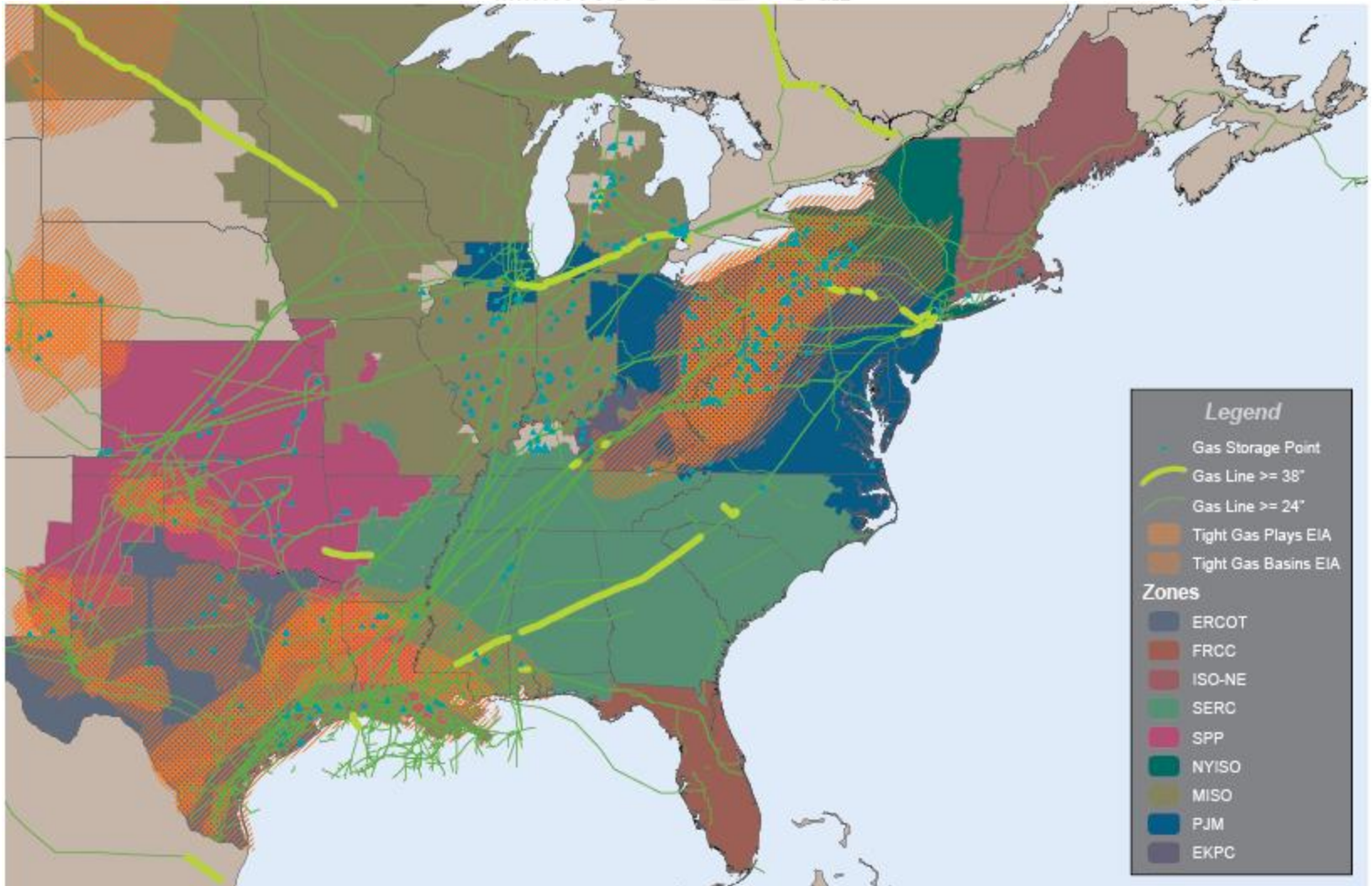
Source: IHS CERA.
20705-11

SHALE GAS!

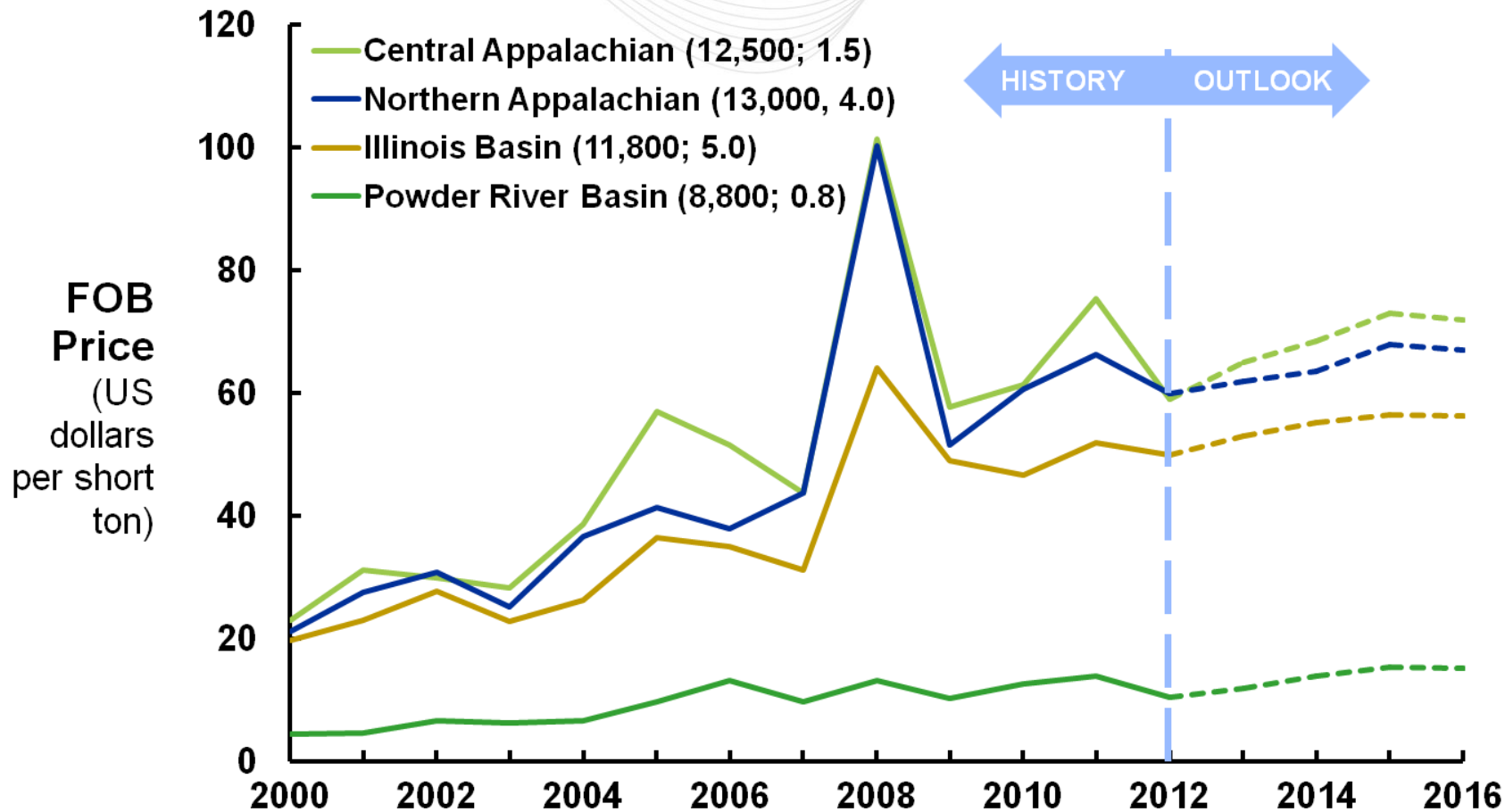
- Low commodity prices, translating to dramatically increased gas consumption for power generation—Marcellus is the cheapest gas in North America!





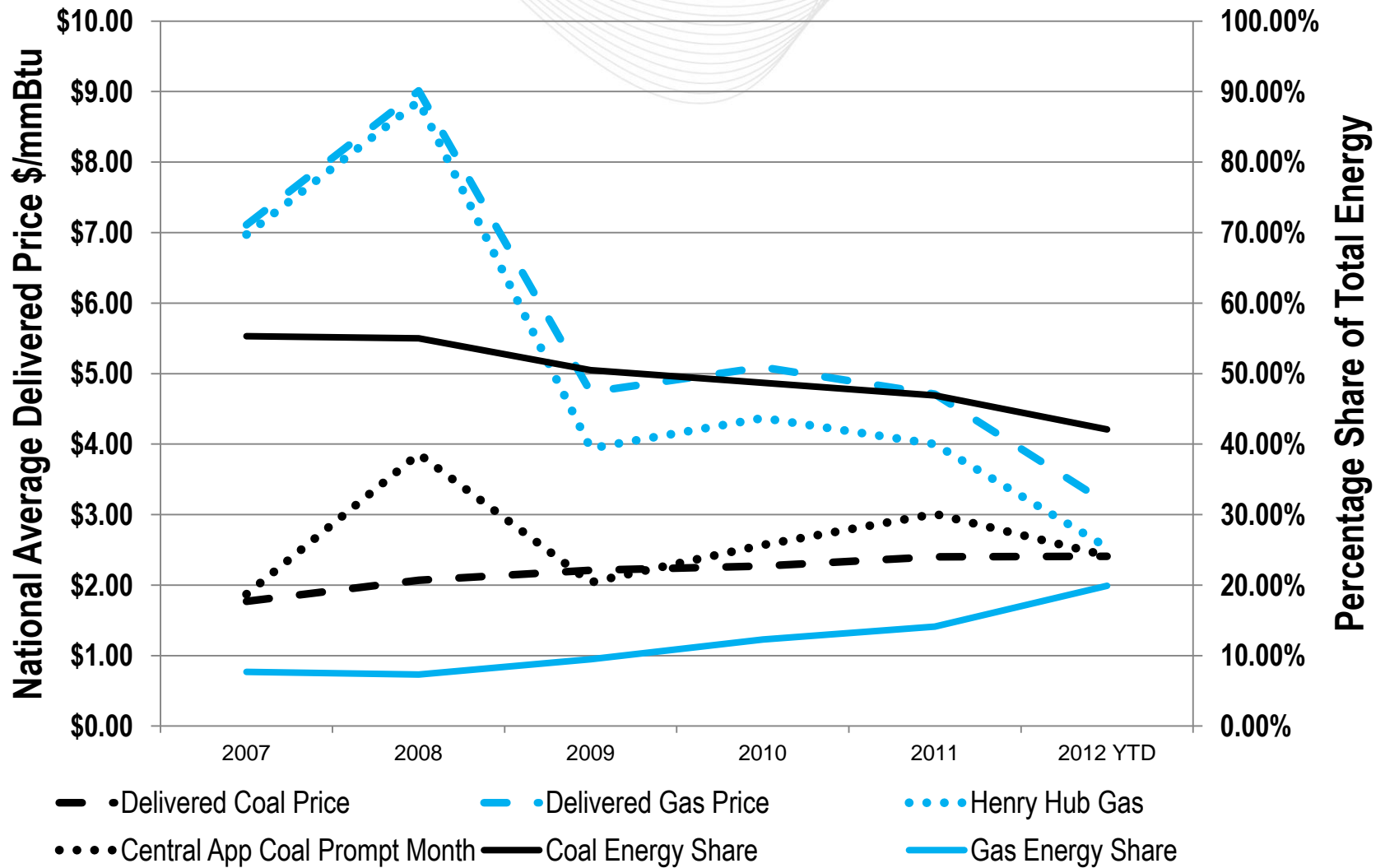


Trend of Increasing Coal Prices Forecast to Continue

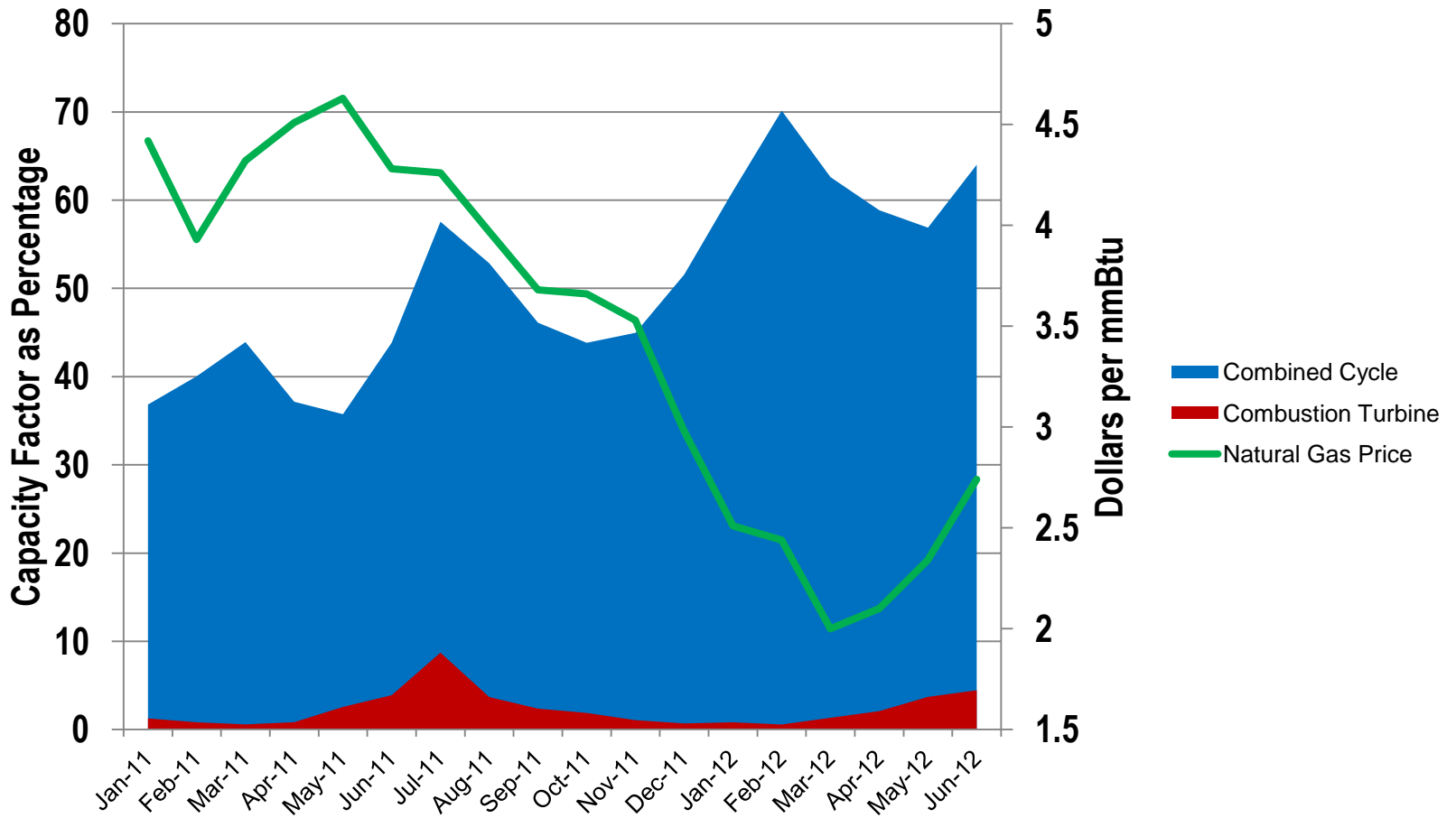


Source: IHS CERA, ICAP.
 Notes: (#;#) = (Btu per pound (lb); lbs sulfur dioxide (SO₂) per MMBtu. FOB = free on board.
 Historical data source: SNL Energy Coal Report

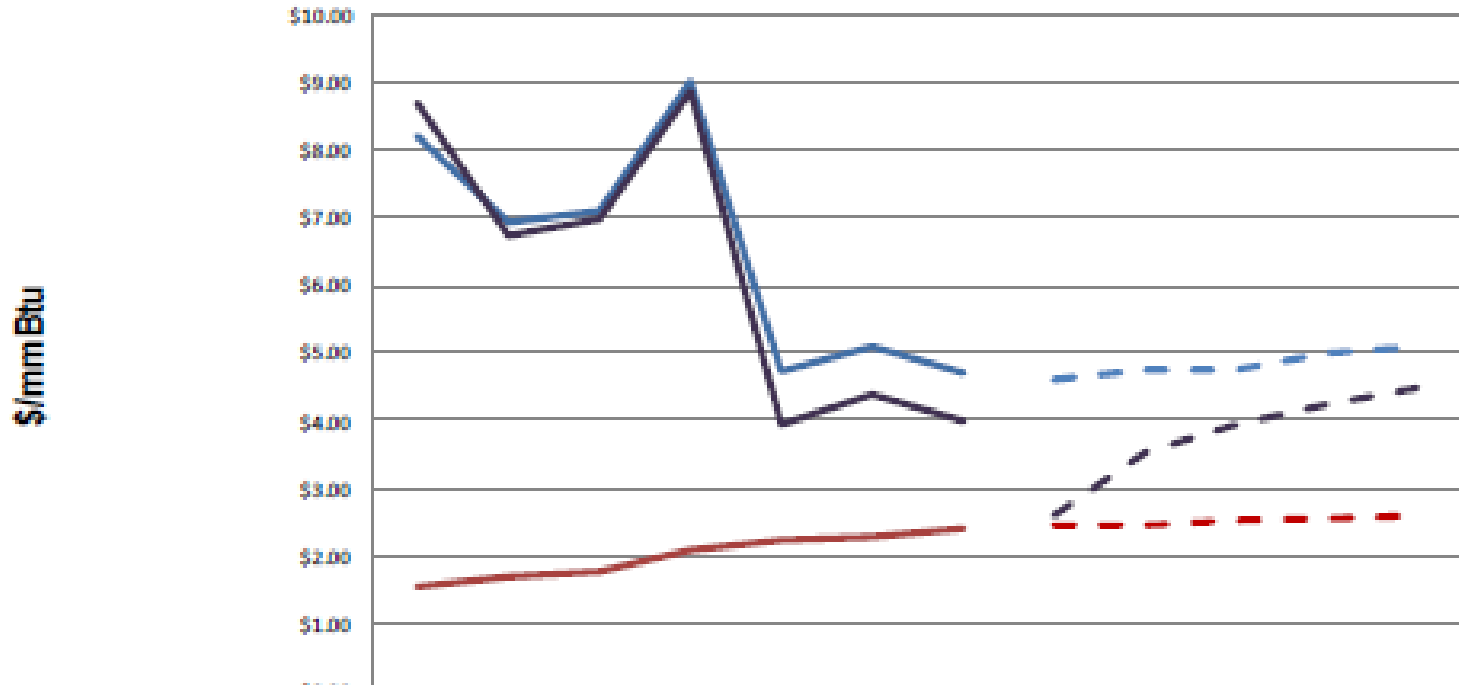
National Average Delivered Prices, Spot Prices, and Energy Shares of Coal and Natural Gas in PJM



Capacity Factors of Natural Gas Combined Cycle and Combustion Turbine Generation



Historic and Forecast National Delivered Prices of Natural Gas and Coal 2005-2016



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
— Natural Gas	\$8.21	\$6.94	\$7.11	\$9.01	\$4.74	\$5.09	\$4.71					
— Coal	\$1.54	\$1.69	\$1.77	\$2.07	\$2.22	\$2.27	\$2.40					
- - - AEO 2012 Forecast Natural Gas								\$4.60	\$4.76	\$4.75	\$5.00	\$5.10
- - - AEO 2012 Forecast Coal								\$2.45	\$2.46	\$2.51	\$2.54	\$2.59
— Historic Henry Hub Spot	\$8.69	\$6.73	\$6.97	\$8.86	\$3.94	\$4.37	\$4.00					
- - - Henry Hub Futures								\$2.59	\$3.53	\$3.96	\$4.24	\$4.49

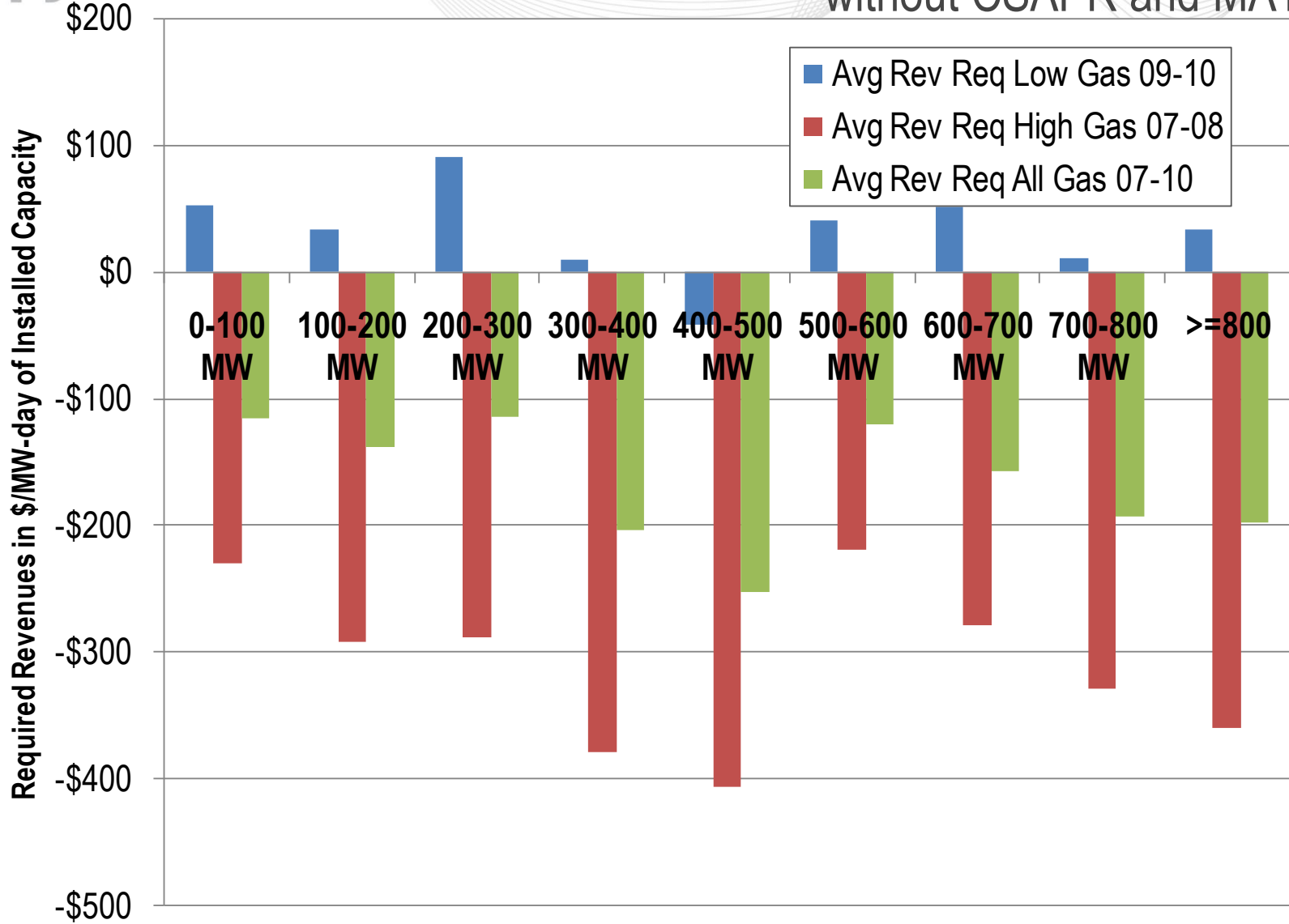
Historic LMP and LMP Futures 2005-2016



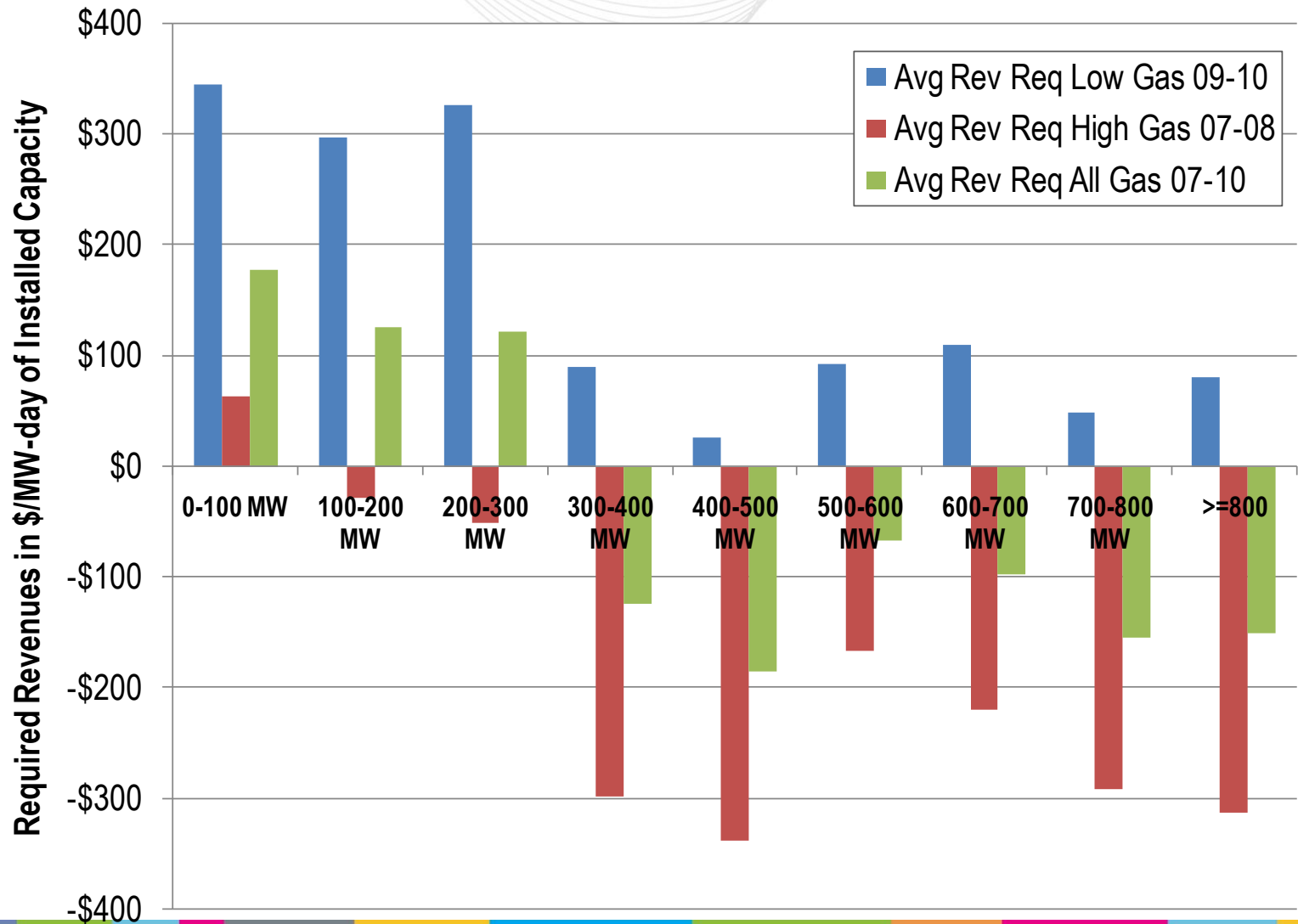
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Historic Load Weighted Average LMP	\$63.46	\$53.35	\$61.66	\$71.13	\$39.05	\$48.34	\$45.94					
NYMEX Western Hub DA Future								\$33.63	\$36.02	\$38.26	\$44.63	\$55.58

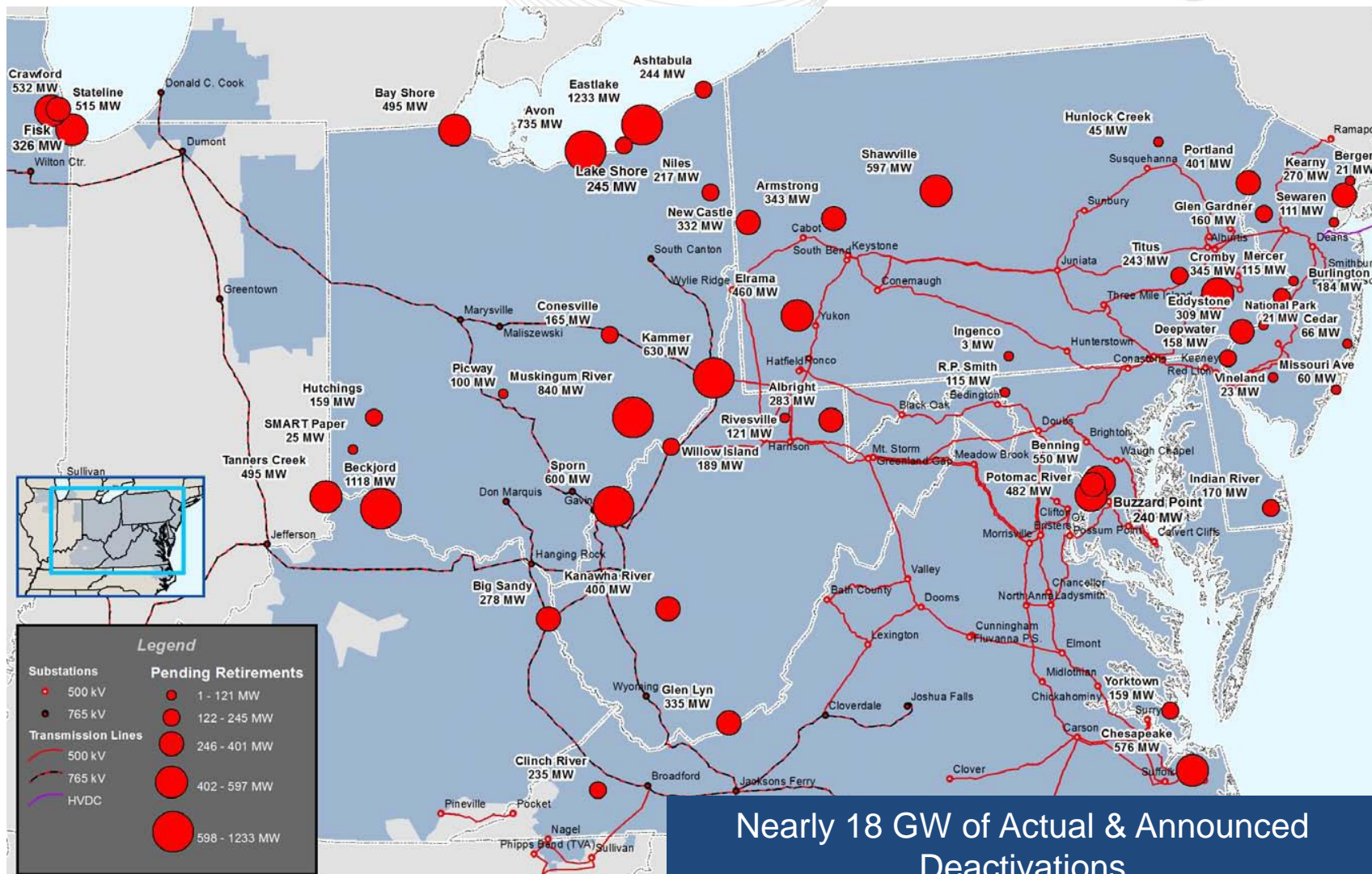
Unprecedented Change in Resource Mix and Capacity Prices

Necessary Revenue to Continue Operating without CSAPR and MATS

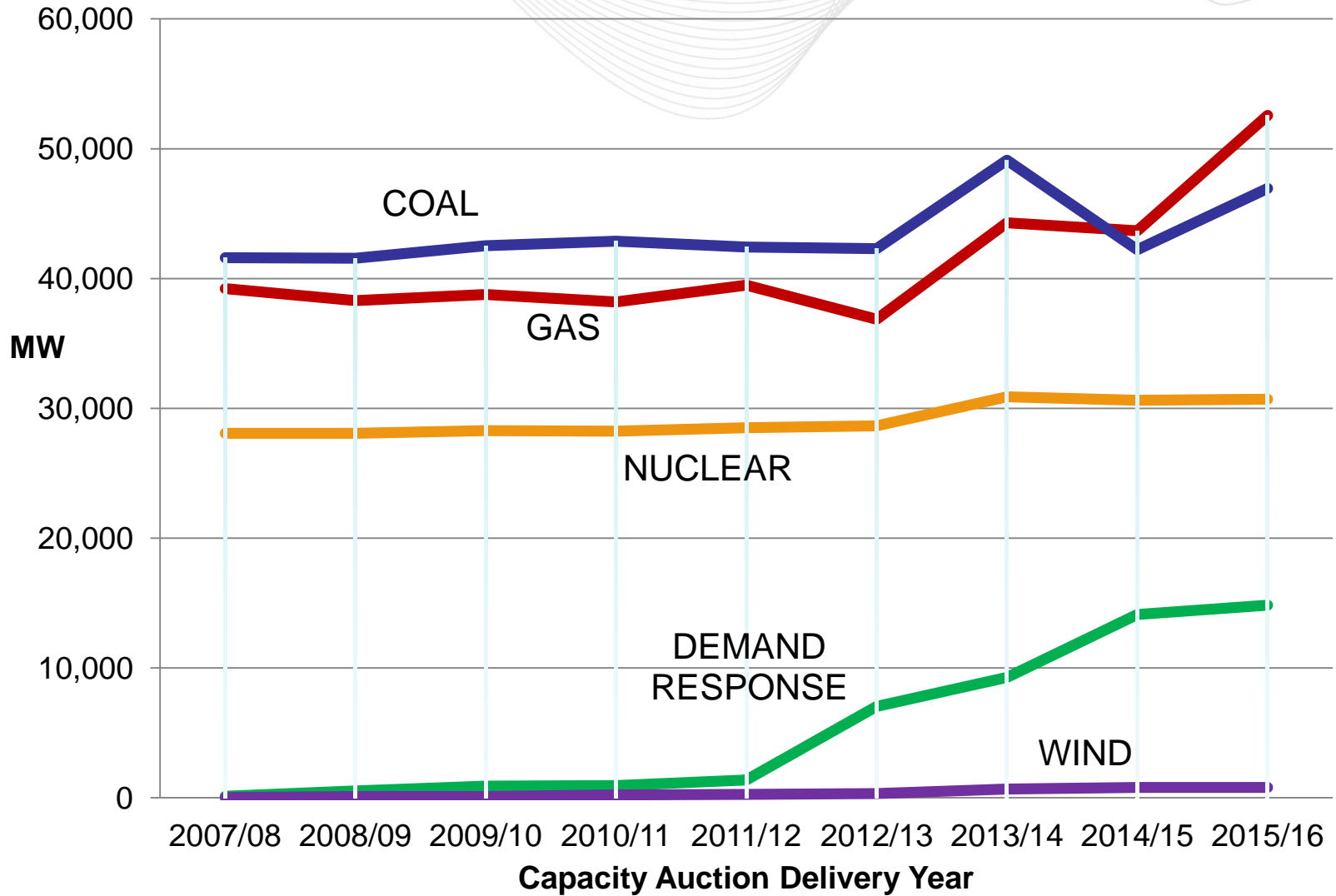


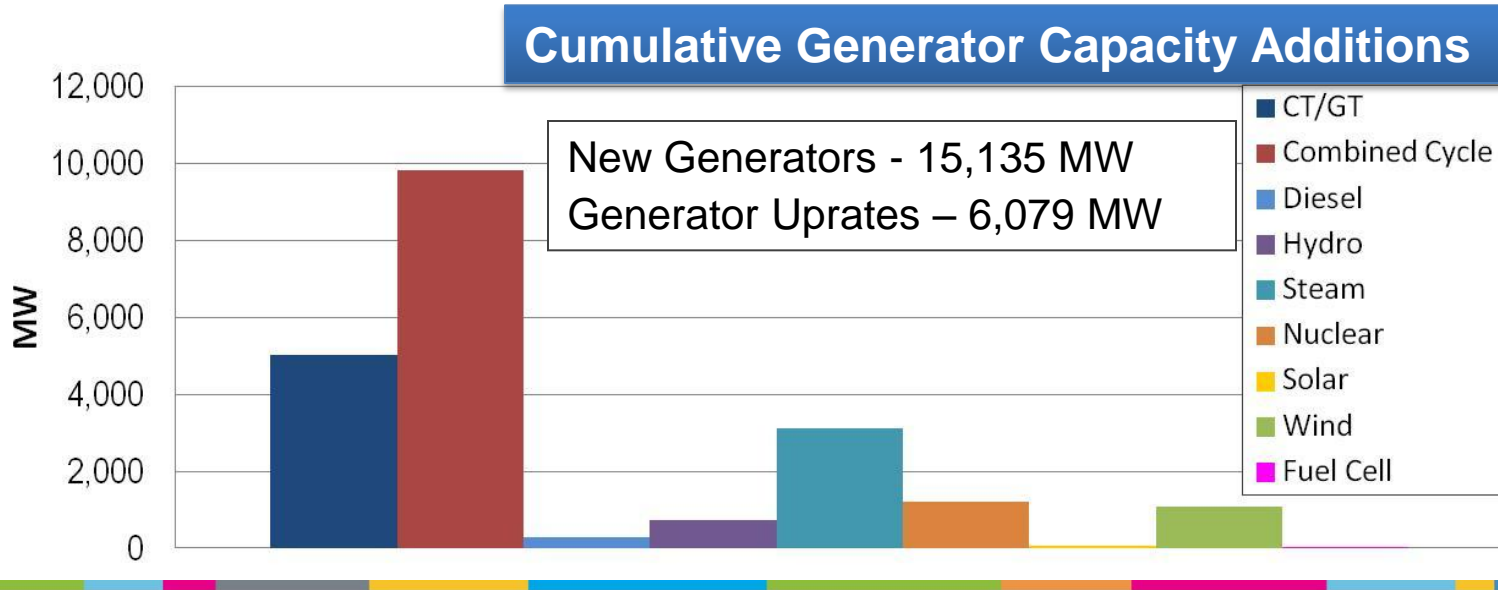
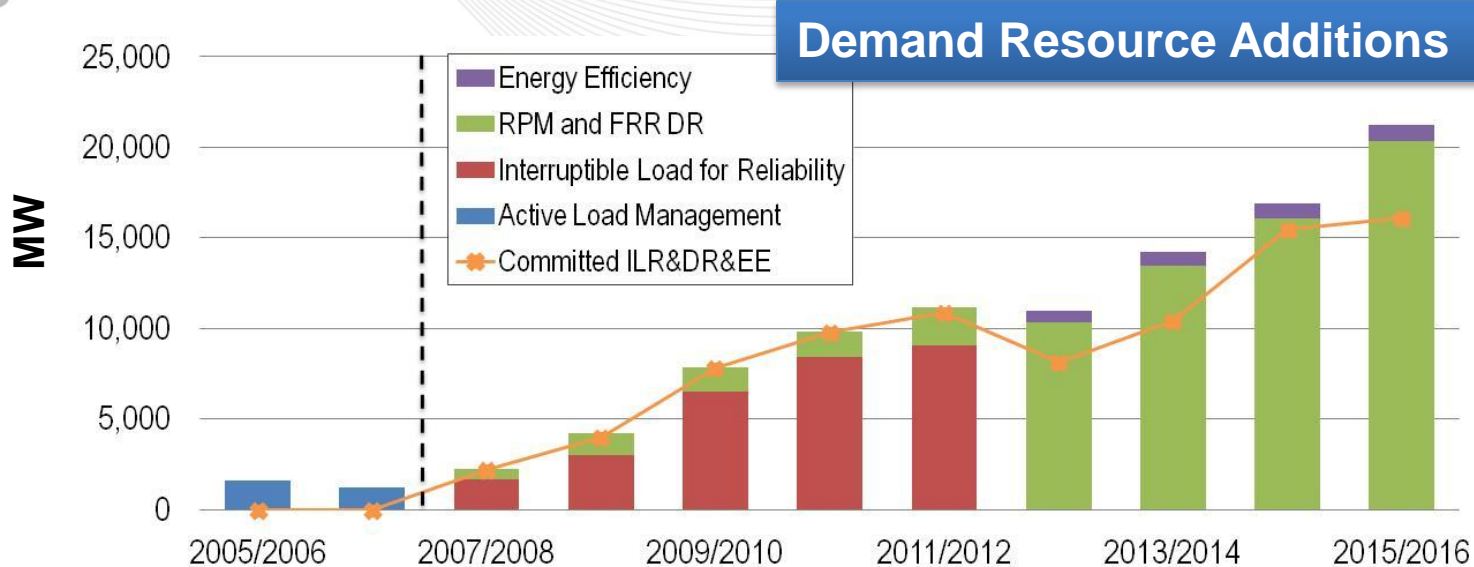
Necessary Revenue to Continue Operating under CSAPR and MATS



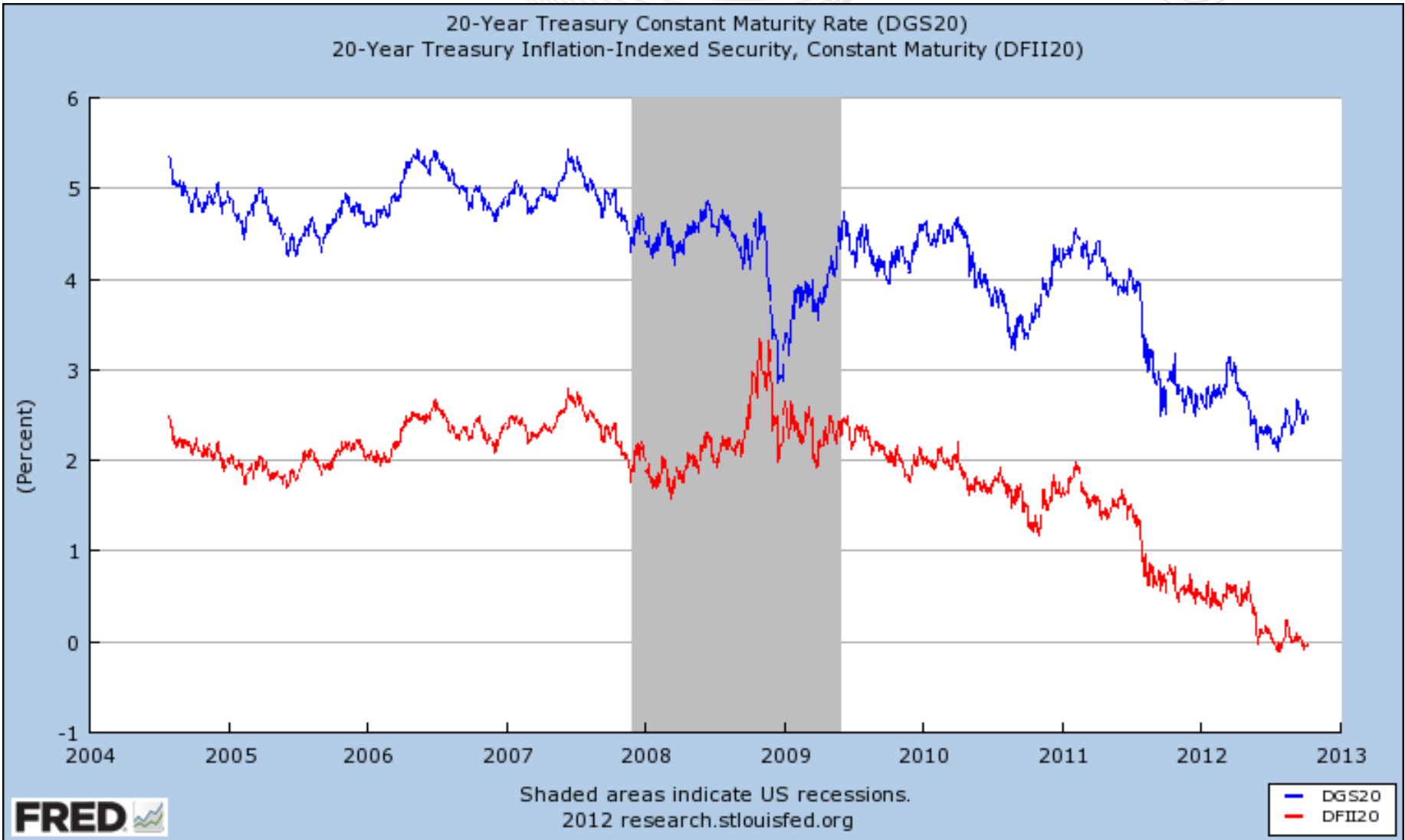


Evolving Resource Mix in the Capacity Market





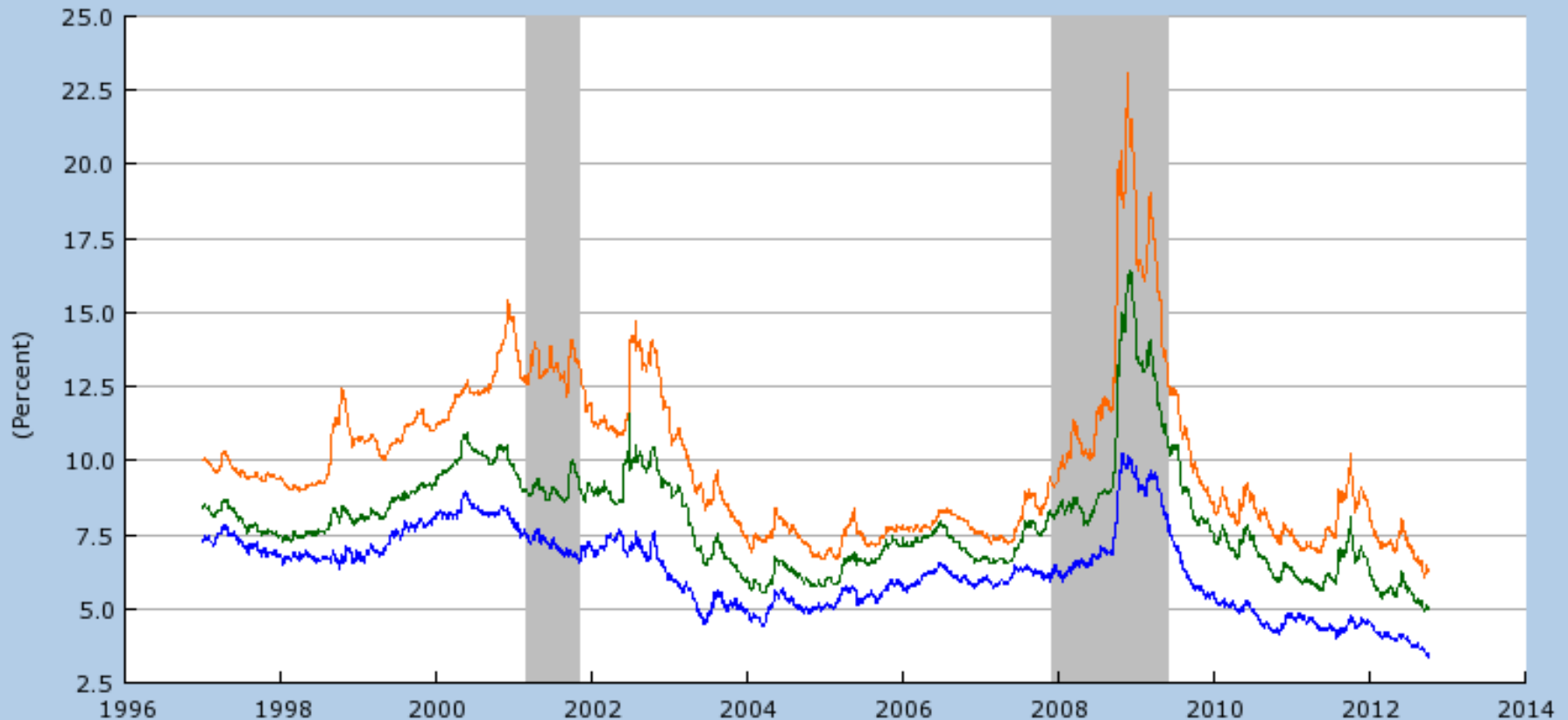
20 Year Treasury Bonds...Imply Lower Equity Returns To Induce New Investment



Corporate Bond Ratings: B, BB, BBB

Cost of Debt is at All-time Lows

BofA Merrill Lynch US Corporate BBB Effective Yield (BAMLC0A4CBBBEY)
 BofA Merrill Lynch US High Yield BB Effective Yield (BAMLH0A1HYBBEY)
 BofA Merrill Lynch US High Yield B Effective Yield (BAMLH0A2HYBEY)

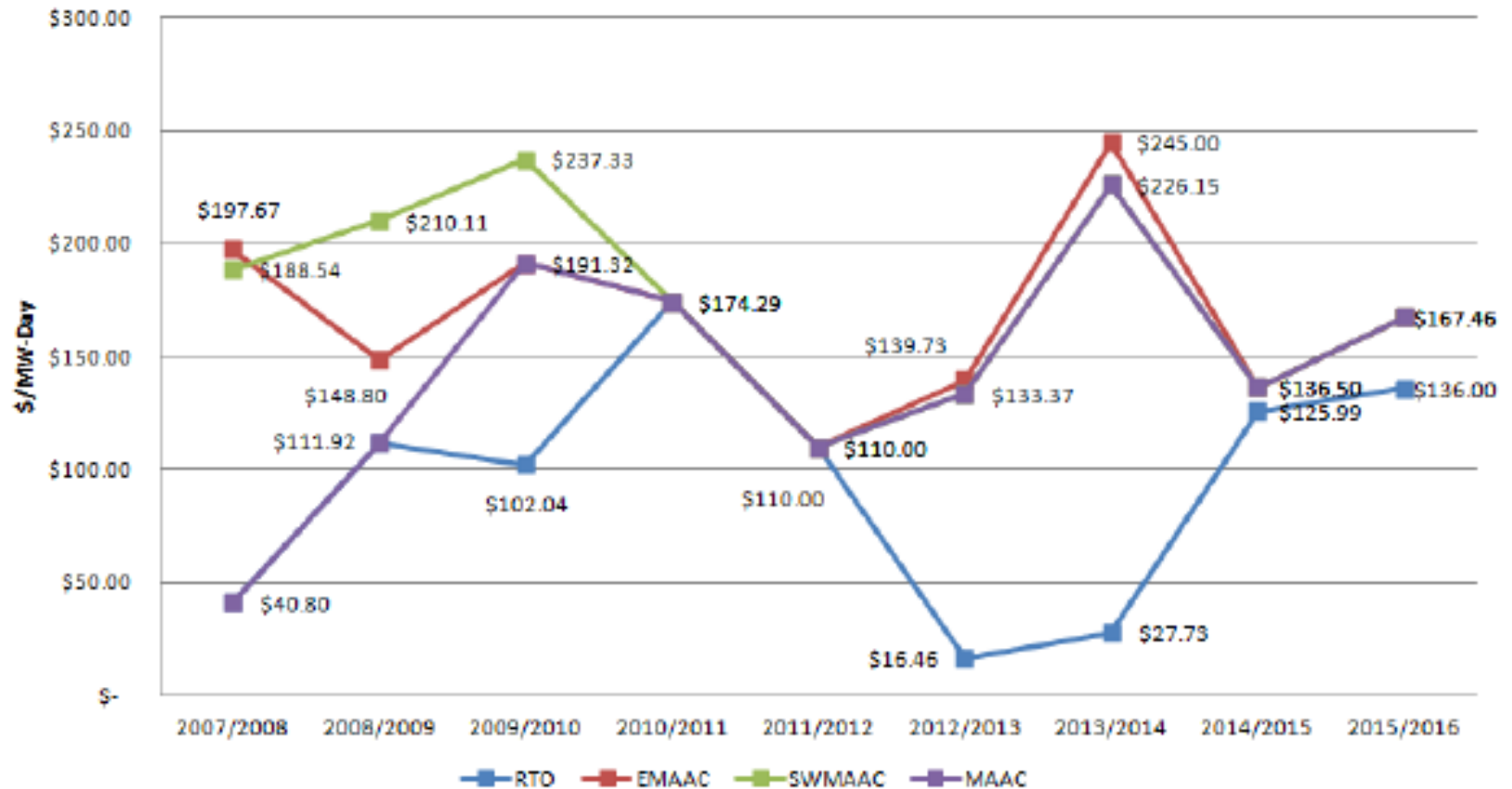


Shaded areas indicate US recessions.
 2012 research.stlouisfed.org

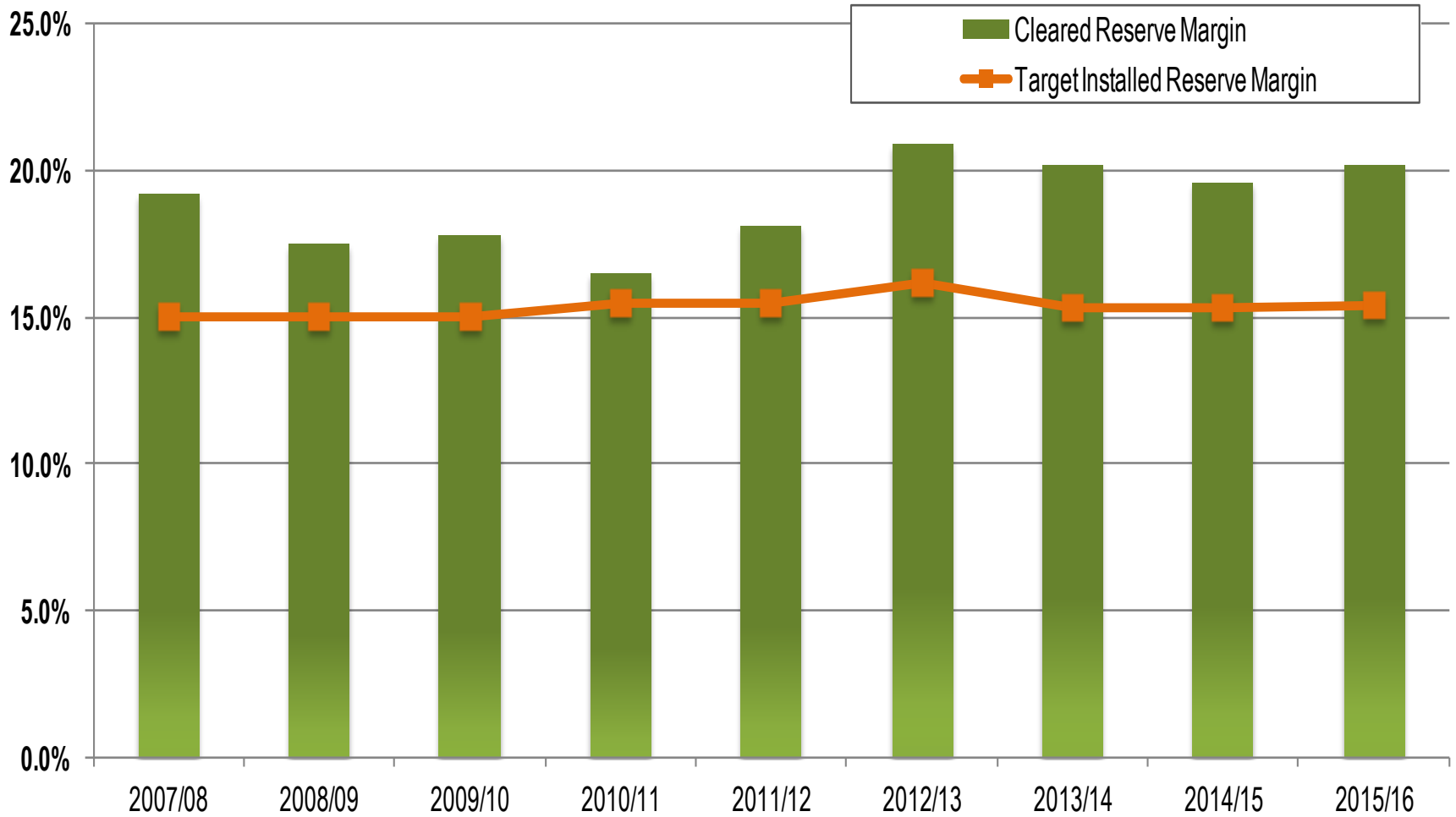
- BAMLC0A4CBBBEY
- BAMLH0A1HYBBEY
- BAMLH0A2HYBEY



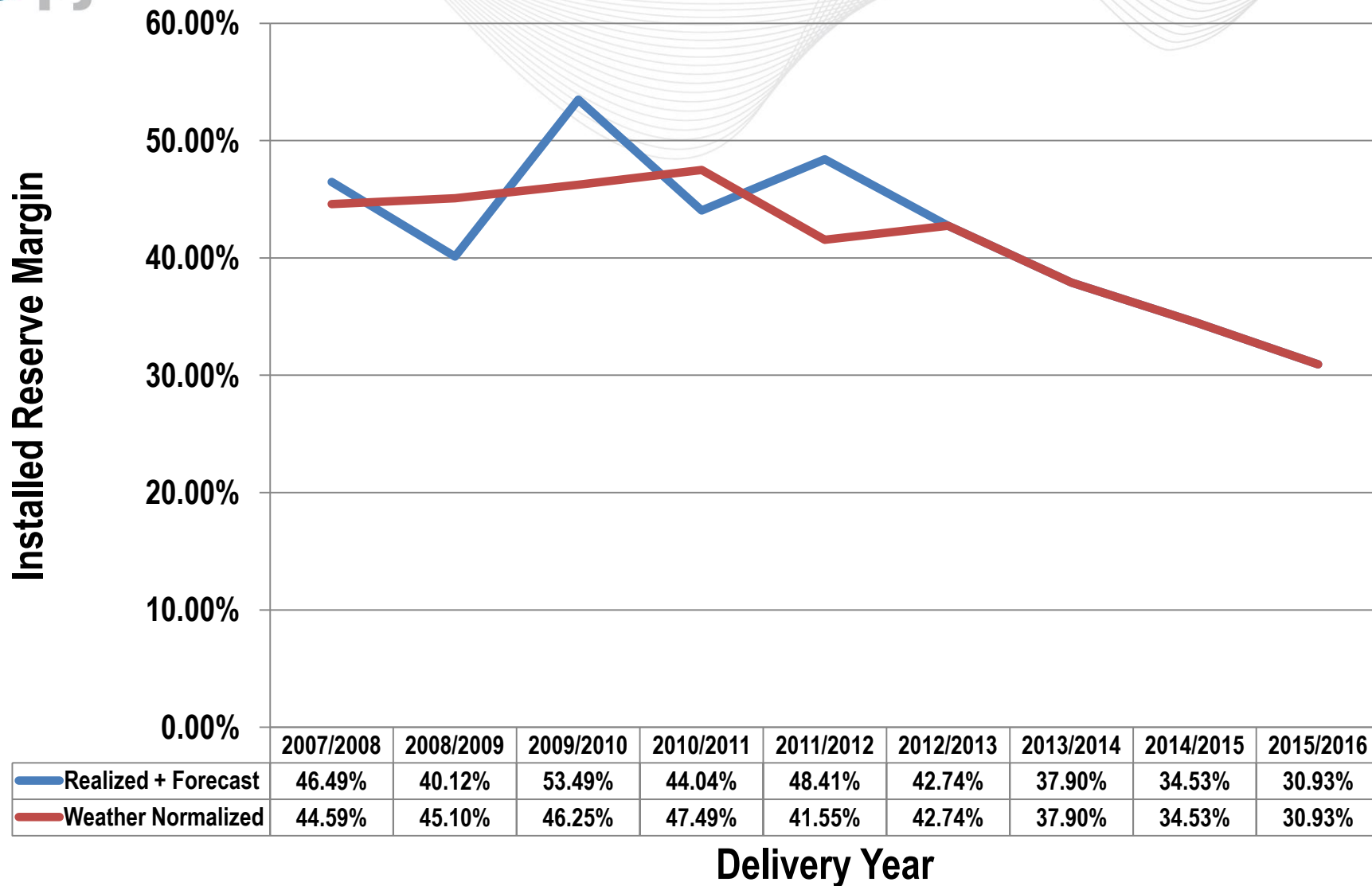
RPM Base Residual Auction Resource Clearing Prices (RCP)



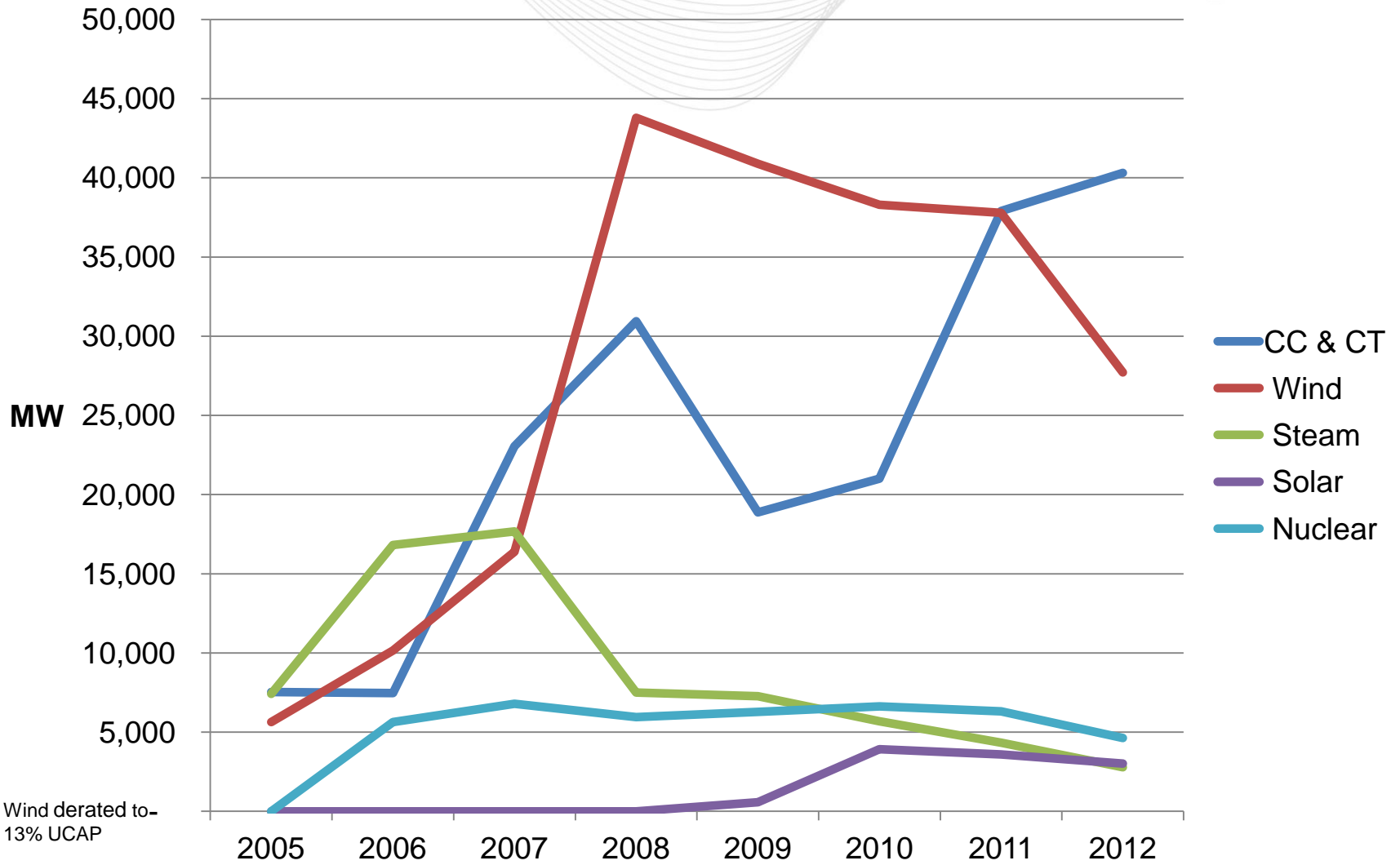
Maintaining Resource Adequacy over the Summer Peak



Winter Installed Reserve Margins in PJM



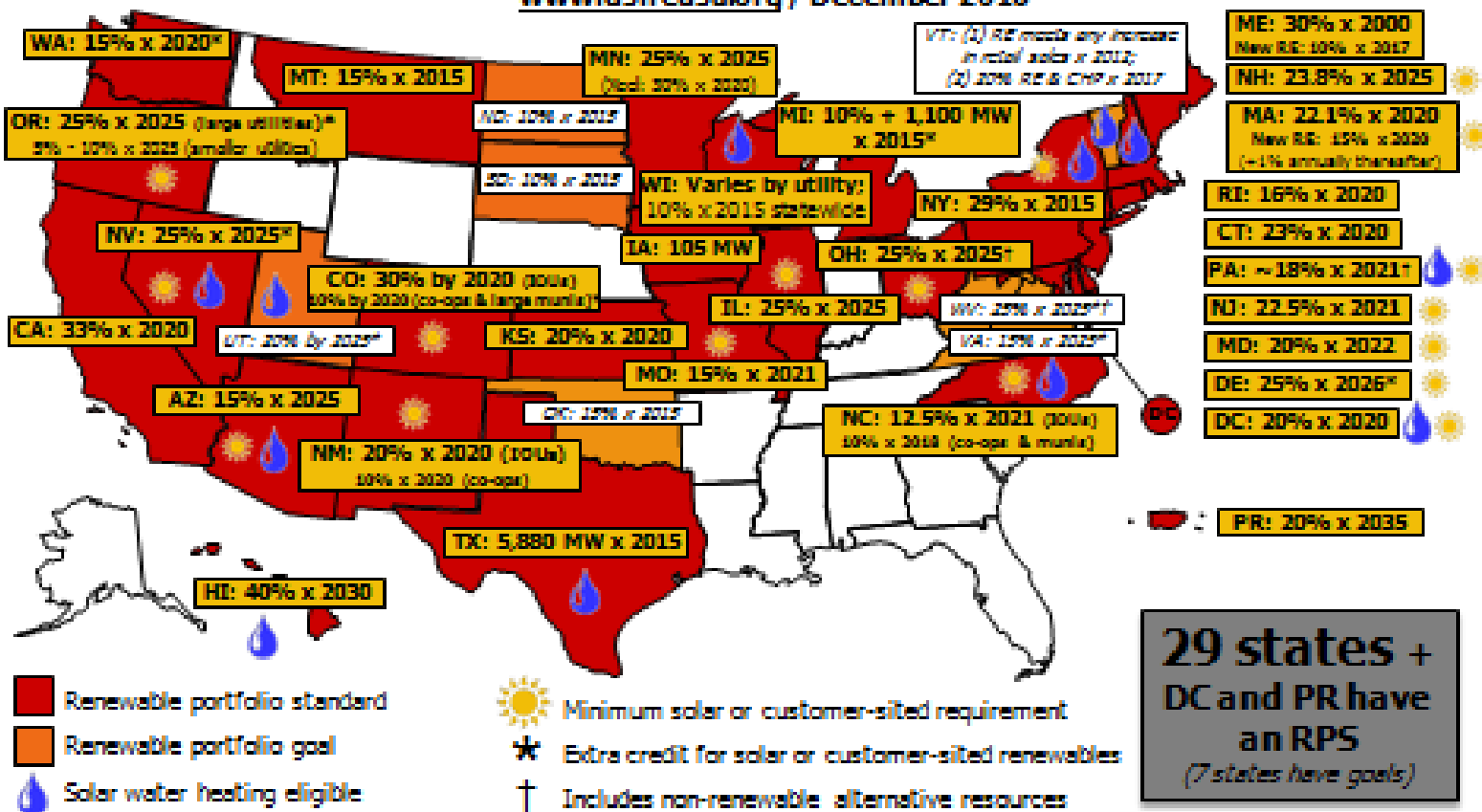
Natural Gas Generation in the Queue Doubles since 2010



Wind derated to-
13% UCAP

RPS Policies

www.dsireusa.org / December 2010



PJM's 2009 CO₂ whitepaper showed 15 GW of wind reduced LMP by \$5.00-\$5.50/MWh on average

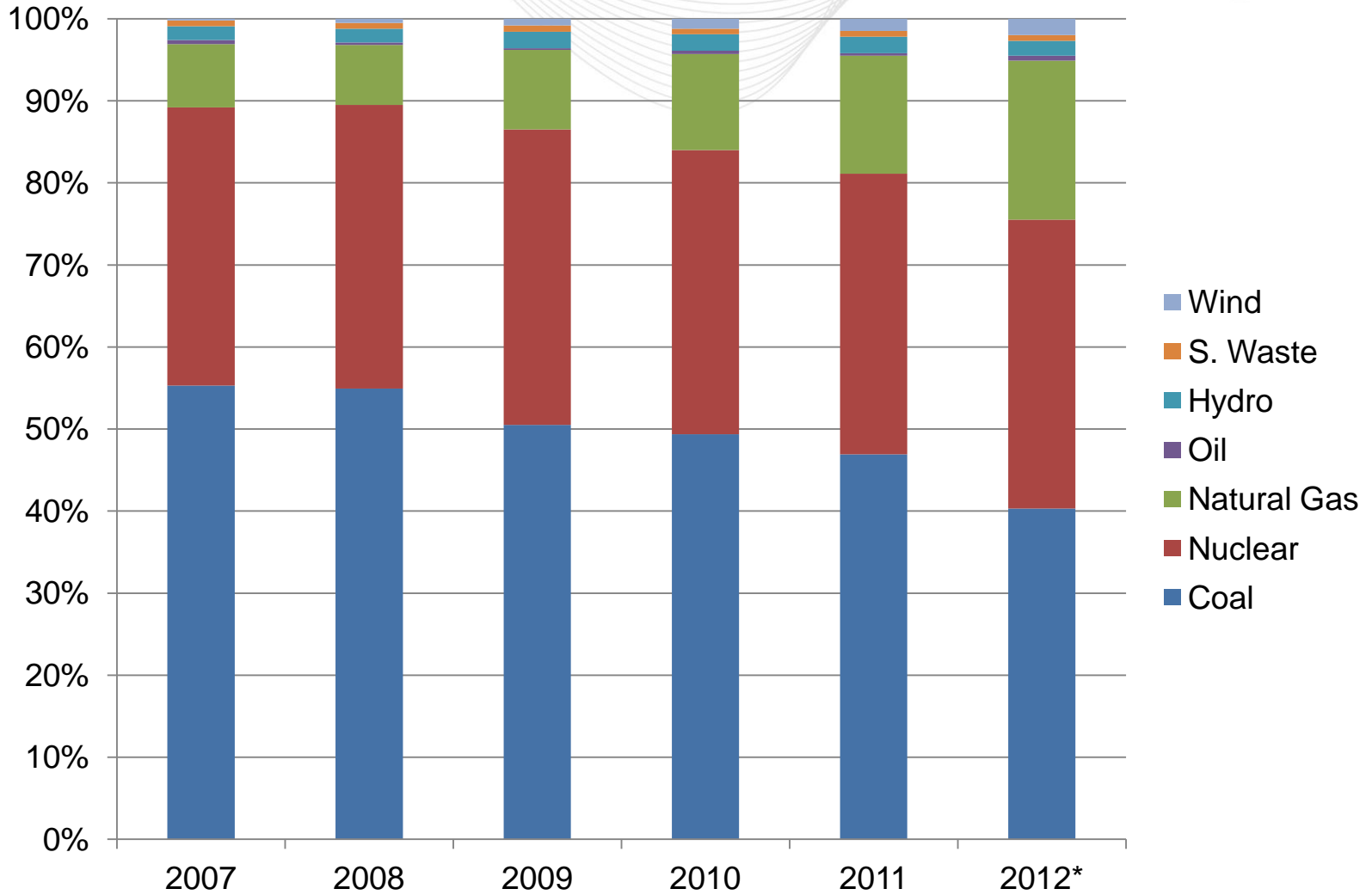
2026		
Target Installed Nameplate based on State Targets	Solar	11,000
	Wind	41,000
	Total	52,000
Forecast Restricted Demand** (2011 PJM Load Forecast)		172,904
Installed Reserve Margin		20%
Installed Capacity Needed		207,485
Installed Capacity Credit***	Solar	4,180
	Wind	6,150
	Total	10,330
Current Installed Capacity		185,544
Additional Non-Renewable Capacity Needed		11,611

* assuming 30% capacity factor for wind and 12% for solar

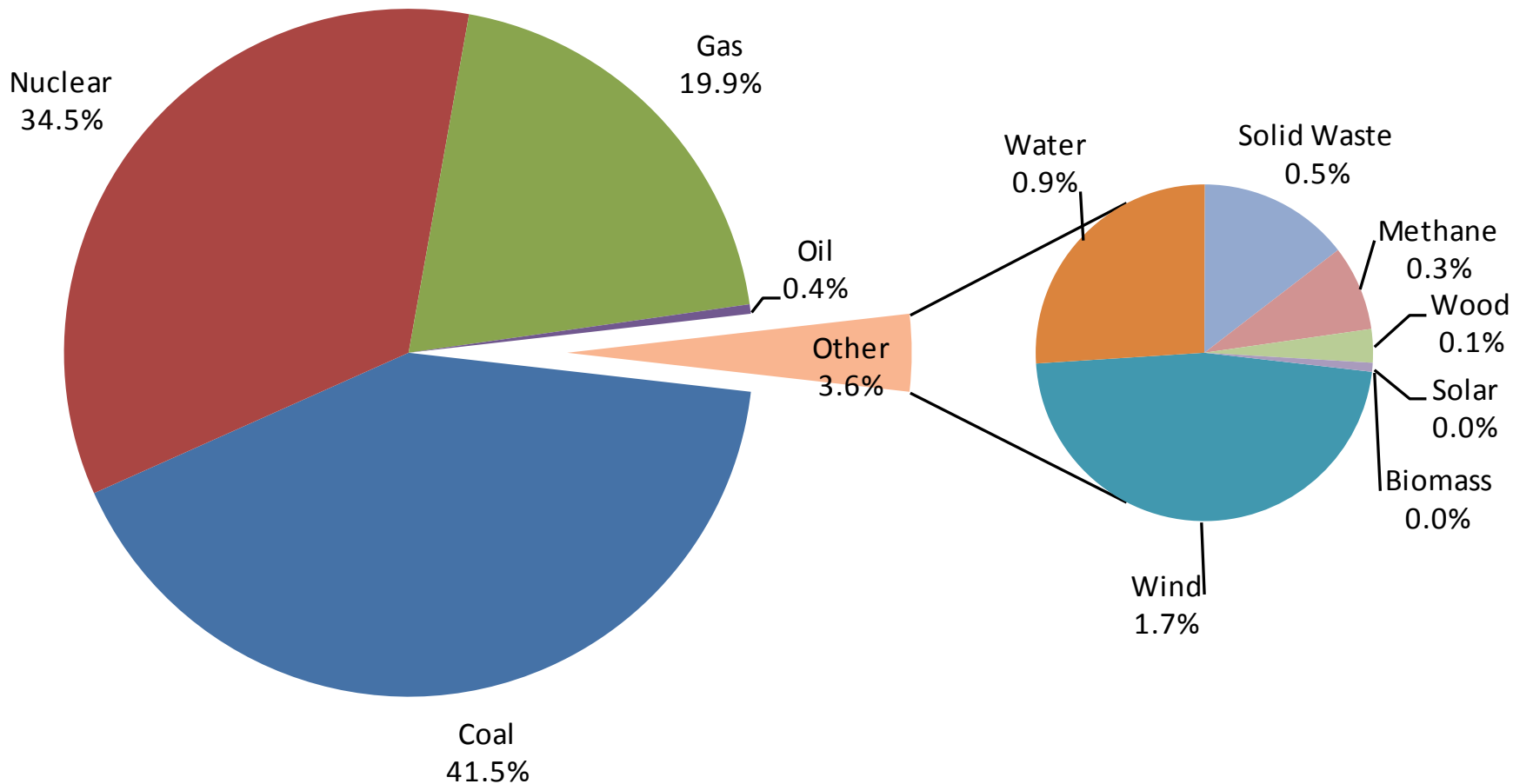
** assuming 10,000MW of DR

*** assuming capacity values at peak are 15% for wind and 38% for solar

Generation and Fuel Mix: In Transition



PJM Fuel Mix - 2012



- Natural gas comes to the fore
 - Increasing share of energy and capacity
- The rumors of coal's demise are greatly exaggerated
 - Even in the wake of EPA and state rules, nearly 60,000 MW of coal remains and it will continue to contribute the most to total energy
- Nuclear remains a solid contributor
- Demand Response is in part replacing retiring coal
 - Helping to maintain resource adequacy
 - Margins in winter declining but still double the target reserve margin
- If RPS remain in place, wind and solar will contribute increasing shares of energy.
 - To date this has been quite small