

Synapse
Energy Economics, Inc.

Do RTOs Need a Capacity Market?

ELCON Fall Workshop & State Industrial Group Meeting

October 25, 2011

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Topics Covered (not necessarily in order)

- The past vs. the future
 - What is Resource Adequacy today?
 - Capacity markets mismatch
- Environmental compliance planning and energy costs
- Flawed capacity market paradigm and its costs
- Alternatives

The Past vs. the Future

- Planning requirements with environmental regs, CO₂, RPS,...
- Average cost vs. marginal cost – where are we?
- Growing coordination – More opportunities, including opportunity for conflict
- Portfolios vs. individual assets
- Load growth and environmental constraints

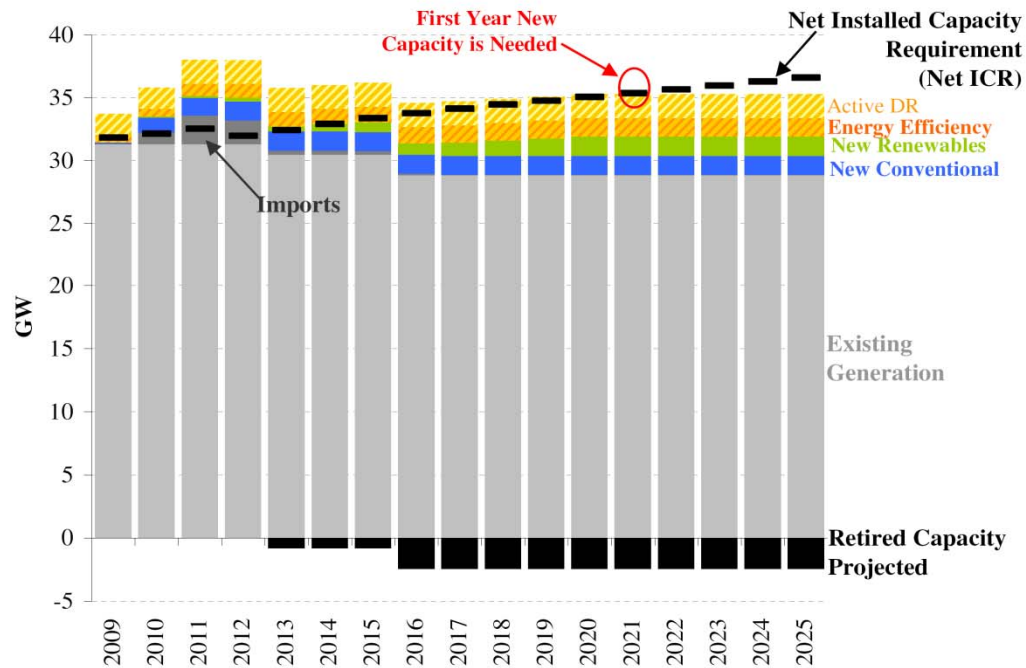


Some things have not changed...

- Capital-intensive nature of electric sector investments
- Requirement for access to fuel, natural resources, and transmission
- Siting constraints
- Profit motive
- Benefits of demand resources

Capacity Markets Context

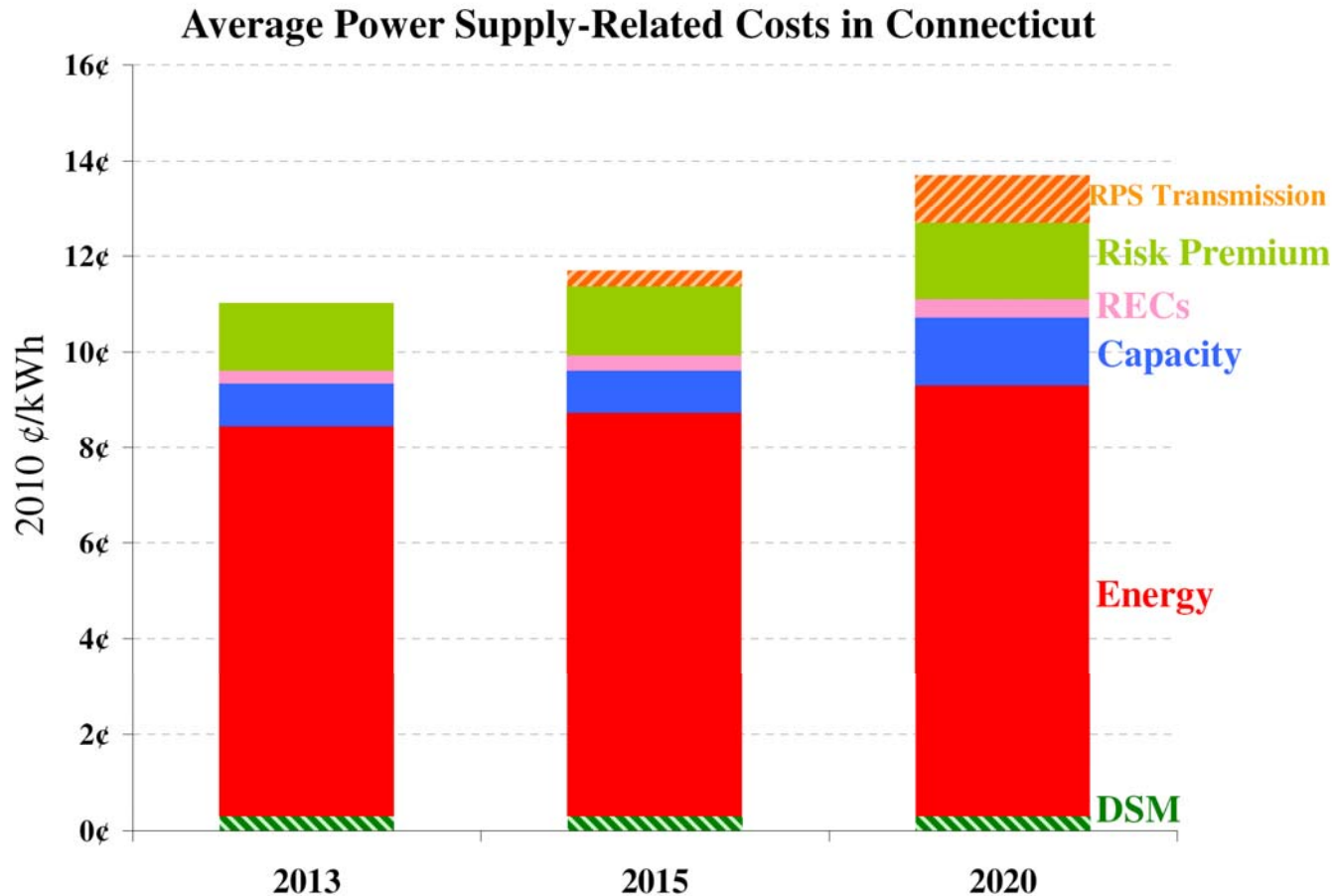
ISO-NE Supply-Demand Balance from 2010 CT IRP



The Brattle Group

Source: "Integrated Resource Planning in Restructured States", Presentation by Sam Newell of the Brattle Group, EUCI Conference, October 17, 2011

Capacity Markets Context

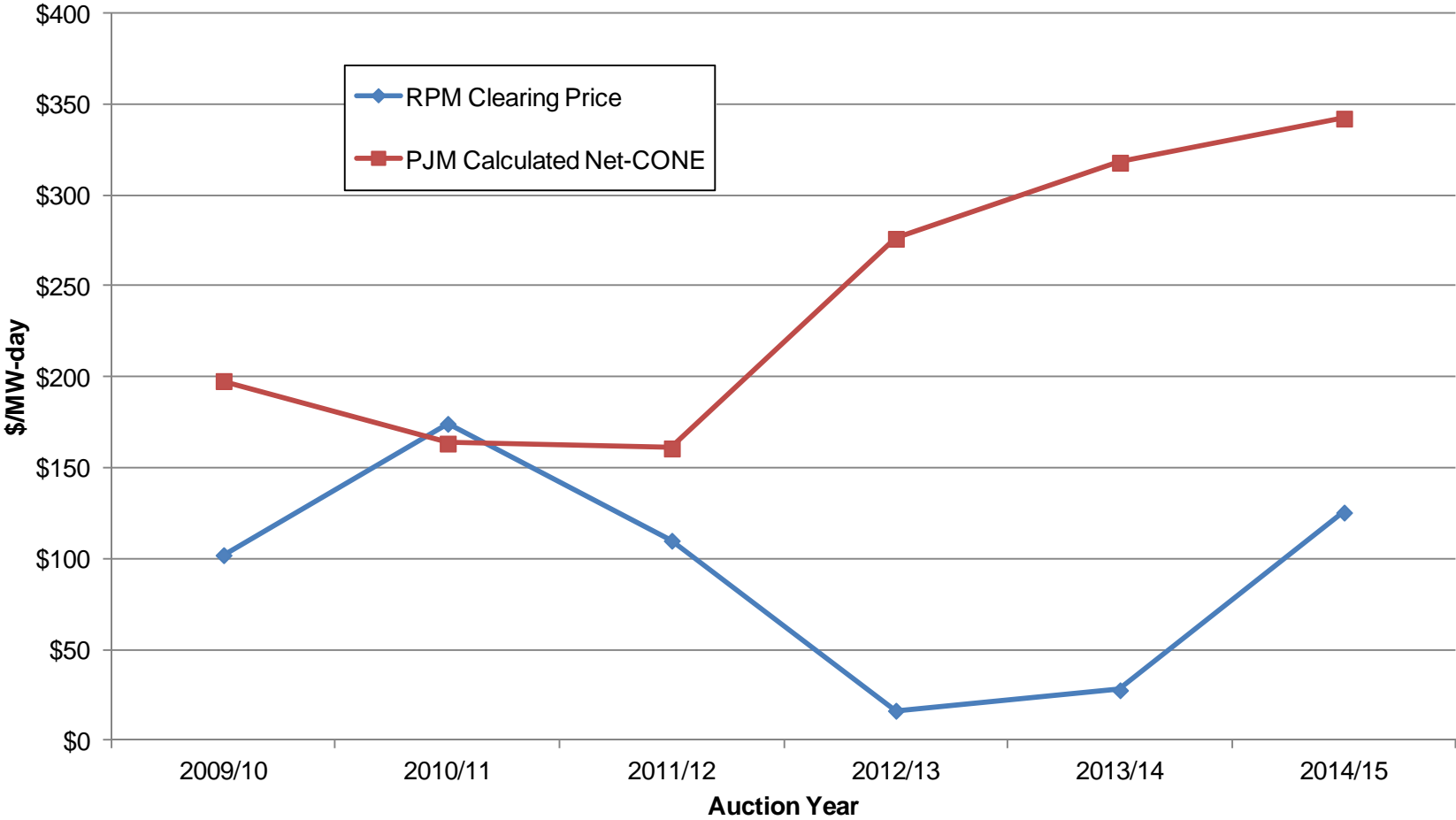


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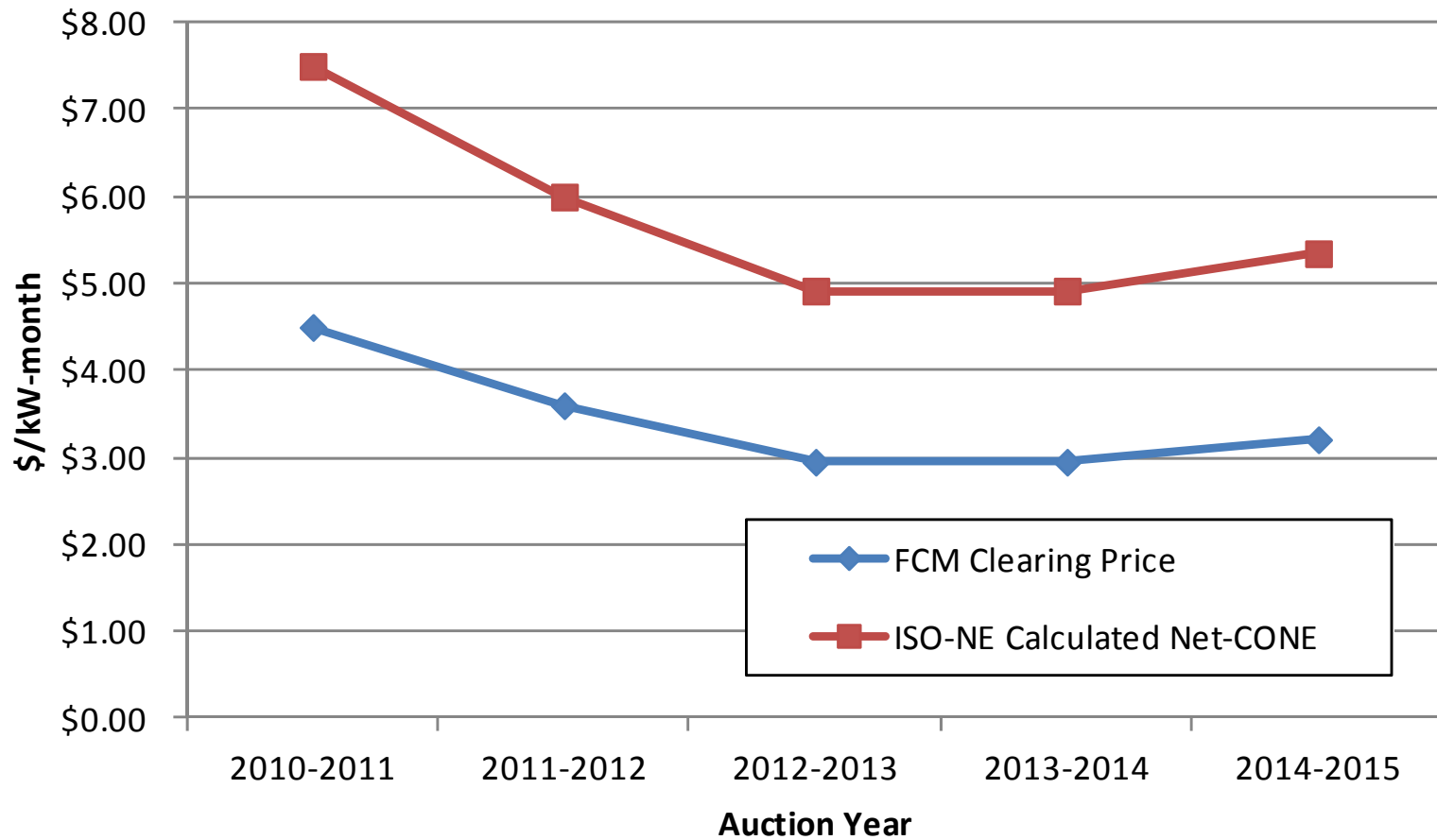
Capacity Markets Context

- Capacity prices were expected to typically be around a generator's net Cost of New Entry (net-CONE)
 - When capacity prices rise above net-CONE, developers should see that as a signal to invest in new generation
 - Prices below net-CONE indicate oversupply
- Capacity prices remain well below net-CONE in all three capacity markets

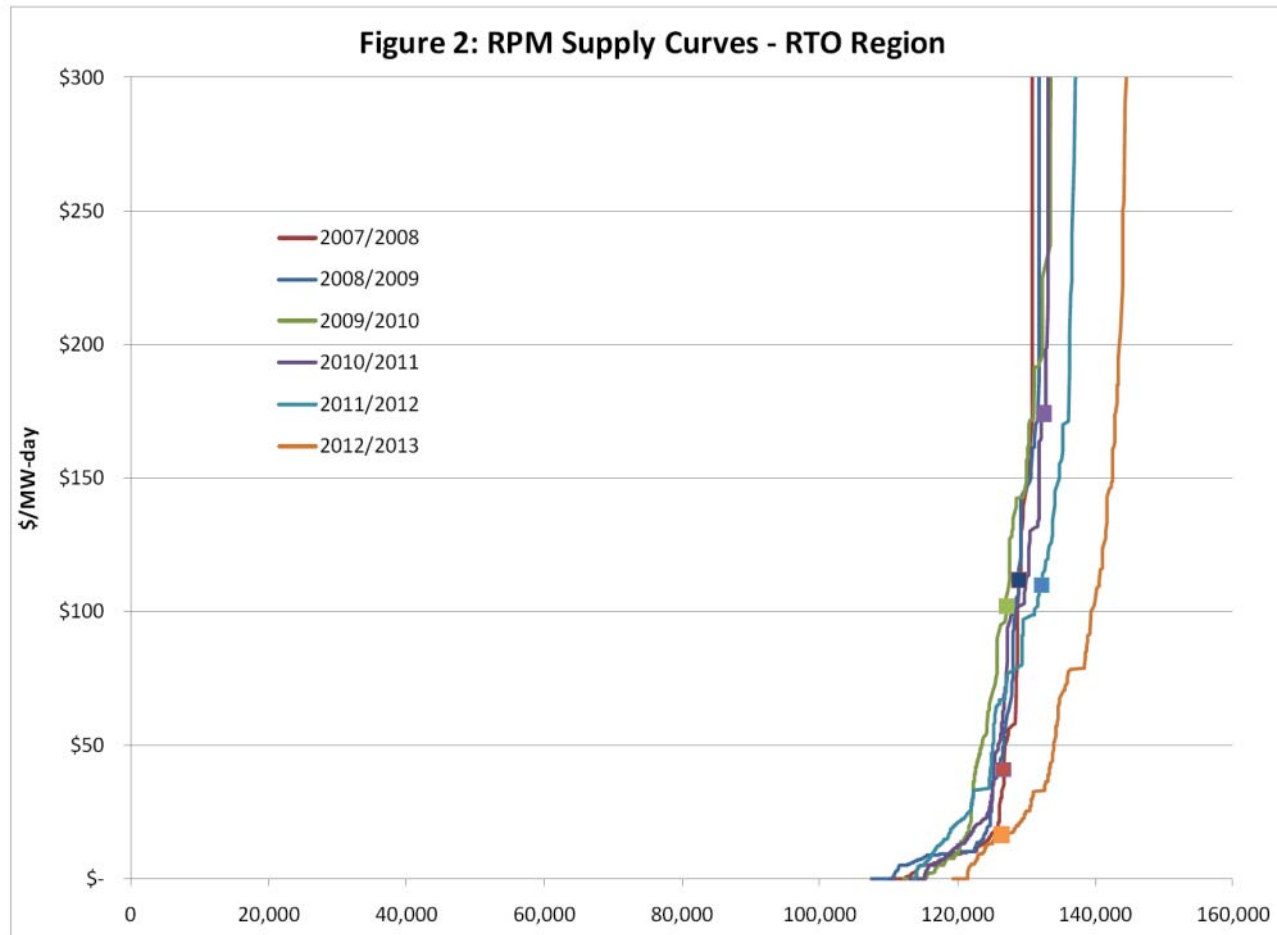
Capacity Markets Context



Capacity Markets Context



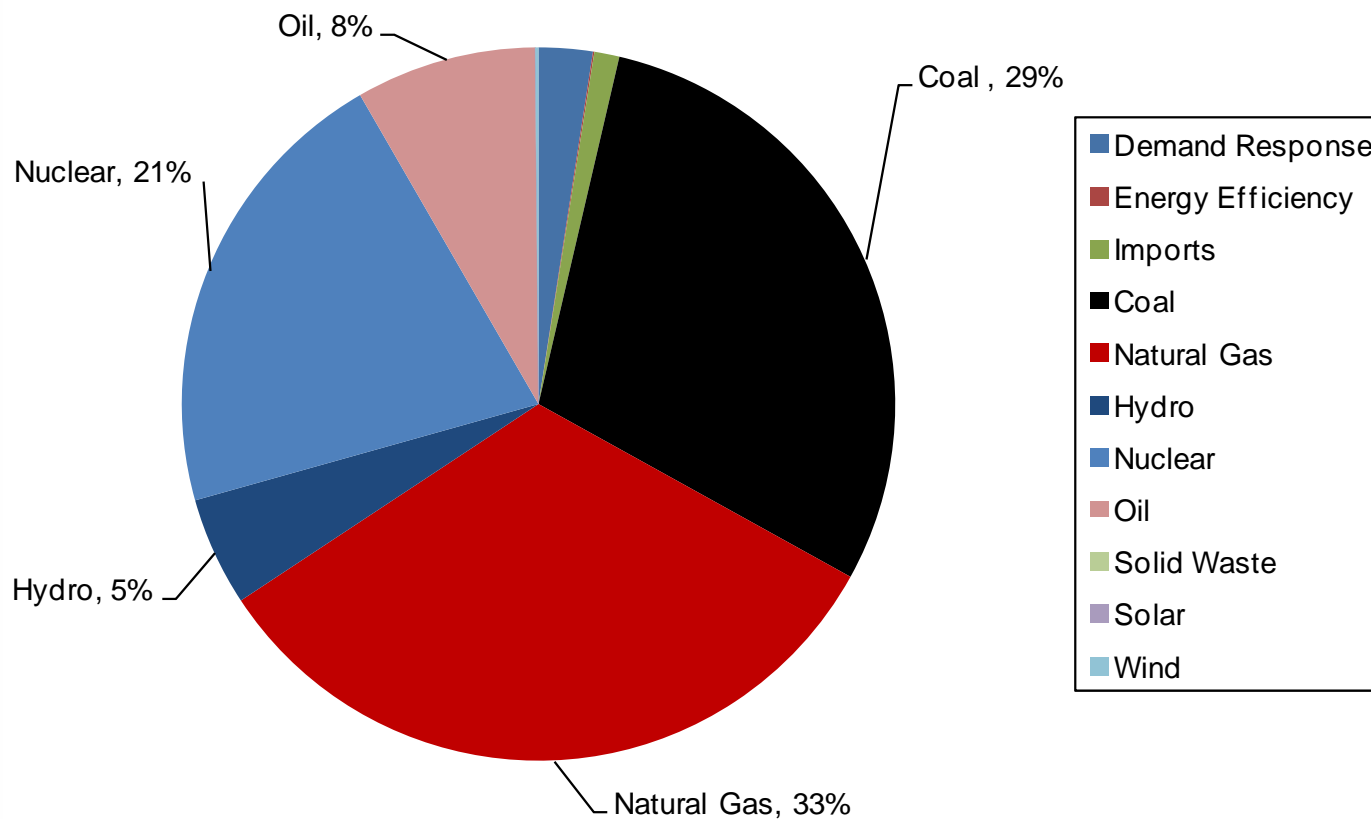
Capacity Markets Context



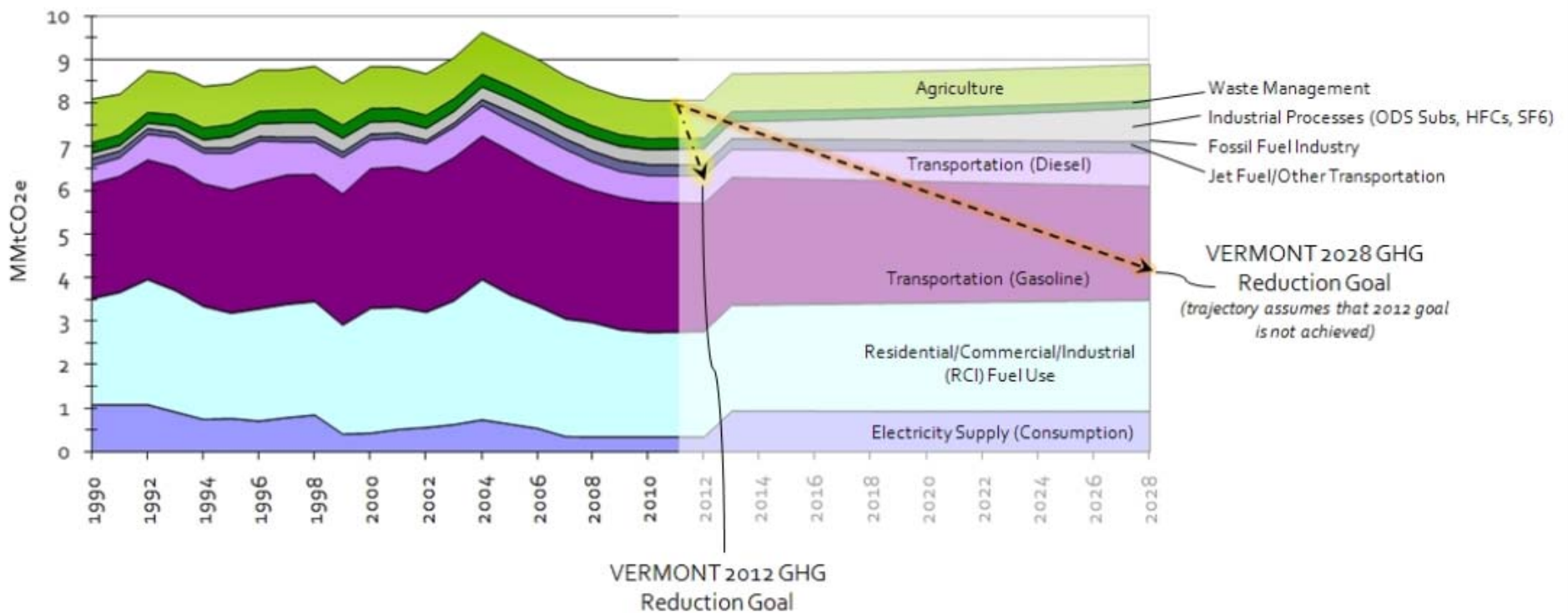
Source: James F. Wilson, Wilson Energy Economics, "Forward Capacity Market CONEfusion", June 2010.

Capacity Markets Context

In PJM, most of the capacity market revenues go to baseload generators.



Vermont's Historical GHG Emissions, GHG Reduction Goals, and Draft Forecast of Future GHG Emissions



Source: Vermont Department of Public Service. *Vermont Comprehensive Energy Plan 2011: Facts, Analysis and Recommendations, Volume 2*. Public Review Draft. Page 14, Exhibit 1-1. 2011.

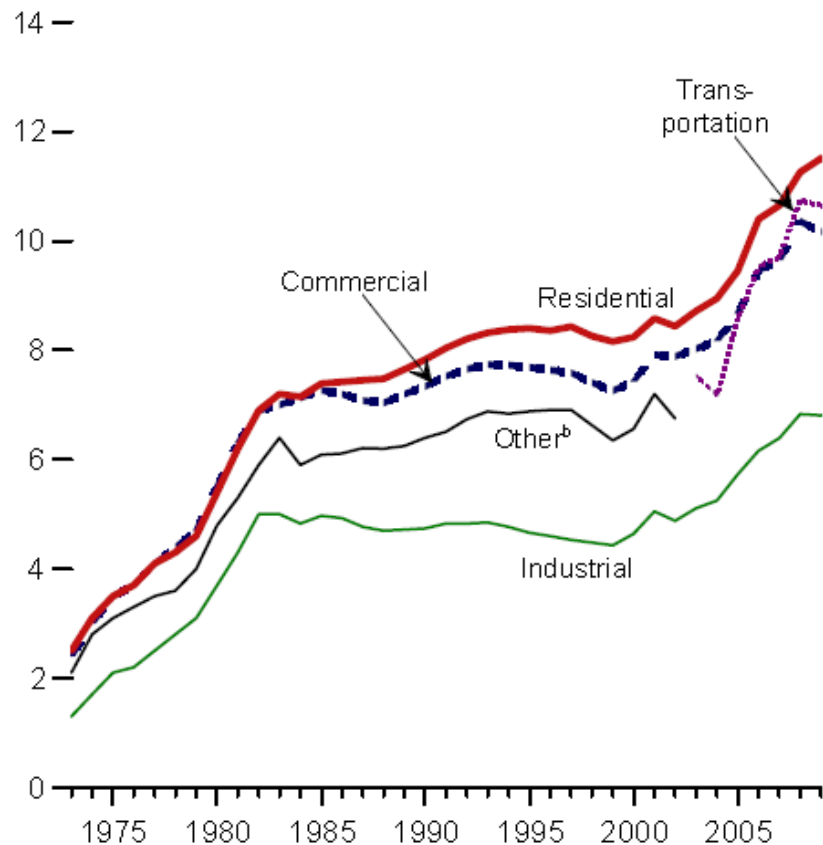
Existing electrical generating capacity by fuel type



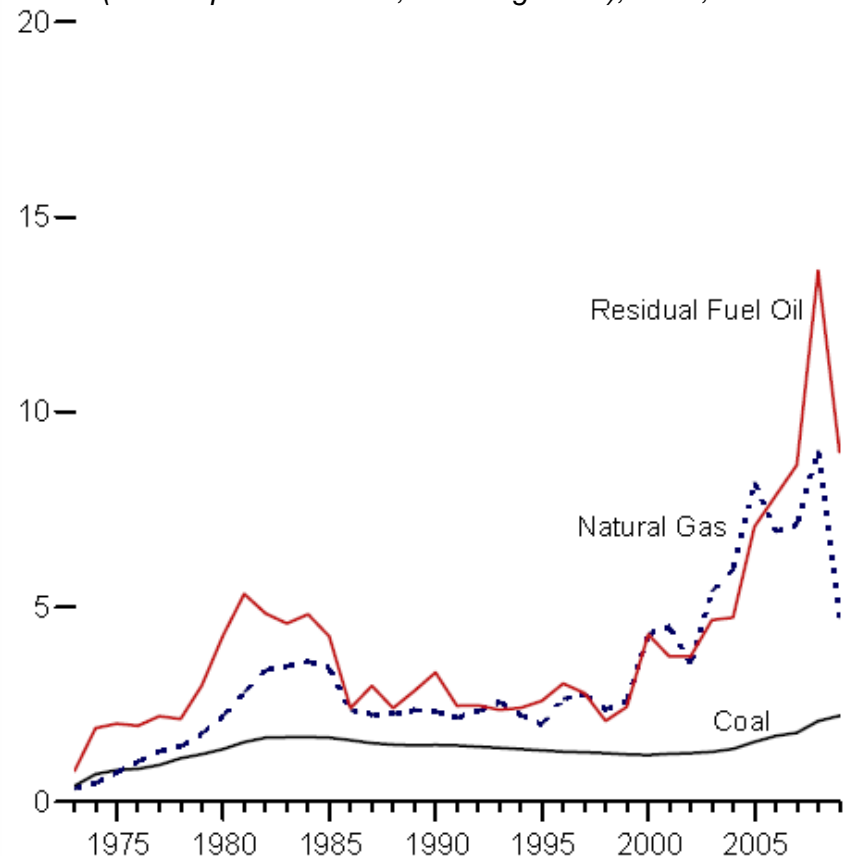
Source: EIA Form 860 2009

Average Retail Prices of Electricity (left) and Cost of Fossil Fuel Receipts at Electric Generating Plants (right)

Average Retail Prices of Electricity
(Cents per kilowatthour), by sector, 1973 – 2010

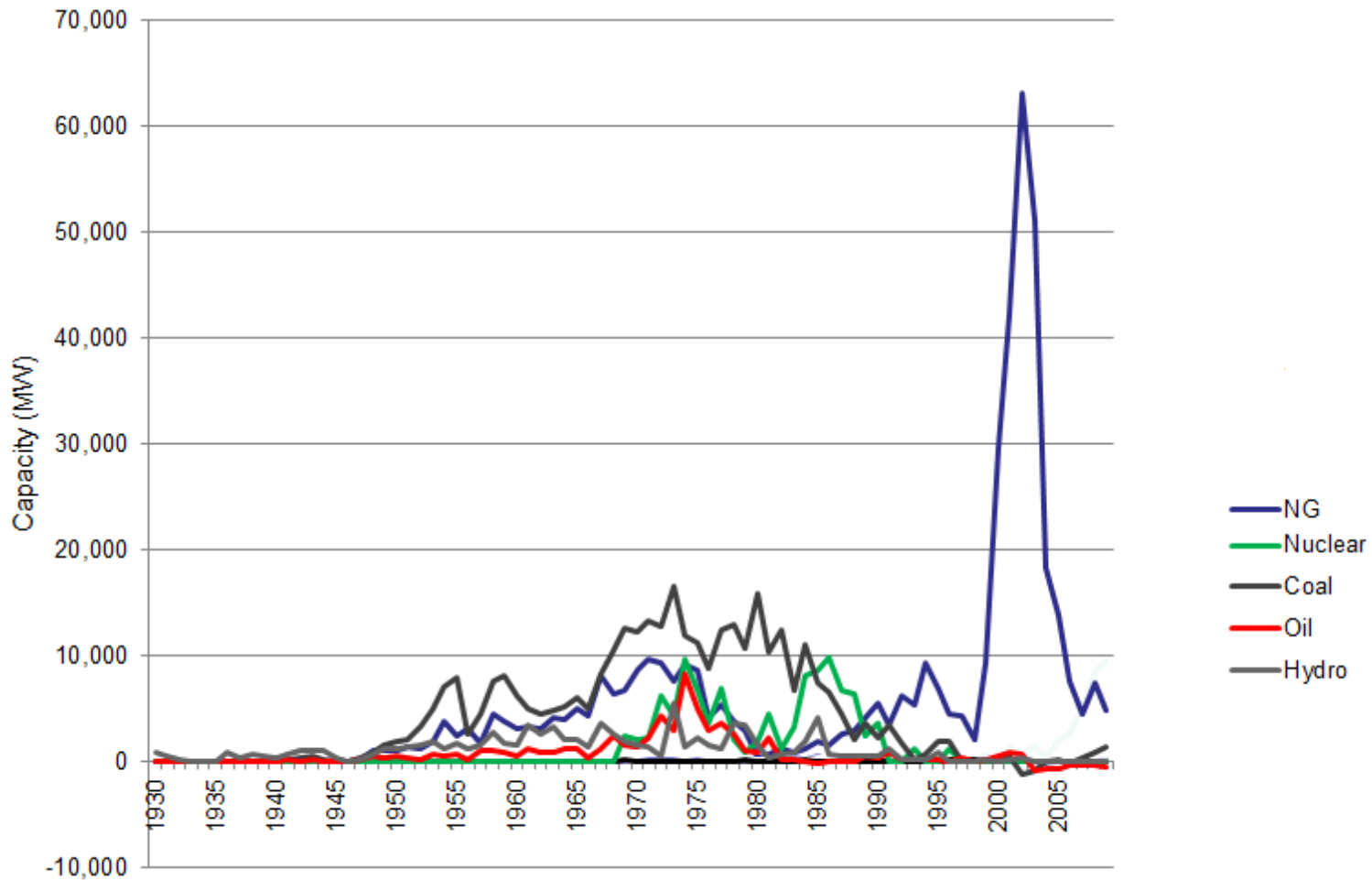


Cost of Fossil Fuel Receipts at Electric Generating Plants
(Dollars per million Btu, including taxes), costs, 1973 – 2010



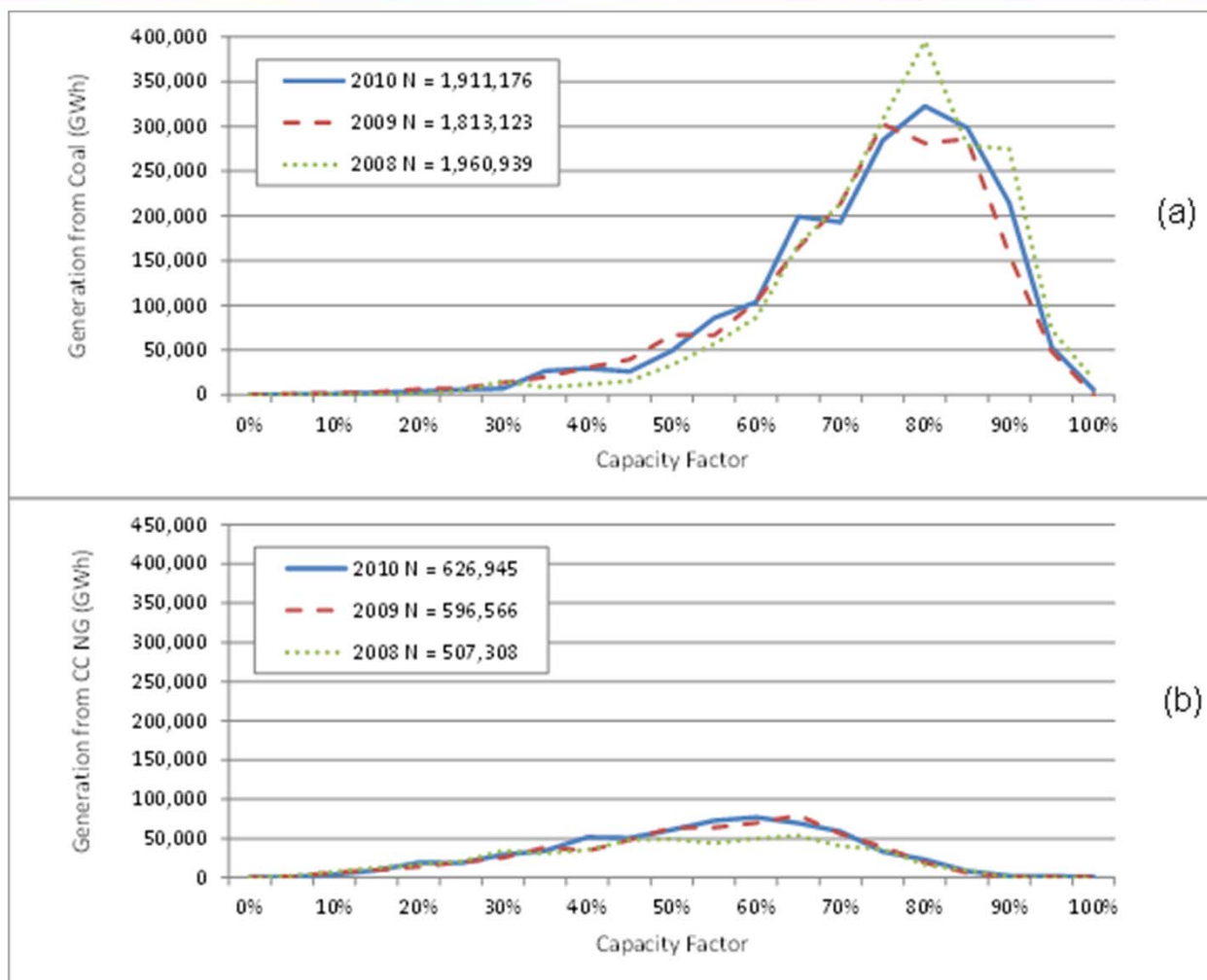
Source: U.S. Energy Information Administration / Monthly Energy Review September 2011

Net capacity installed (or retired) in the U.S. by fuel



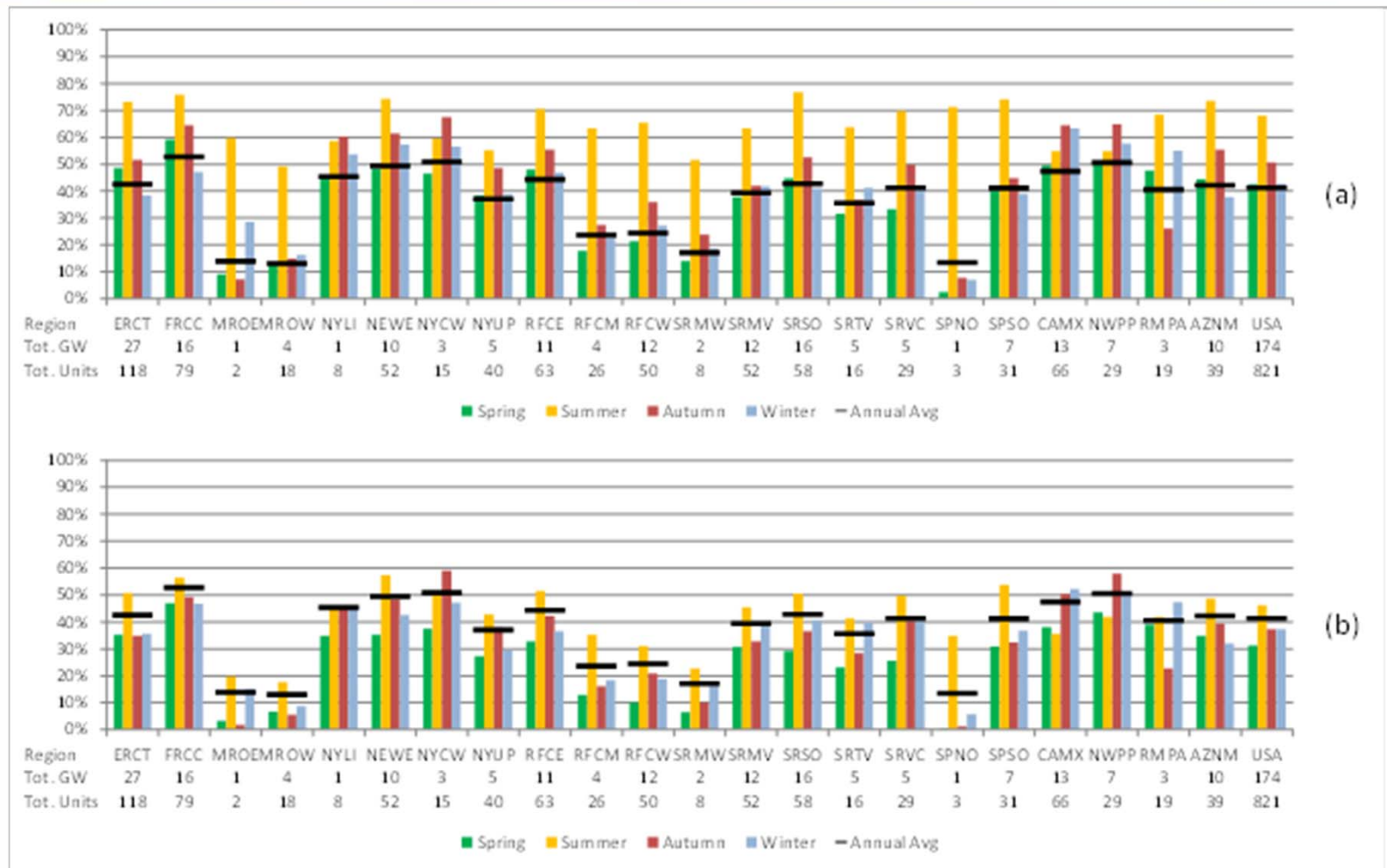
Source: *Memorandum: Using Existing Natural Gas Capacity to Displace Coal Generation, 2011 Update*. Synapse Energy Economics. August 2011. Page 3.

Coal (a) and CCNG (b) generation by capacity factor – 2008, 2009, and 2010



Source: Memorandum: Using Existing Natural Gas Capacity to Displace Coal Generation, 2011 Update. Synapse Energy Economics. August 2011. Page 7.

Capacity factors for CCNG units by season and region for (a) on-peak and (b) off-peak hours



Source: Memorandum: Using Existing Natural Gas Capacity to Displace Coal Generation, 2011 Update. Synapse Energy Economics. August 2011. Page 9.

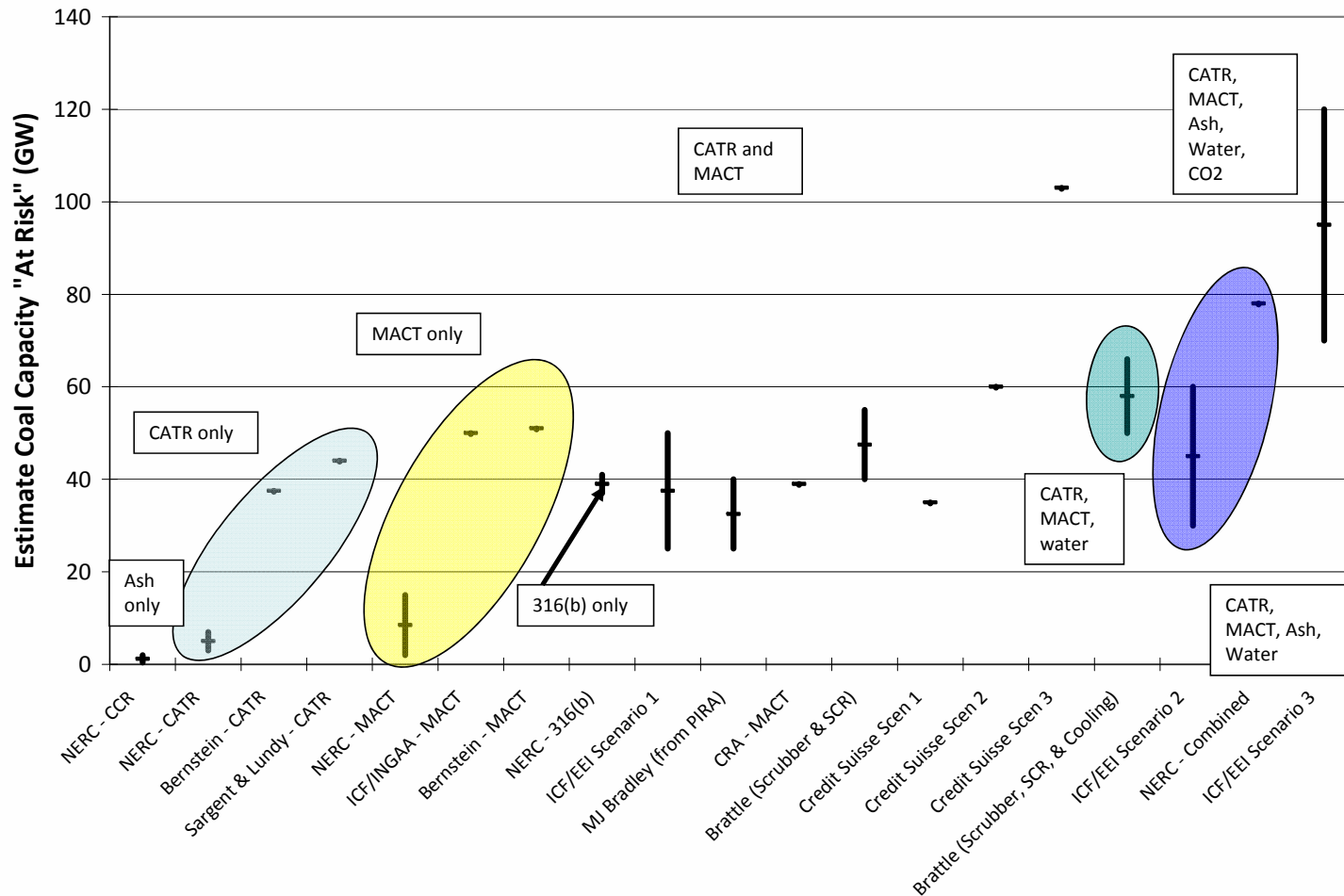
Upcoming EPA rules

2011	2012	2013	2014	2015	2016	2017	2018	Beyond
		Cross State Air Pollution Rule (SO ₂ /NO _x)						
		Coal Combustion Residuals (Ash)						
		Hazardous Air Pollutants (including mercury)						
		Cooling Water Intake						
		Effluent Limitation Guidelines						
CO ₂ Prevention of Significant Deterioration								
		CO ₂ New Source Performance Standards						
		NAAQS Review for PM 2.5						
		NAAQS Review for NO _x and SO ₂ Secondary Standards						
		NAAQS Review for Ozone						

	Proposed rules
	Final rules
	Compliance period/NAAQs designations effective

Source: *Economics of Existing Coal Generation and Opportunities for Clean Electricity*. Prepared by Synapse Energy Economics. May 2011. Slide 9.

Projected coal capacity “at risk” under various regulatory policies

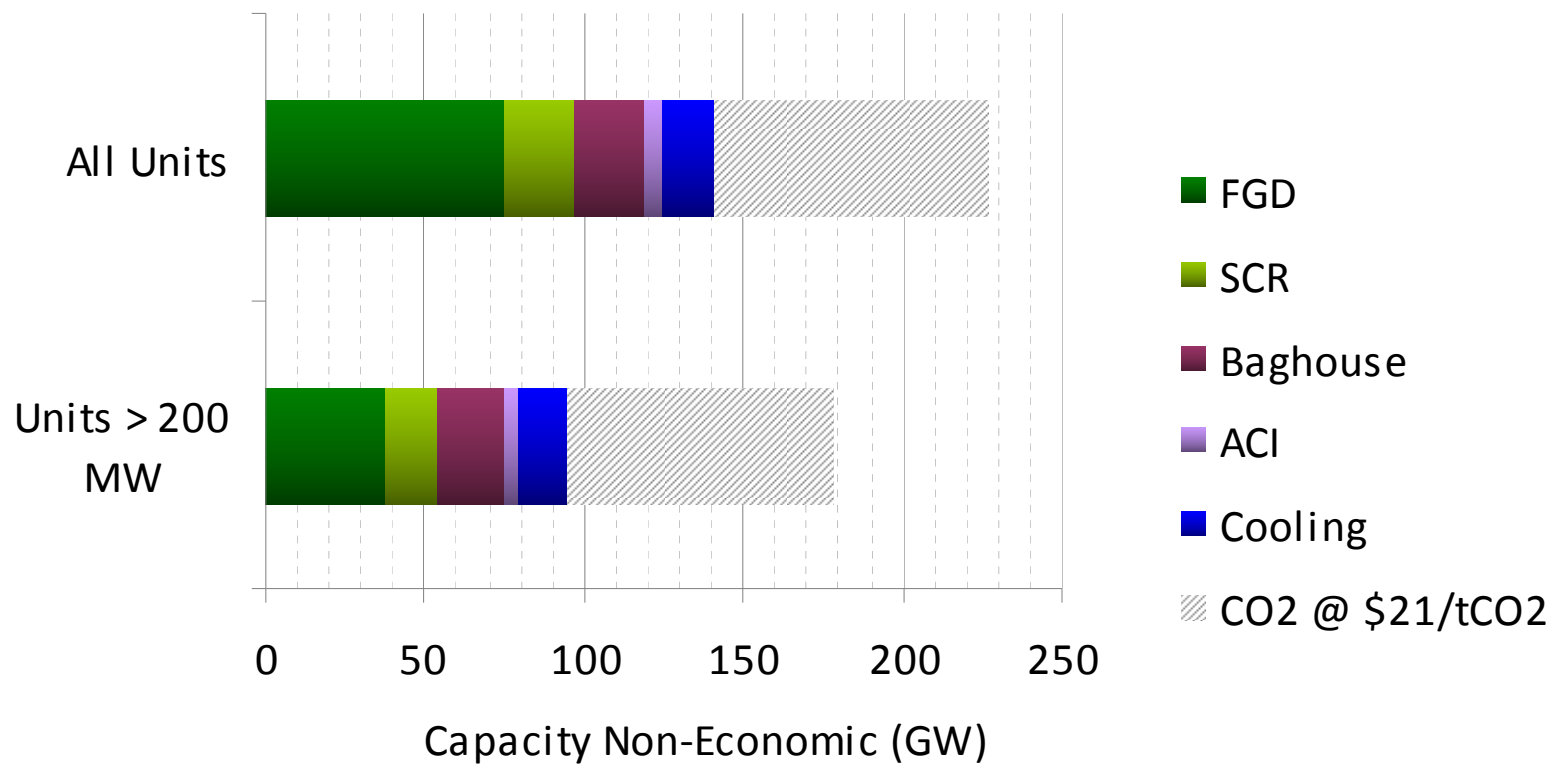


Source: *Economics of Existing Coal Generation and Opportunities for Clean Electricity*. Prepared by Synapse Energy Economics. May 2011. Slide 10.

Observations Based on Coal-at-Risk Studies

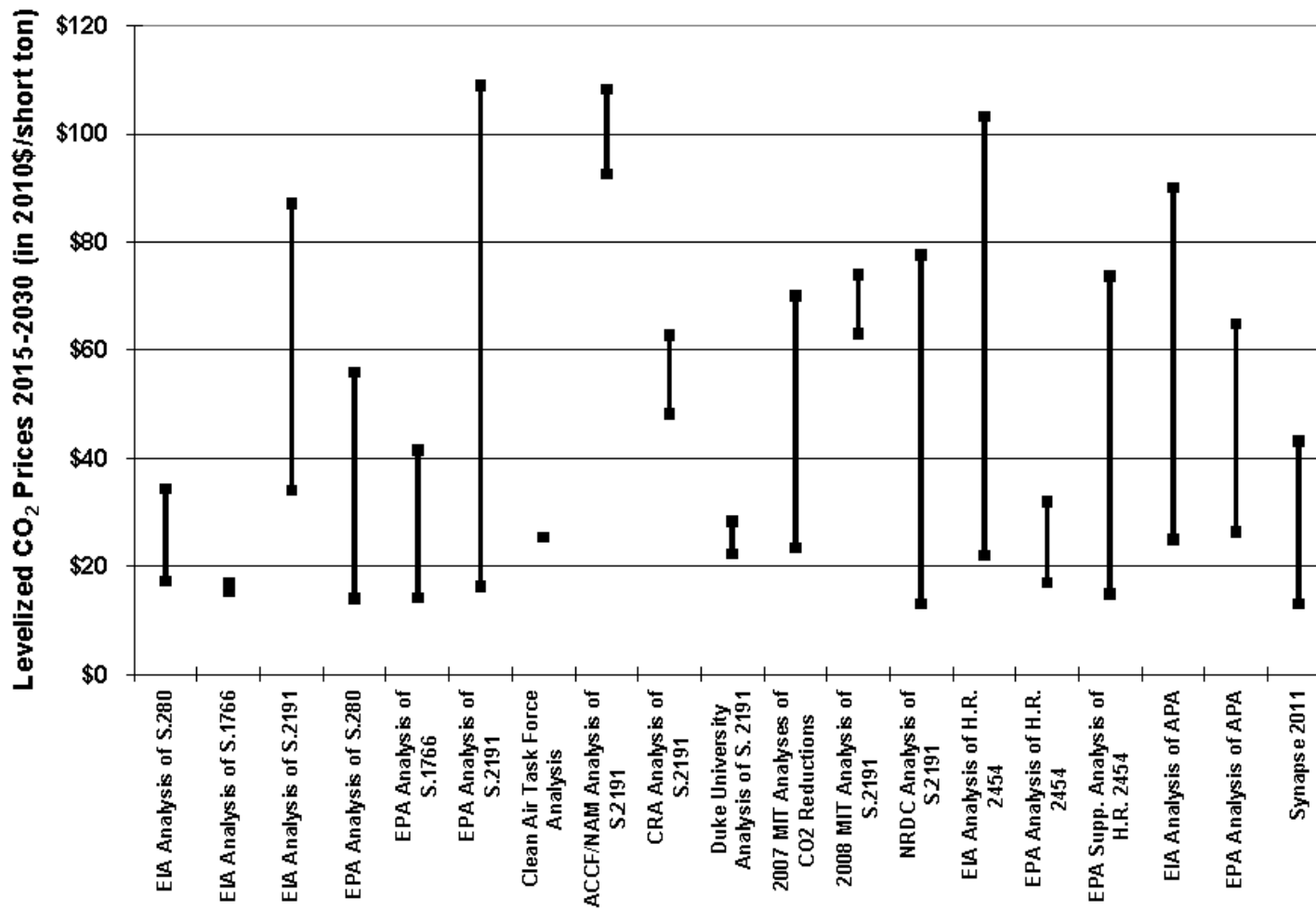
- Comprehensive regulation (analysis?) results in more coal at risk
- Natural gas prices—within the bandwidth modeled—do not explain differences in study results regarding plants at risk
- Regulatory details (e.g., flexibility) have a big impact on plants at risk
- Only one analysis included CO₂ cost, a significant omission!
- *Take Home: Demand comprehensive analysis!*

U.S. coal units affected by environmental regulations (non-economic with respect to existing natural gas)



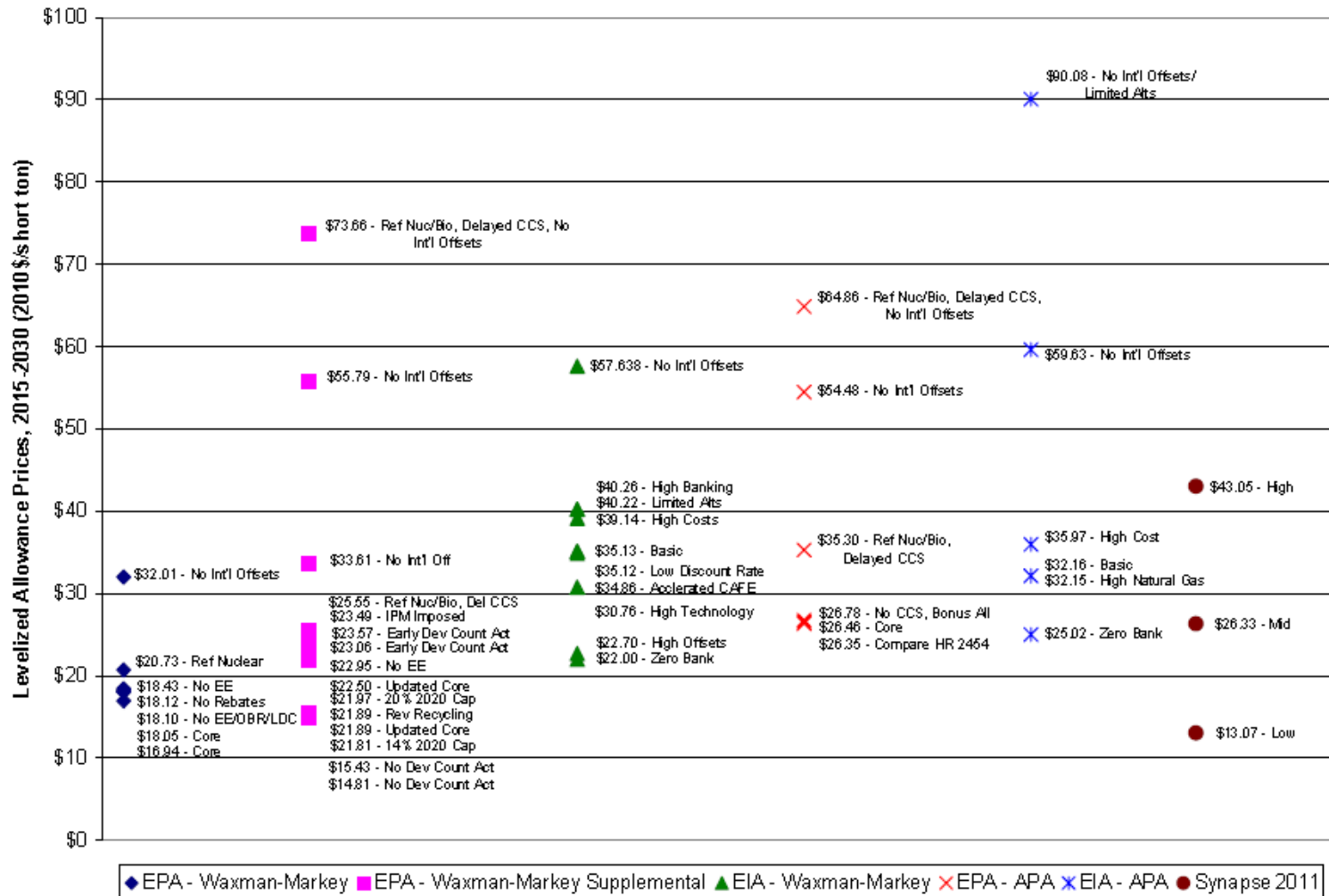
Source: *Economics of Existing Coal Generation and Opportunities for Clean Electricity*. Prepared by Synapse Energy Economics. May 2011. Slide 14.

GHG allowance price projections based on analyses of federal legislative proposals – levelized



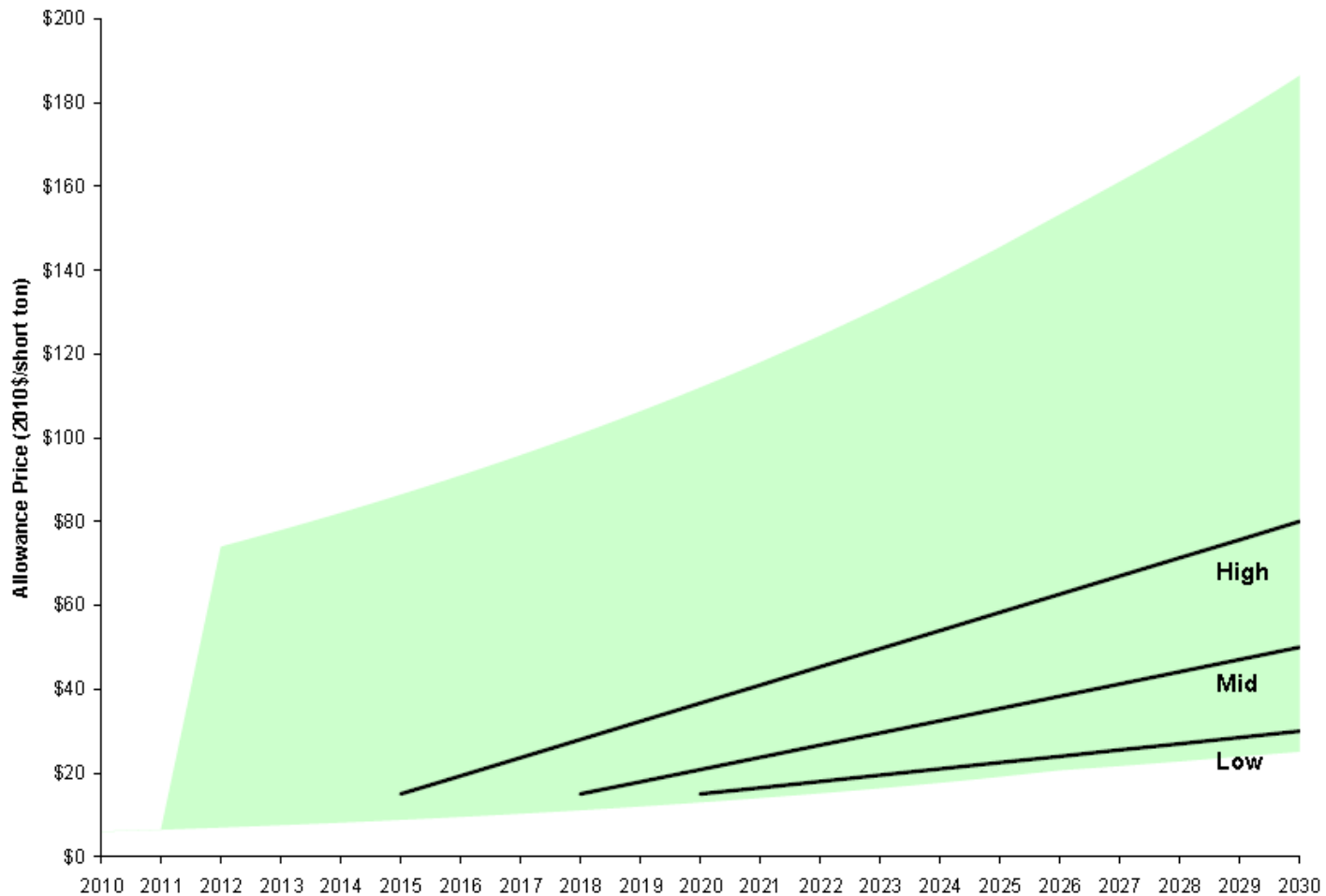
Source: 2011 Carbon Dioxide Price Forecast. Synapse Energy Economics. February 2011. Page 9.

Synapse CO2 trajectories and GHG allowance price projections for HR 2454 and APA 2010 – levelized 2015 - 2030



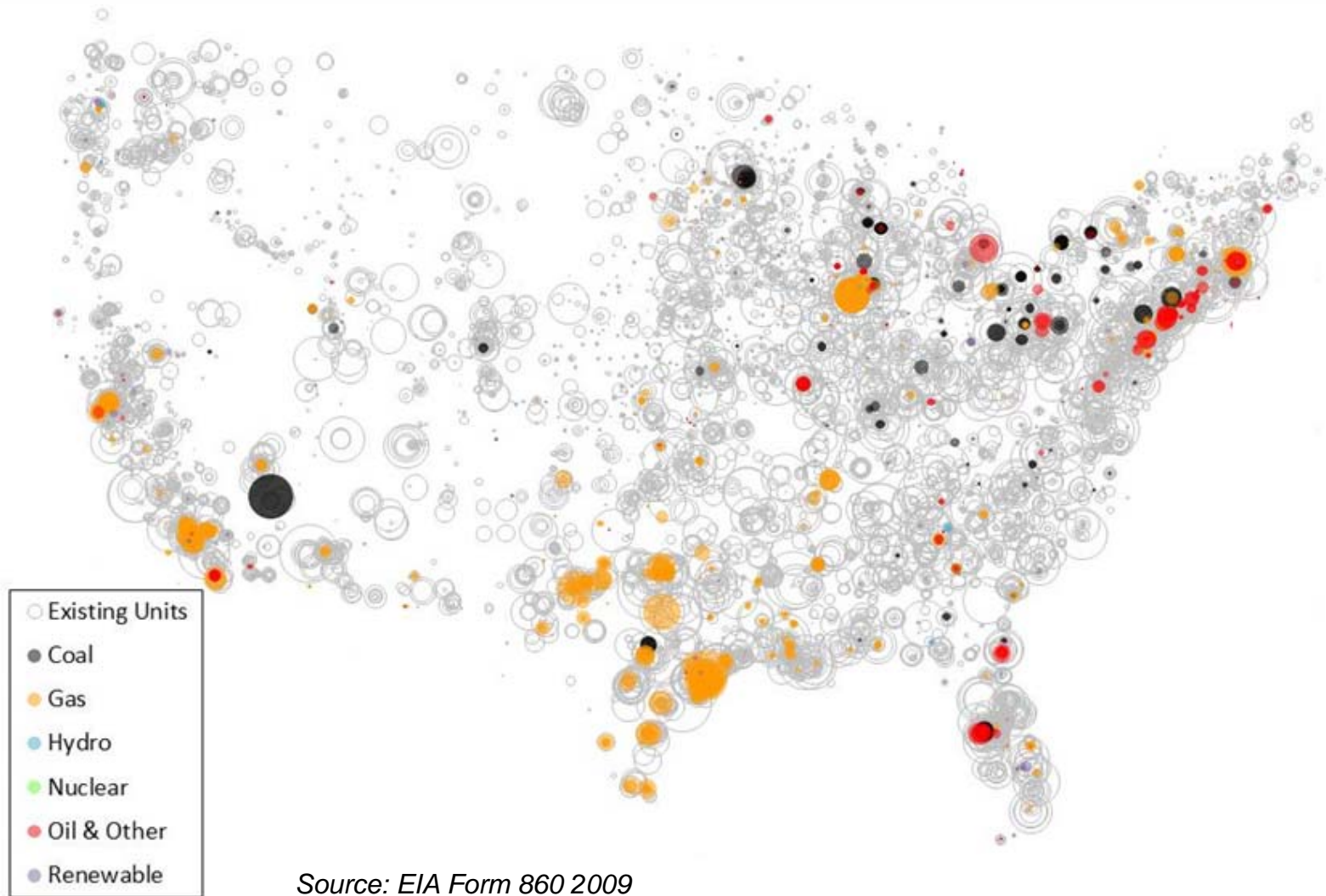
Source: 2011 Carbon Dioxide Price Forecast. Synapse Energy Economics. February 2011. Page 21.

Synapse 2011 carbon price forecast



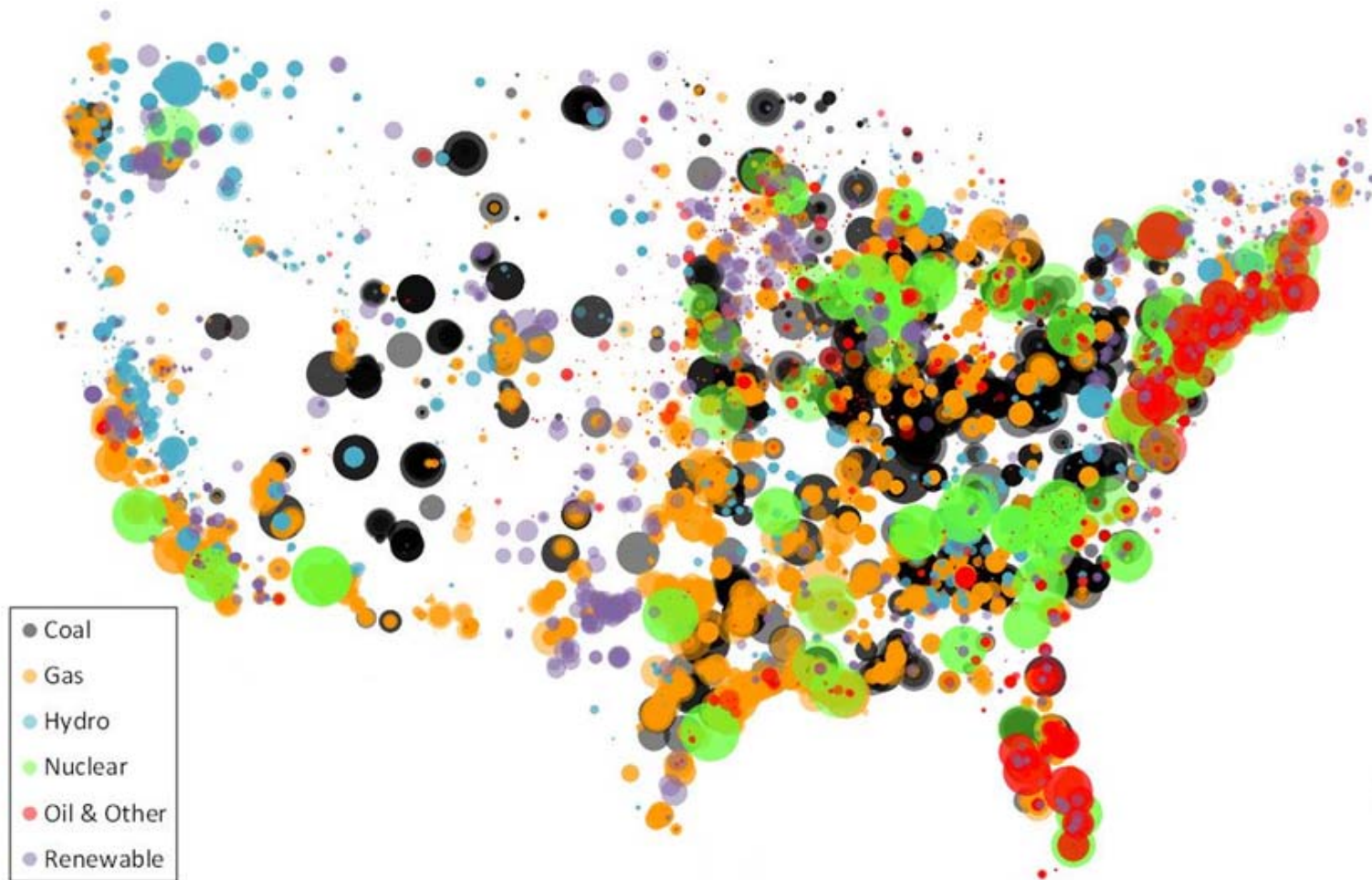
Source: 2011 Carbon Dioxide Price Forecast. Synapse Energy Economics. February 2011. Page 1.

Retired electrical generating units as of 2009 (Incomplete)



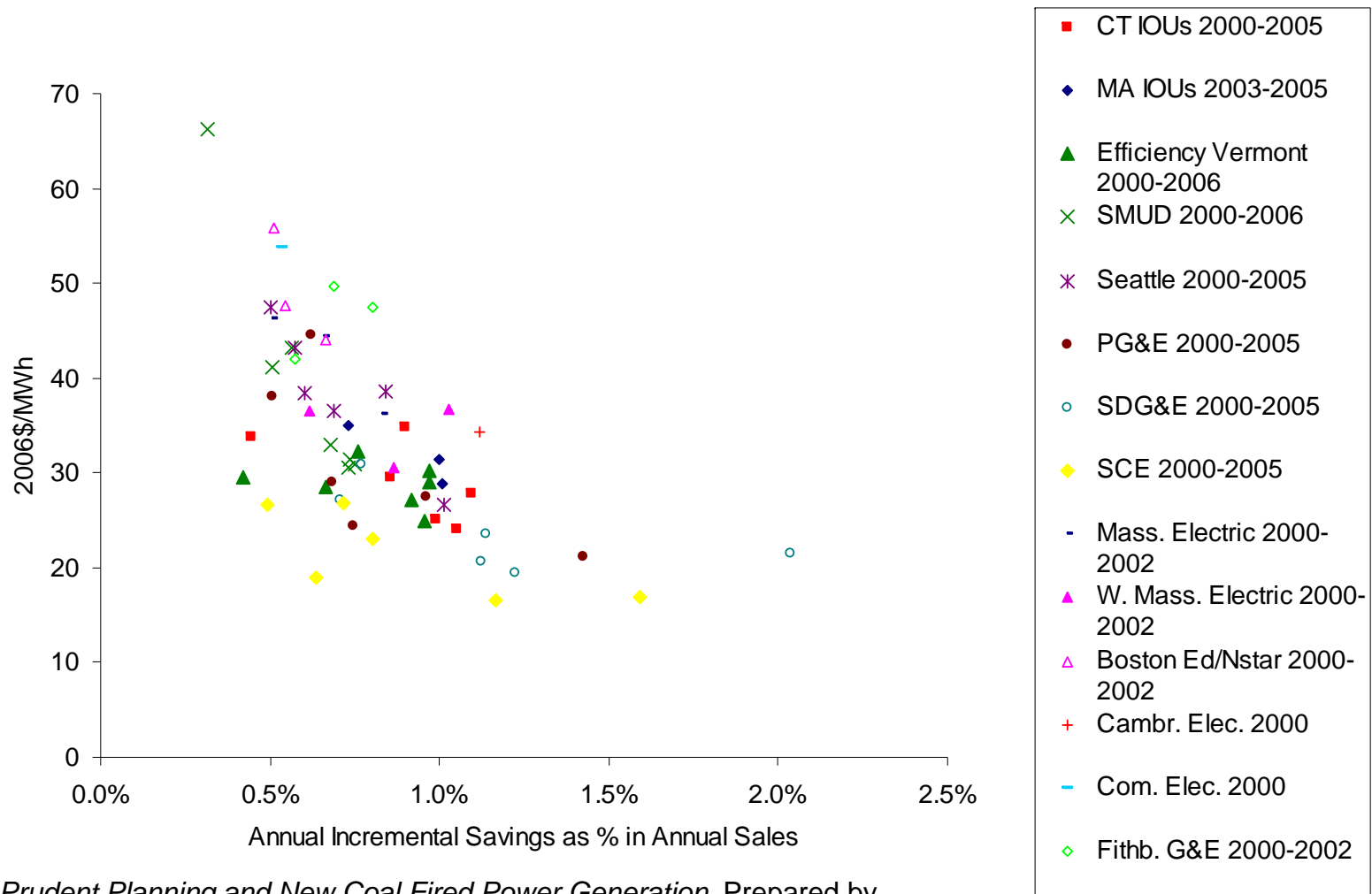
Source: EIA Form 860 2009

Existing electrical generating capacity by fuel type



Source: EIA Form 860 2009

Electric utility energy efficiency costs



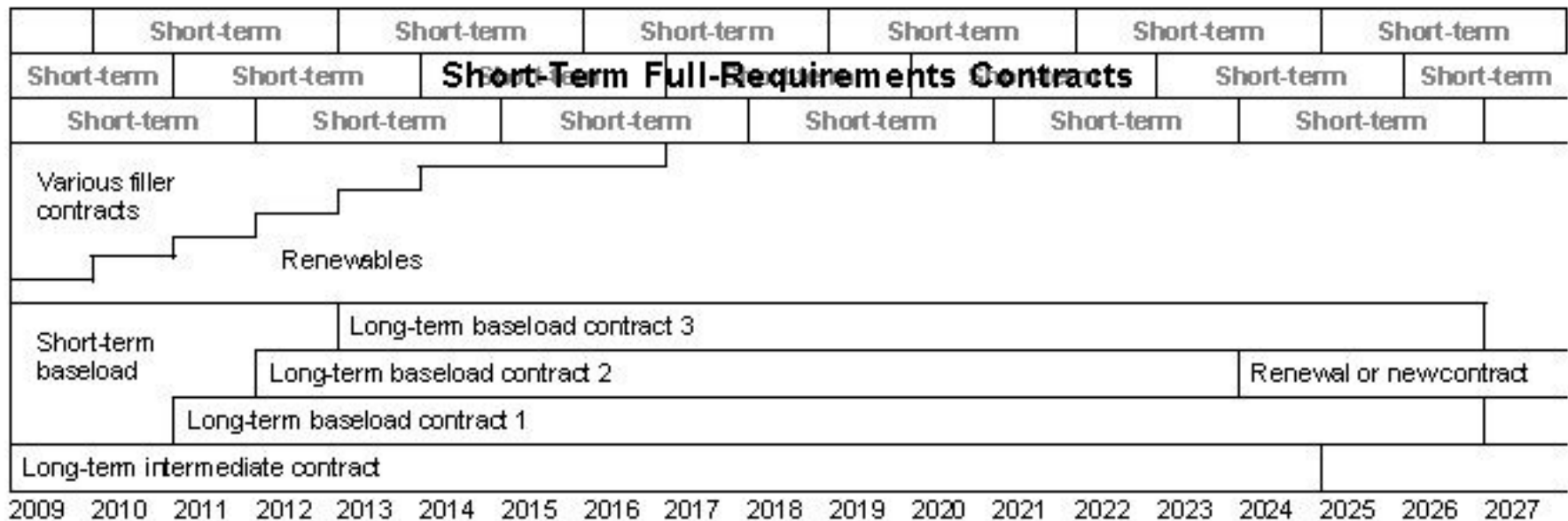
Source: *Prudent Planning and New Coal Fired Power Generation*. Prepared by Synapse Energy Economics for CERES Conference 2008. April 2008. Slide 7.

Capacity Markets' Paradigm Flaws...

- All capacity is *not* created equal
- There is a limited market for new “generic” capacity—only in constrained LDAs
- There is even less market for a one-year capacity product, three years out, through a centralized market
- Administratively determined price is not the same as a market price
- Costs: in PJM, about \$50 Billion and counting...
- *Incenting the Old, Preventing the New*

- Support (and do not discourage) long-term bilateral capacity and self supply
- Allow *market* to recognize distinctions in types of capacity – i.e., state mandates, RPS, etc.
- Allow flexibility for portfolios of energy and capacity that can combine attributes and deliver value
- Don't cook the market outcome by imposing an RPM-style, all-requirements auction
- Portfolios, portfolios, portfolios

Integrated portfolio management in a restructured supply market



Source: *Integrated Portfolio Management in a Restructured Supply Market*. Resource Insight, Inc., and Synapse Energy Economics, Inc., prepared for Ohio Consumers' Counsel. June 2006. Page 31.