Protecting Consumers from Bad Utility Planning

The Electricity Consumers Resource Council Fall Workshop

Washington, DC

October 21, 2014

Bruce Biewald

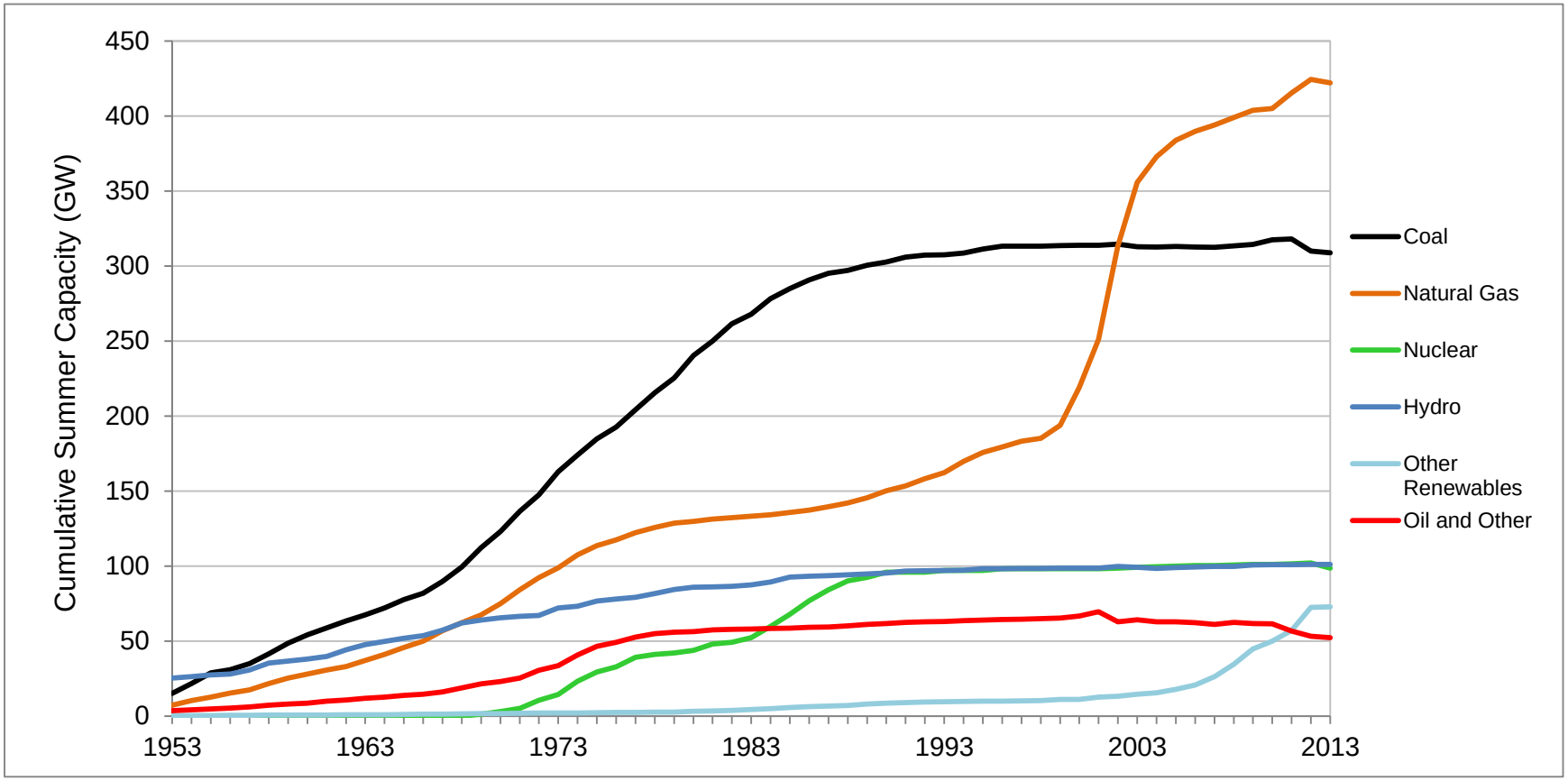
 |

Summary

Is electric utility planning important?	Yes.
How bad is current electric utility planning?	Very bad.
Why is electric utility planning so bad?	• Regulated monopoly • Problematic incentives
What can be done?	• Get involved in the details at utility commissions • Coordinate with other stakeholders

Overbuilding gas capacity

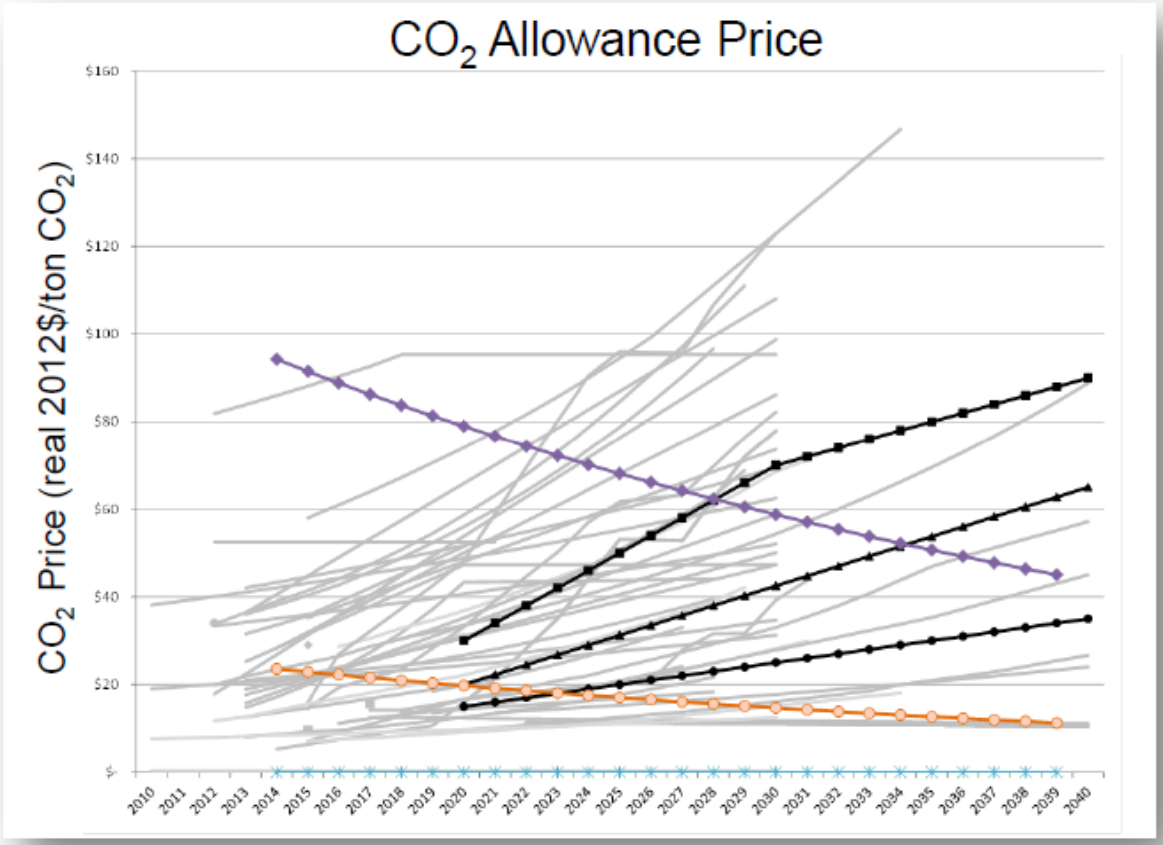
U.S. generating capacity by type



Examples of poor utility planning

Confusion about real and nominal dollars

Hawaii Electric Company (HECO) 2013 IRP



Source: Hawaii Electric Company, 2013

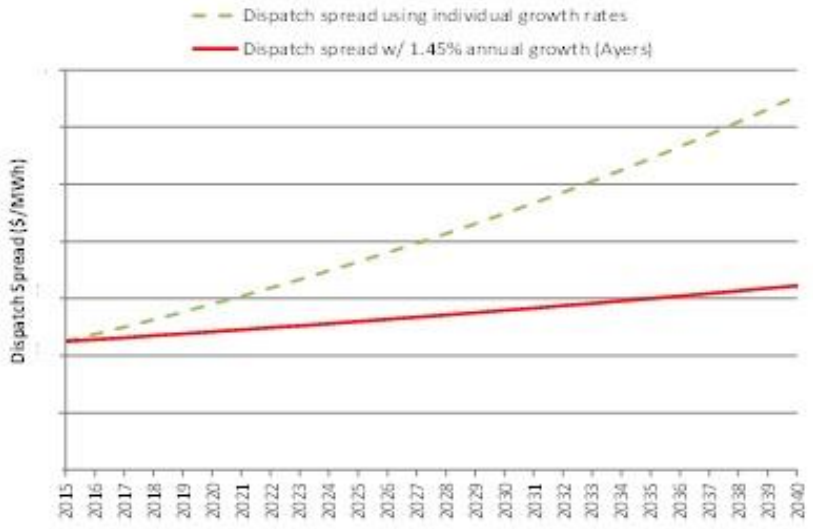
- Review of CO_2 price assumptions are critical.
- Does price include "allowances." If so, what assumptions underlie those allowances? Does it rise faster than inflation? Or much, much slower?

Scenario analysis with no reference case

Cost Driver	1. Blazing a Bold Frontier	2. Stuck in the Middle	3. No Burning Desire	4. Moved by Passion
Economic Conditions	Slow Growth	Moderate Growth	Strong Growth	Moderate Growth
Renewable Portfolio Standards (RPS) Energy Regulations	Raised: 2020 at 30% 2030 at 60%	Status Quo: 2020 at 25% 2030 at 40%	Lowered: 2020 at 20% 2030 at 30%	Status Quo: 2020 at 25% 2030 at 40%
Electricity Demand				
♦ *Underlying Economic Sales & Peak (pg 12)*	Low	Medium	High	Medium
♦ *Customer Renewable Self-Generation (pg 18)*	Very High	Medium	Low	High
♦ *Energy Efficiency Portfolio Standards–EEPS (pg 21)*	Exceeded 110% of Base	Partially Achieved 75% of Base	Partially Achieved 75% of Base	Achieved 100% of Base
♦ *Electric Vehicles (pg 25)*	High	Medium	Low	Medium
Construction Cost Escalation Rate (pg 28)	General: 3% Renewables: 0%	General: 3% Renewables: 3%	General: 3% Renewables: 3%	General: 3% Renewables: 2%
Fuel Supply & Prices (pg 29)				
♦ *Oil*	High Forecast	Reference Forecast	Low Forecast	Reference Forecast
♦ *Biofuels*	Low Forecast	High Forecast	High Forecast	High Forecast
♦ *LNG*	High Forecast (high forecast for neighbor islands)	Reference (high forecast for neighbor islands)	Reference (high forecast for neighbor islands)	Reference (high forecast for neighbor islands)
Energy Incentives	Continue	Gradually phased out by 2016	End 2014	Continue
Greenhouse Gas Regulations	CO_2: $100/ton	CO_2: $0	CO_2: $0	CO_2: $25/ton
Operating Costs	Escalate at 1.87%	Escalate at 1.87%	Escalate at 2%	Escalate at 1.87%

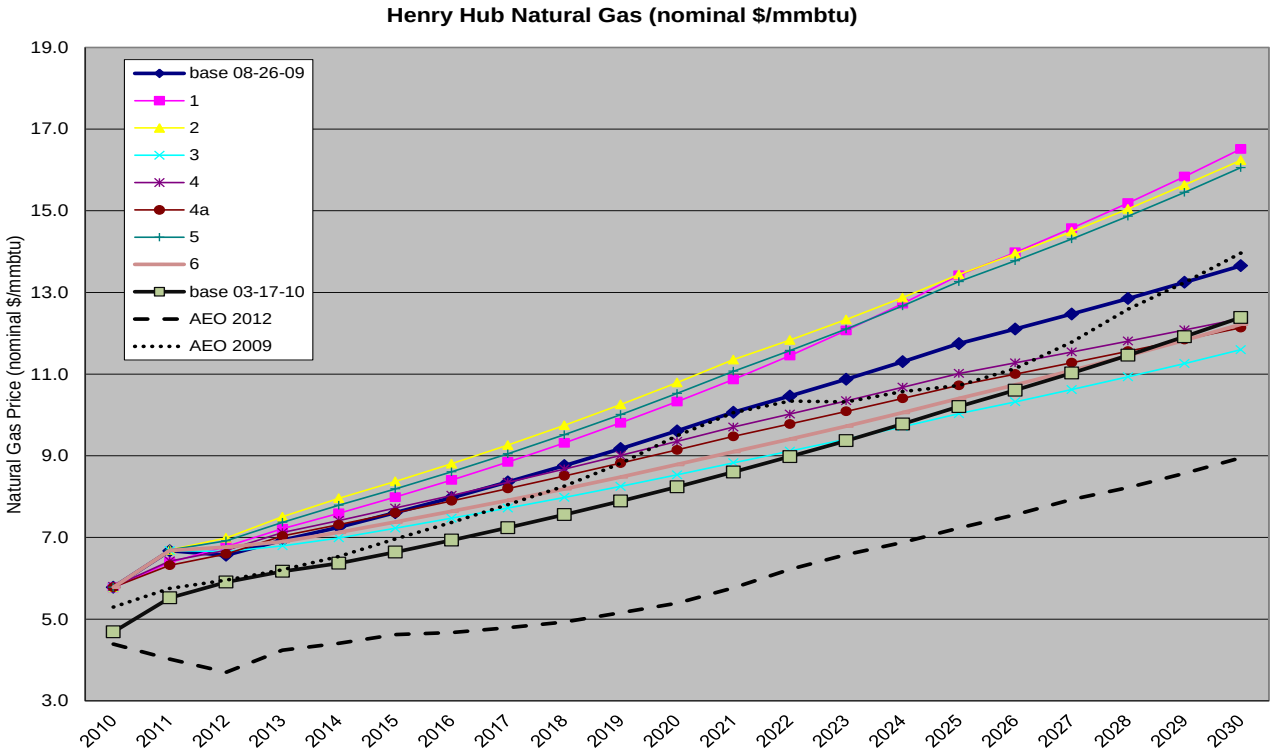
Failure to use an electric system model to evaluate a $500 million retrofit

- IPL used a two-page spreadsheet to justify a huge investment
- Said that running a model was not necessary because the spread between costs and benefits was so huge
- Shortcut mechanism in spreadsheet had significant mathematical error in it
- $10 increasing at 1.45% ≠ ($30 increasing at 2.45% - $20 increasing at 1.00%)



Use of out-of-date commodity prices

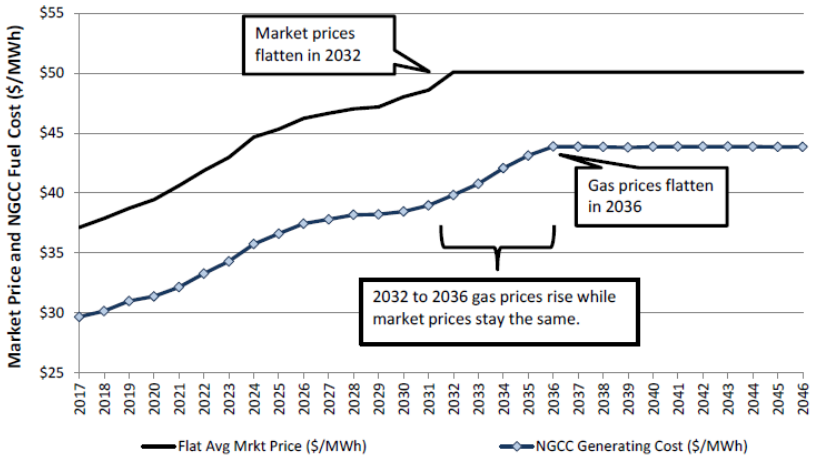
- In TVA's 2012 IRP, it used gas and coal price projections from mid-2009
- The IRP was subsequently used as the justification (in 2013) to proceed with retrofits at certain units (Gallatin)



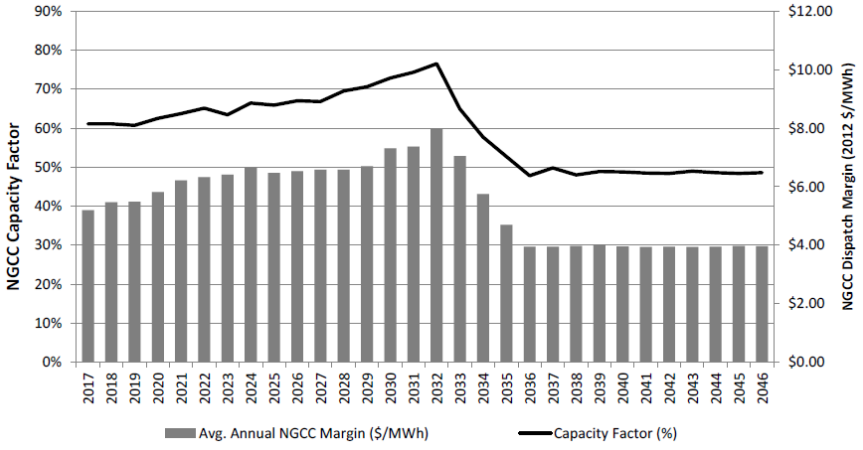
Internally inconsistent forecasts for commodity prices

- Midwestern utility projected market prices and gas prices through 2046
- Projection for market prices flattened (in real terms) in 2032, while prices for gas flattened (in real terms) in 2036, resulting in a collapse of projected gas capacity factors when gas prices exceed market prices

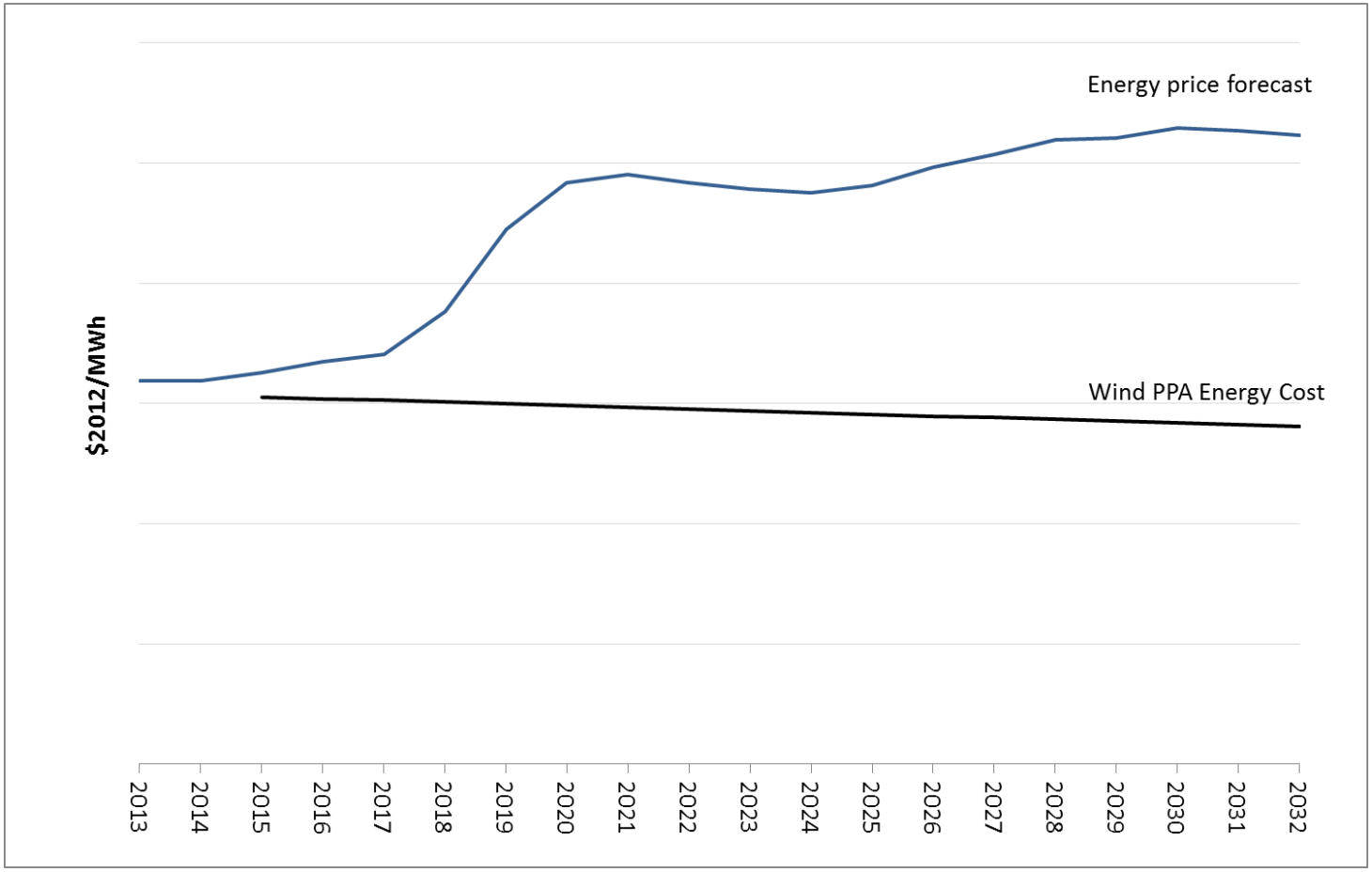
Mismatch on gas/market prices…



…results in surprising capacity factor drop in out-years.



Rejecting alternative resource options



Failure to optimize portfolio in the face of retirement

- Not allowing incremental EE or RE into the mix and not sizing replacing units creates a non-optimal plan
- Vectren assumed straight replacement of existing coal units, and sizes aren't even matched correctly
- NGCCs were 40-60 MW larger than the unit replaced, or (in the case of two units) 138 MW larger
- Also didn't give credit to capacity sales when larger-than-required units were constructed.

Table 5.
Unforced capacity (UCAP) of coal and replacement units (MW).

Unit(s)	***Fossil Units (after retrofits)***	***CCGT replacement***	***CT Replacement***
Brown 1 / 2	240 / 242	306	202
Culley 3	269	306	202
Brown 1 & 2	481	620	*(not modeled)*

Source: Fisher, J. 2014. Testimony in Indiana Utility Regulatory Commission Cause No. 44446.

Clustering units fails to illustrate individual unit liabilities (or strengths)

- IP&L lumped their coal units into a single analysis in 2013 CPCN
  - The Company witness presented an analysis designed to test the economic viability of retrofitting all of the Petersburg units by testing the cost of implementing the retrofits against replacing the plant with a single CCGT
  - Individual units were not analyzed; rather, the analysis reviewed the proposition that the entire plant is either retrofitted or retired as a single bundle
  - The results of this analysis were scaled to the Harding Street Unit 7
- PNM lumps Palo Verde 3 and San Juan 4 into a single economic analysis
- FirstEnergy Ohio lumps two OVEC units (Kyger Creek and Clifty Creek), Sammis, and Davis-Besse Nuclear into a single analysis

Depreciation period is not captured in the model; analysis is truncated prematurely

- Midwest company showed net benefit for retrofit over first 10 years; neglected to show next 10 years when the unit is non-economic
- Since the recovery period on the retrofit is at least 20 years, the analysis indicates that the investment would fail…but this was hidden from regulators

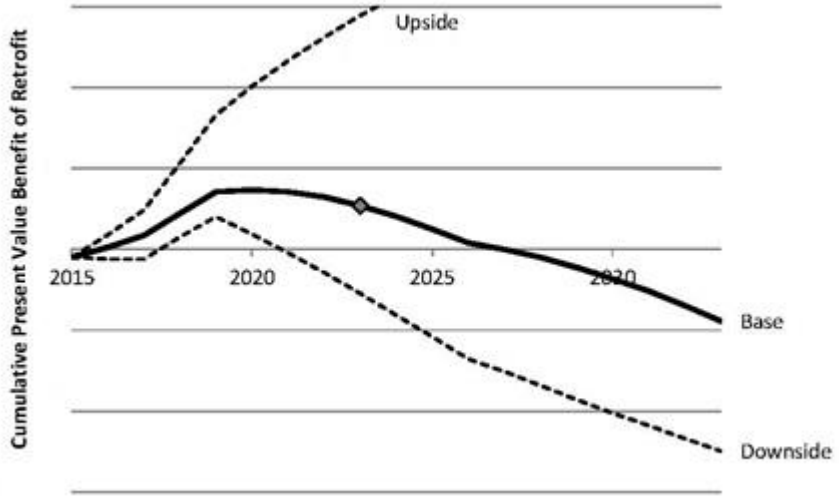
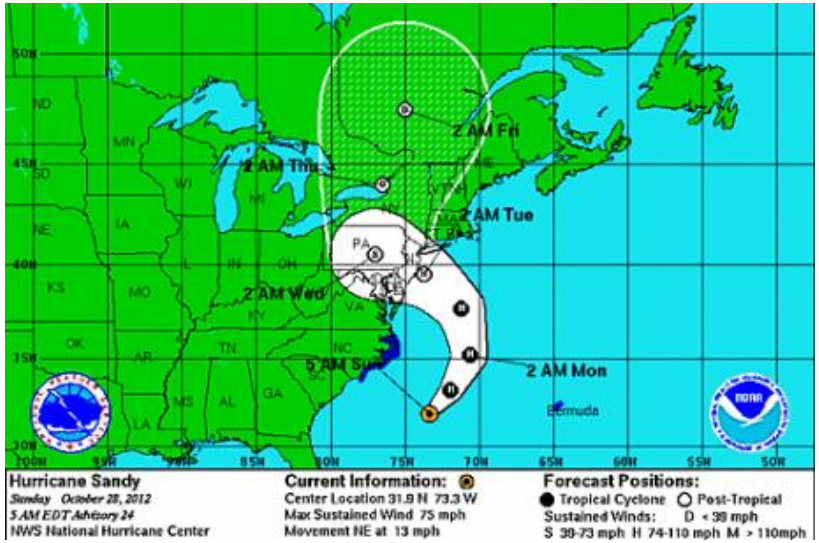


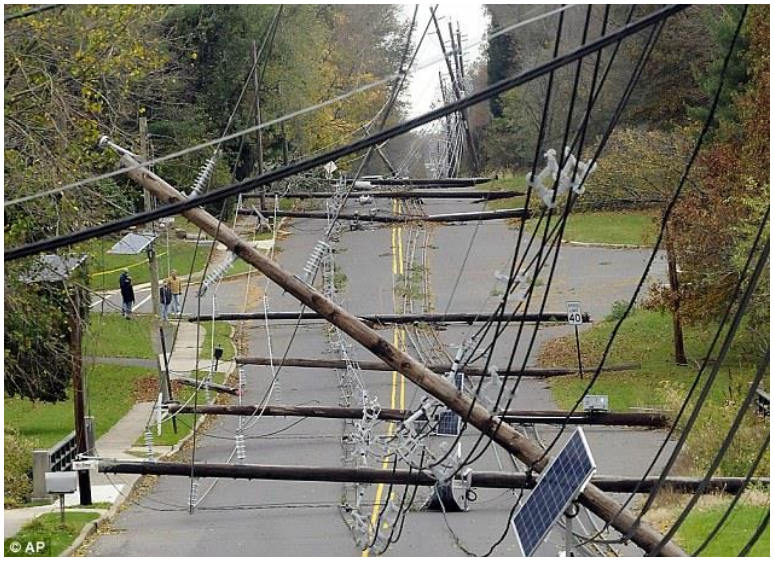
Figure has been modified to remove confidential data

Rate recovery period inconsistent with modeled depreciation

- Scrubber retrofit at AEP's Big Sandy 1 coal unit costing $1 billion
- Planning analysis based on 20+ year remaining life
- Ratemaking proposal for accelerated depreciation
- "Tangible risk" that the unit would have to be retired in 15 years
- If accelerated depreciation and early retirement were factored in, the retrofit would be non-economic

Over-investing in distribution infrastructure





- Post-Hurricane Sandy, Public Service Electric and Gas (PSEG) proposed $3.9 billion 10-year program to harden electric and natural gas distribution grid
- Through discovery and hearings, interveners learned that planning for proposed program occurred over the course of nine weeks between January and February of 2013
- Limited cost-effectiveness analysis from the Company indicated that $20 billion of benefits hinged on distinction of mean versus median value of one variable
- Company economic analysis discounted the costs but not the benefits
- Intervener group of NJLEUC, Rate Counsel, and AARP successfully reached settlement with PSEG to proceed with targeted plan of $1.2 billion over three years, with independent monitoring of planning and implementation

Absence of documentation

Response to data request in an ongoing IRP docket, asking for planning model information:

"The content of internal business strategy discussions constitutes confidential business information. In addition, because of ongoing litigation challenges, [the Company] presently conducts internal strategy meetings with an attorney present for the purpose of giving legal counsel and in anticipation of litigation. As a result of this litigious climate, no minutes are taken and any analyses are performed in real time. A spreadsheet tool is used to summarize data, but that tool is a proprietary, business confidential tool which has data contained therein which is also proprietary."

Ignoring expected environmental regulations

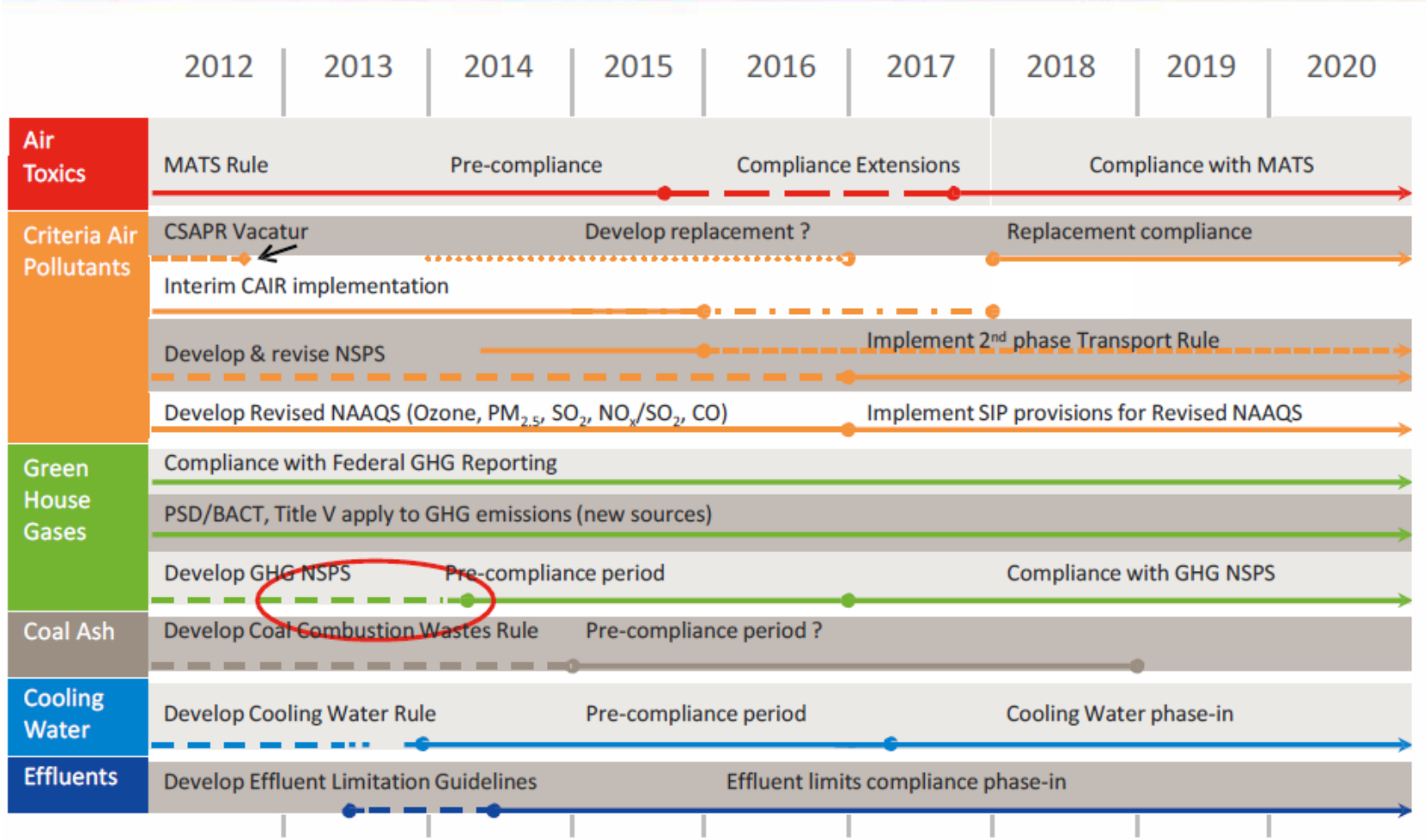
- EKPC's analysis of Cooper Unit 1 retrofit project compared to retirement/other resources
- MATS costs of $15 million were included with $0 costs for future environmental regulations:
  - "No additional costs to make Cooper Unit 1 compliance with undetermined environmental rules were included"
- EKPC chose the retrofit project, modeling a 20-year analysis period
- When asked to provide any estimates of future environmental costs:
  - "Projected annual costs for the plants have no bearing on determining the reasonableness of the Cooper Unit 1 project."
  - "Any documents discussing the potential costs of compliance would be speculative in nature" – **but the Company had developed CCR and 316(b) estimates** *(Synapse estimated NAAQS/CSAPR costs)*

Rule	Costs under Lenient Final Rule, $M	Costs under Strict Final Rule, $M
CCR	$10.7	$51.5
NAAQS & CSAPR	$7.3	$33
316(b)	$0.8	$15.2
Total, $2020	**$18.8**	**$99.7**
Total, present value	**$14.9**	**$79.2**

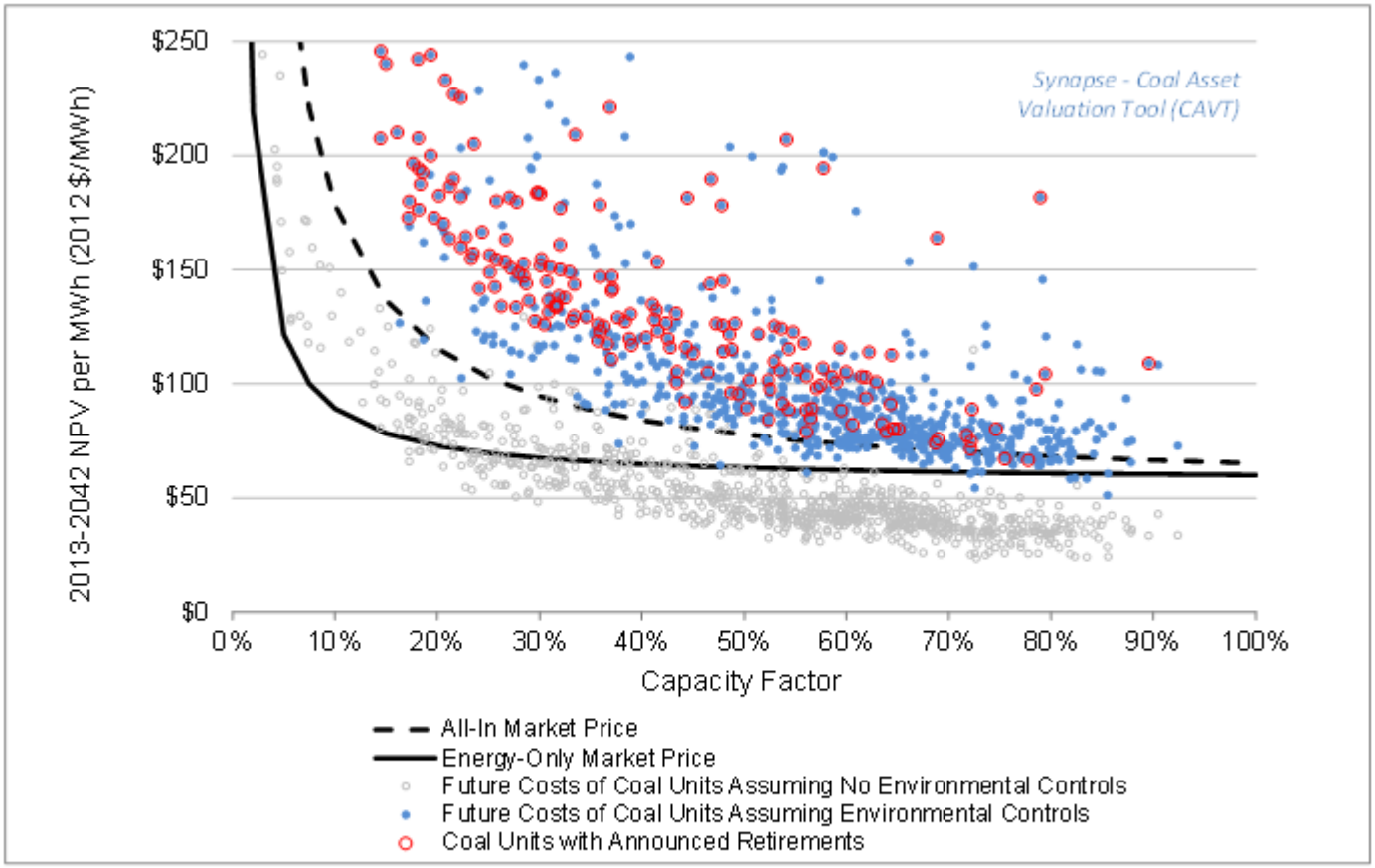
Ignoring expected environmental regulations

- “Piecemeal planning”
- In 2011, we found that PacifiCorp had done planning for regional haze compliance that resulted in new FGDs being built at two units in 2009 (Naughton)
- Discovery revealed that the Company was internally planning on multiple environmental regulations that were not put into its forward-planning model

Environmental compliance obligations



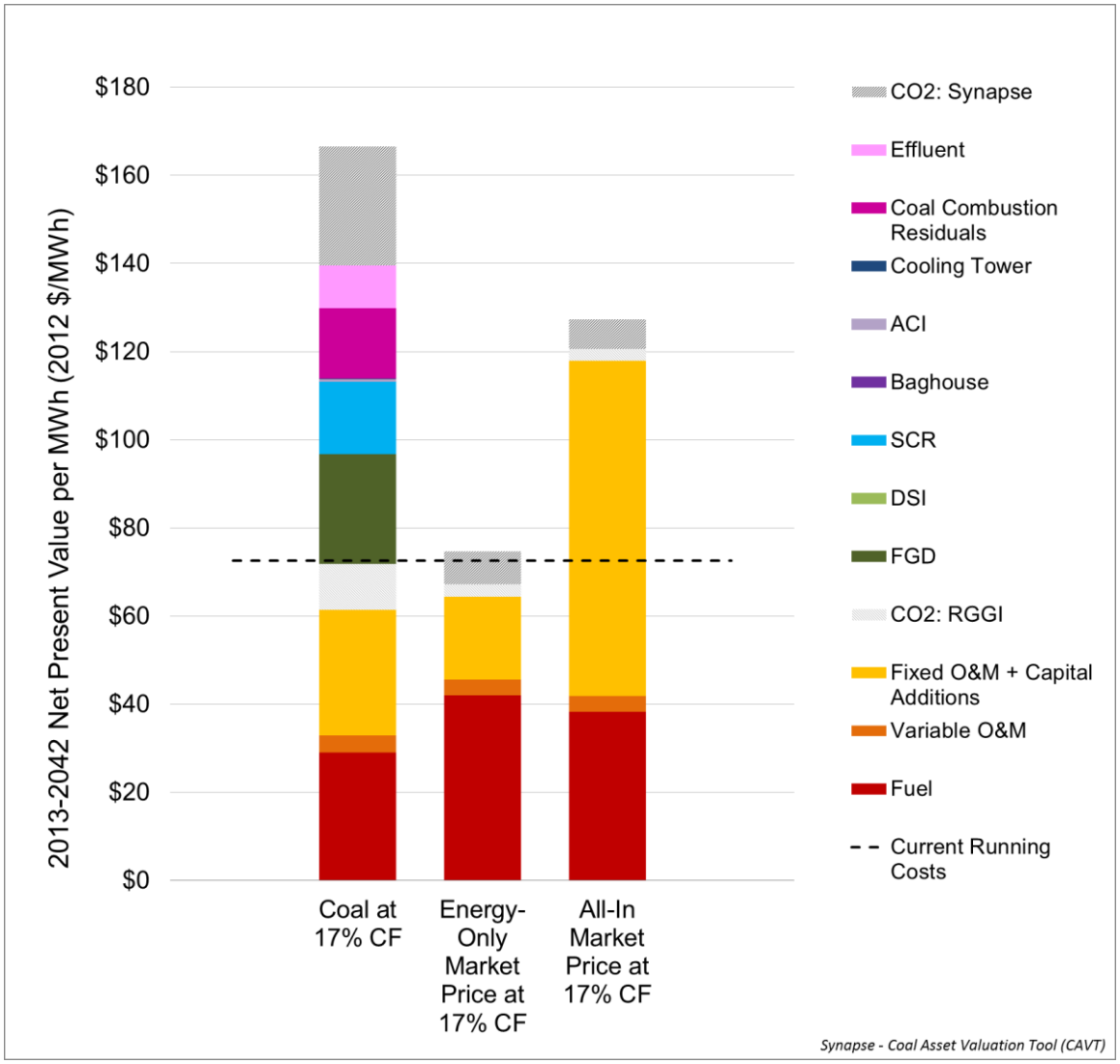
Projected net present value of coal units assuming environmental retrofits, compared to typical national market electricity prices, 2013-2042



Note: The y-axis in Figure 2 is truncated at $250/MWh; some units with capacity factors of 15 percent or less have net present value costs that are higher than $250/MWh when assuming new environmental controls.

Source: Knight, Patrick, Elizabeth A. Stanton, Jeremy Fisher, and Bruce Biewald, October 11, 2013, "Forecasting Coal Unit Competitiveness: Coal Retirement Assessment Using Synapse's Coal Asset Valuation Tool (CAVT)."

Bridgeport Station 3:
A Case Study in Uneconomic Coal



Uneconomic U.S. coal capacity compared to market purchases

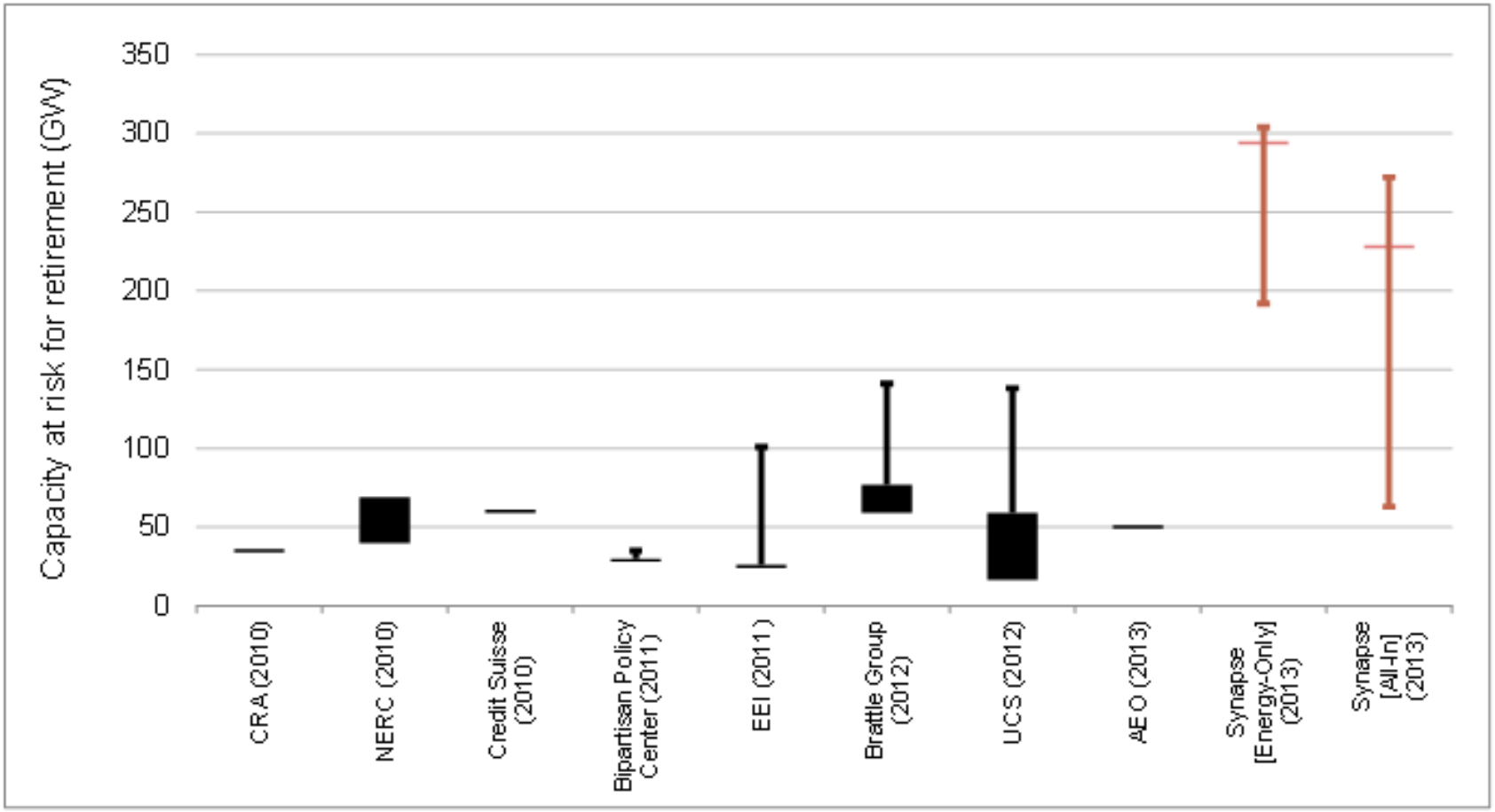
Uneconomic Coal Capacity Compared to All-In Purchases (GW)

		Environmental Retrofit		
		Lenient	Mid	Strict
Natural Gas Price	High	63 (20%)		230 (74%)
	Mid		228 (73%)	
	Low	101 (33%)		274 (88%)

Note: Percentages indicate the share of the capacity of the uneconomic units compared to total coal capacity.

Source: Knight, Patrick, Elizabeth A. Stanton, Jeremy Fisher, and Bruce Biewald, October 11, 2013, "Forecasting Coal Unit Competitiveness: Coal Retirement Assessment Using Synapse's Coal Asset Valuation Tool (CAVT)."

Comparison of coal retirement projection ranges



Note: Each projection uses different assumptions for environmental retrofits, natural gas prices, and CO_2 prices.

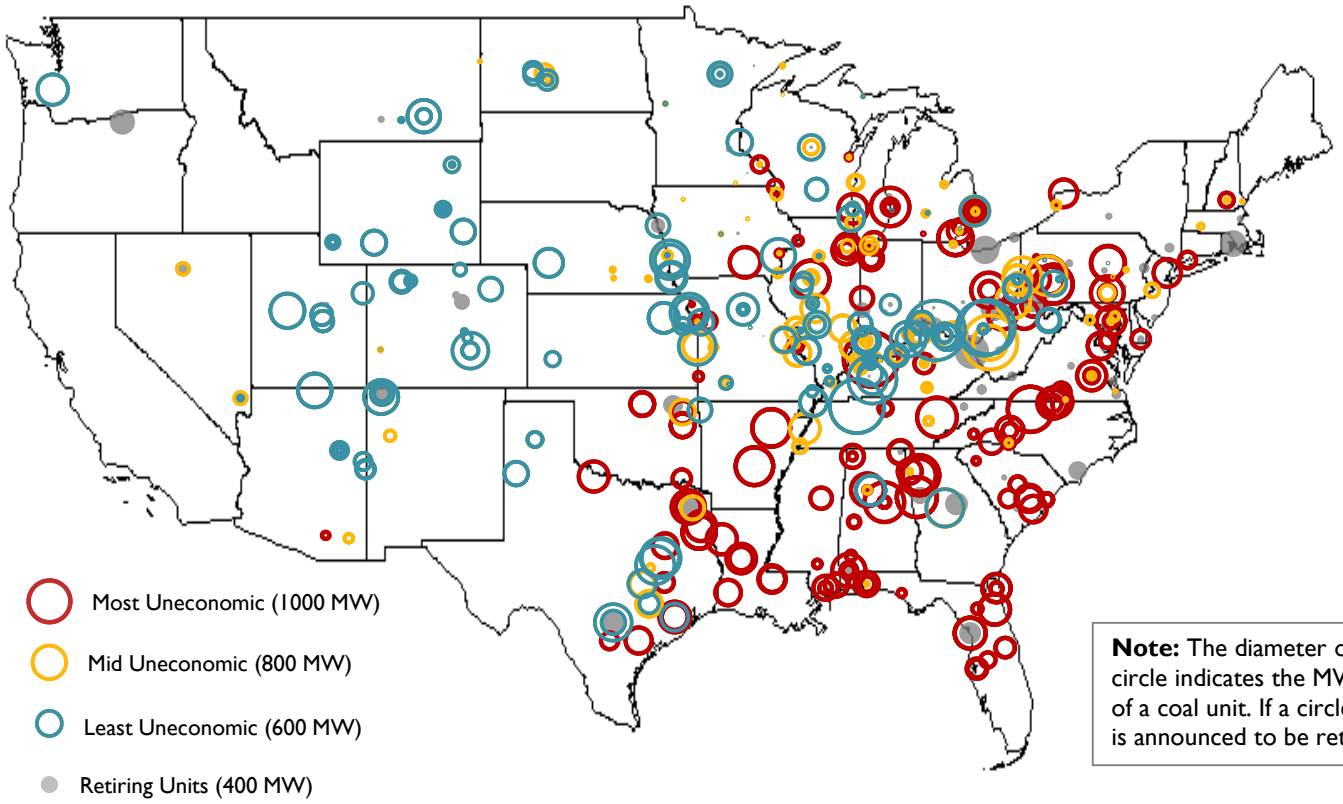
Source: Knight, Patrick, Elizabeth A. Stanton, Jeremy Fisher, and Bruce Biewald, October 11, 2013, "Forecasting Coal Unit Competitiveness: Coal Retirement Assessment Using Synapse's Coal Asset Valuation Tool (CAVT)."

Environmental retrofit and natural gas assumptions

Natural Gas Price	Very High	Natural gas prices grow at 130% of the AEO 2012 Reference Case rate of change
	High	Natural gas prices grow at the AEO 2012 Low Estimated Ultimate Recovery Case rate of change
	Mid	Natural gas prices grow at the AEO 2012 Reference Case rate of change
	Low	Natural gas prices grow at the AEO 2012 High Estimated Ultimate Recovery Case rate of change
Environmental Control Requirements	Strict	FGD, SCR, Baghouse, ACI, Impingement Controls and Recirculating Cooling on units with intakes > 125 MGD, Coal Combustion Residual (Subtitle C), Effluent Regulatory Option "4a," "Synapse Mid" CO_2 Price
	Mid	FGD, SCR, Baghouse, ACI, Impingement Controls and Recirculating Cooling on units with intakes > 125 MGD, Coal Combustion Residual (Subtitle D), Effluent Regulatory Option "3," "Synapse Mid" CO_2 Price
	Lenient	Baghouse, ACI, Impingement Controls, Effluent Regulatory Option "3a," "Synapse Low" CO_2 Price

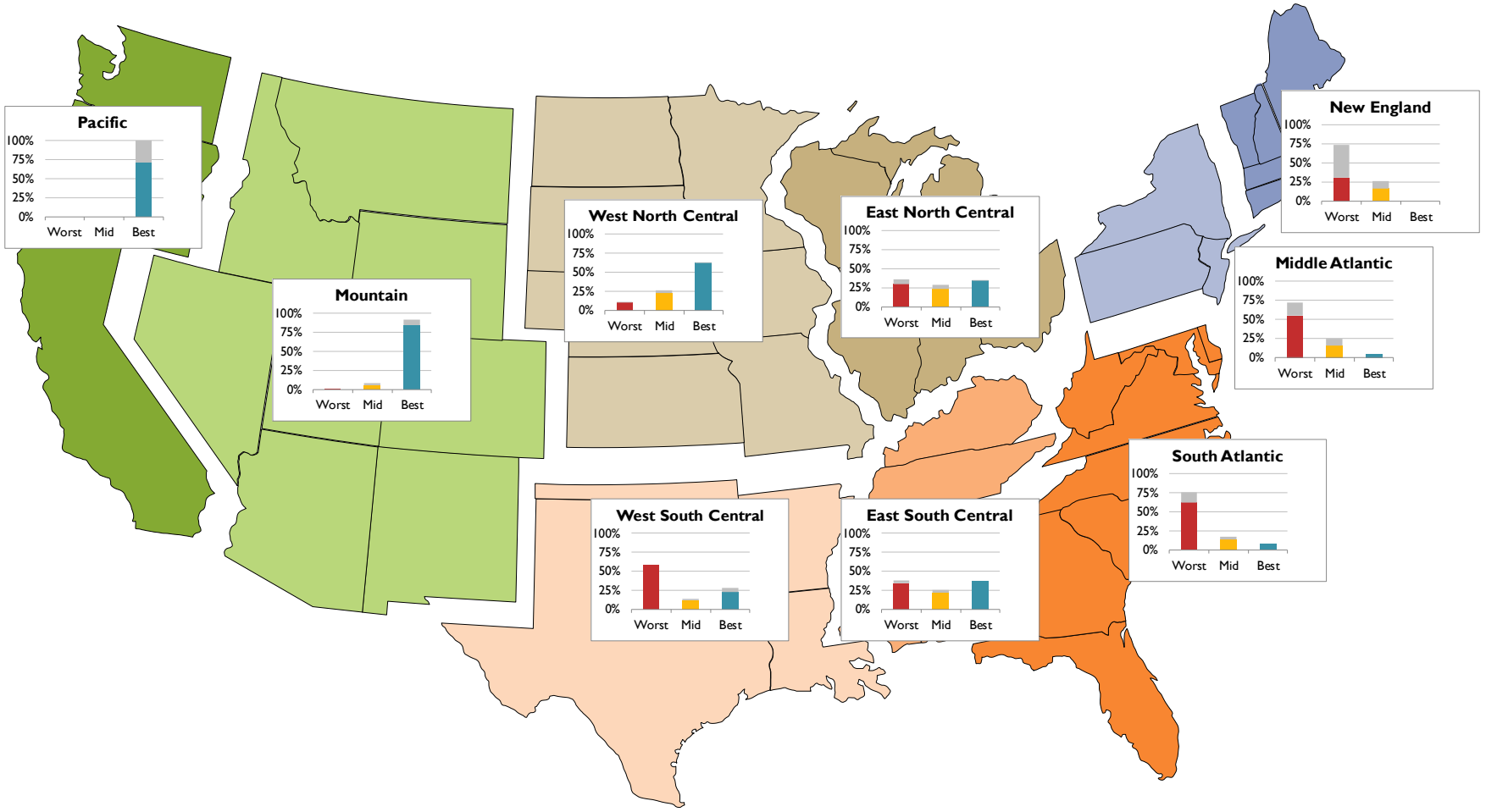
Source: Knight, Patrick, Elizabeth A. Stanton, Jeremy Fisher, and Bruce Biewald, October 11, 2013, "Forecasting Coal Unit Competitiveness: Coal Retirement Assessment Using Synapse's Coal Asset Valuation Tool (CAVT)."

U.S. coal units by economic viability

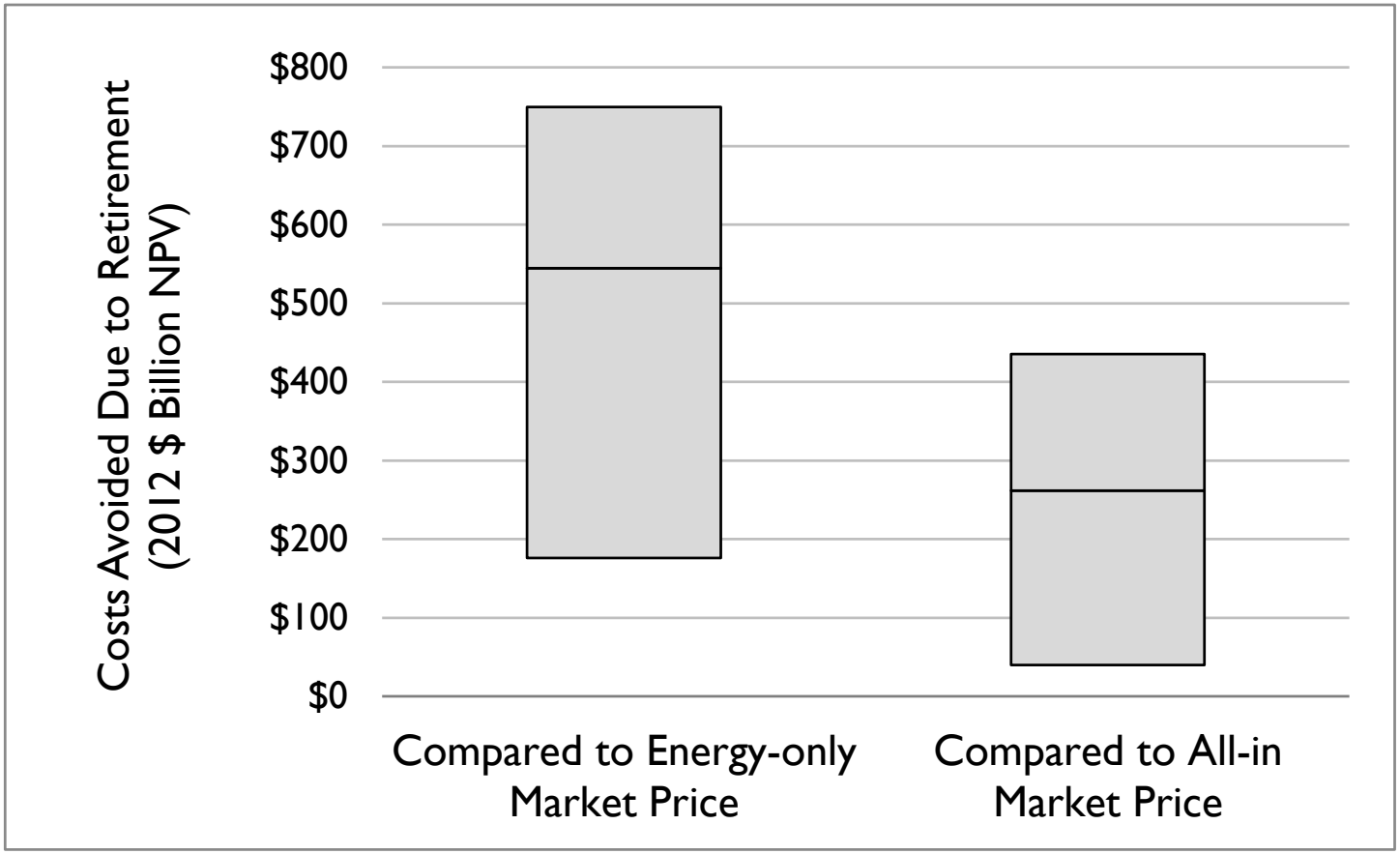


Source: Synapse CAVT Analysis

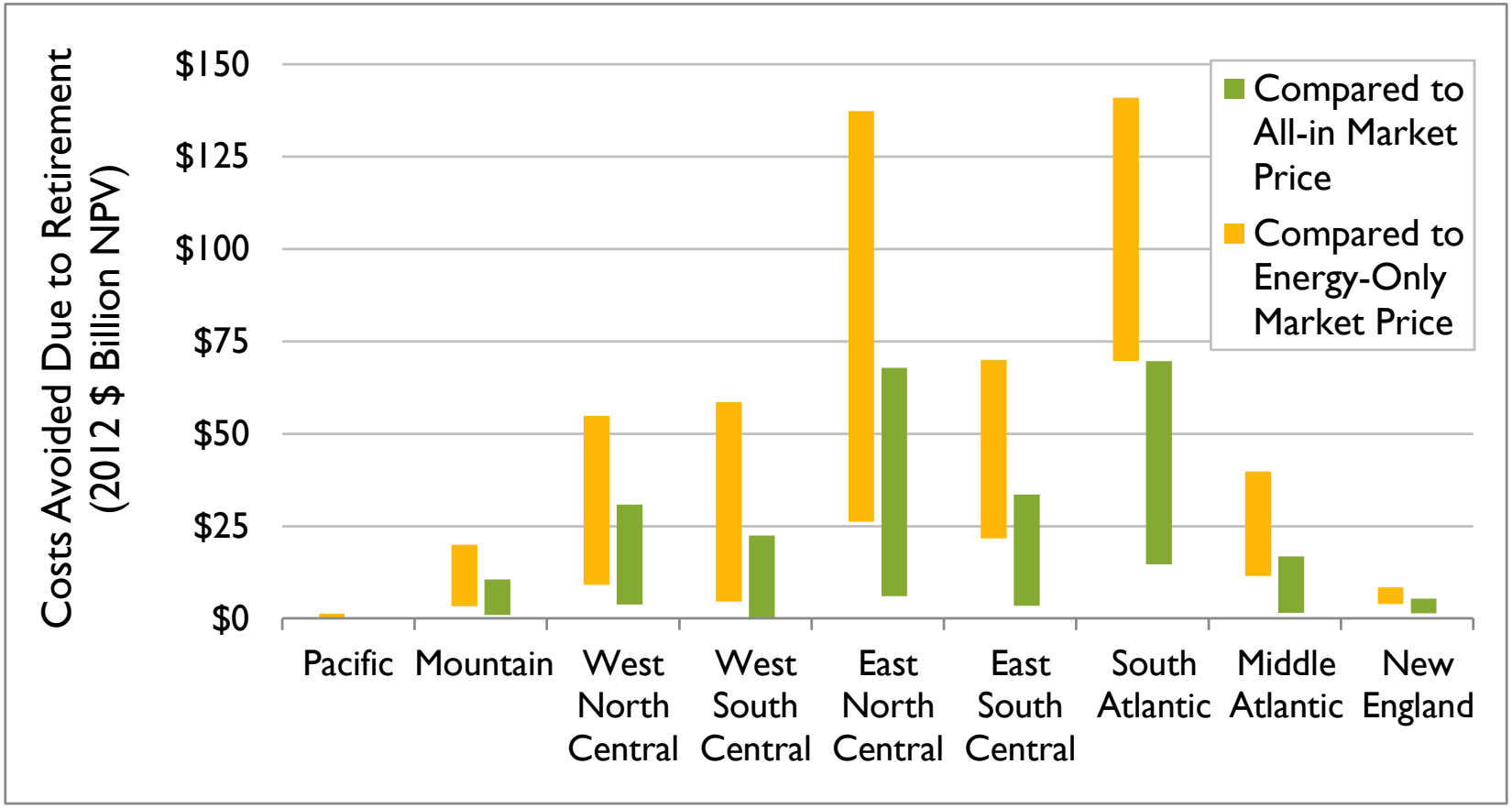
U.S. coal capacity by economic viability and region



Costs avoided due to retirement



Costs avoided due to retirement by region



Why is electric utility planning so bad? (And what can be done about it?)

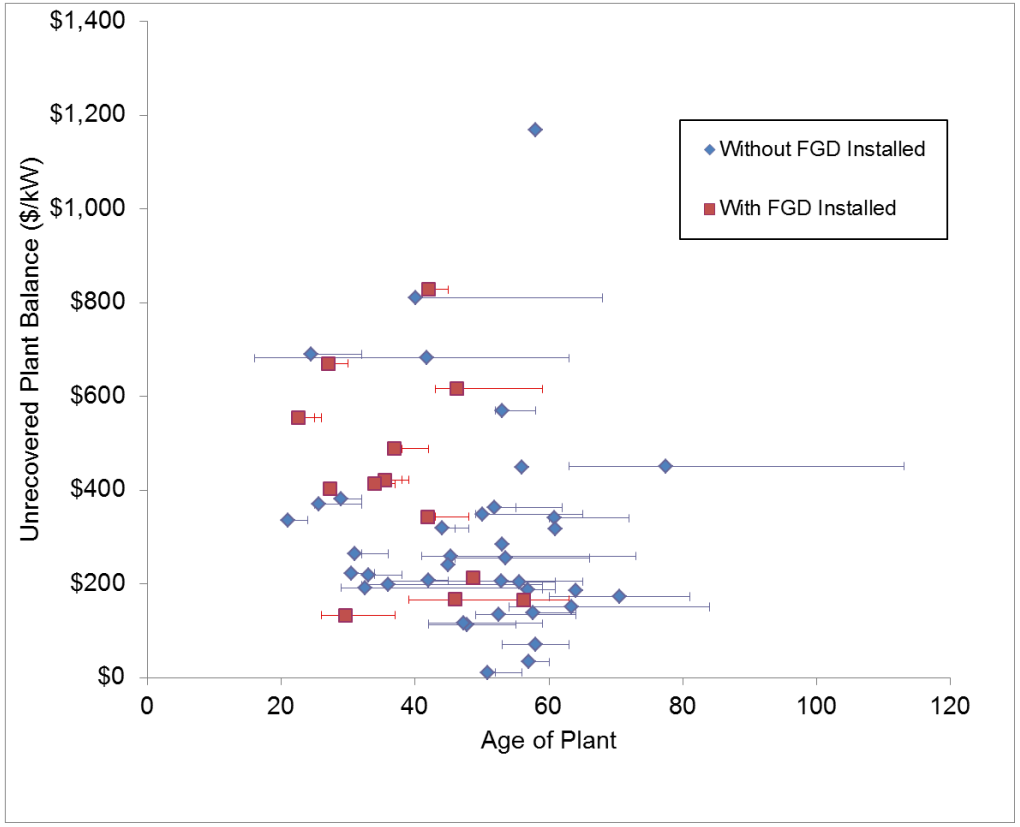
Utility ratemaking

- Regulated Monopoly Economics
- Electric utility prices are not set by “the market.” They are set by state public utility commissions in “rate cases”
- Fuel, O&M, purchased power, and administrative costs are passed through as expenses
- Power plant investments are put into “ratebase” and recovered over time with an allowed administratively determined return on equity
- Plant investment that is not prudently incurred should be removed from rates
- Plant investment that is not “used and useful” should be removed from rates

Why is utility planning so bad?

Regular Business	Regulated Monopoly Utility Business
Prices determined by strategy and markets	Prices set by regulators
Cost overruns decrease profits	Cost overruns can increase profits
Manage risk	Manage regulatory risk
Ignore sunk cost	Significant concern about sunk cost recovery

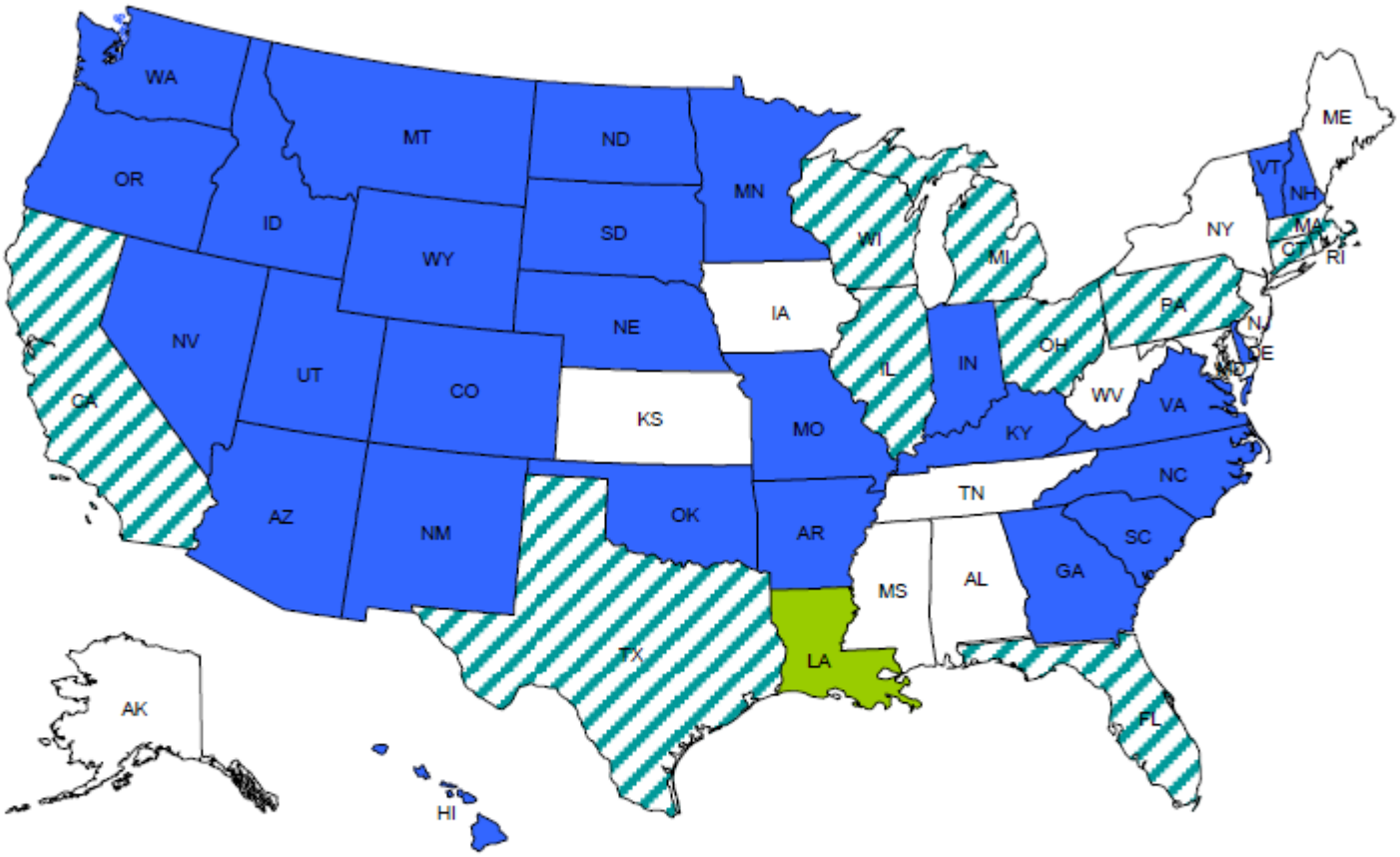
Utility incentives: Old coal plants have significant investment in rate base



Source: Presentation by Bruce Biewald, August 8, 2013, "Synapse 2013 Technical Training. Session 3: Components of Good Planning IRP and CPCN," slide 19.

- Data from data collected from 52 coal plants owned by 11 utilities
- Average plant age weighted by capacity: ~47 years
- Average plant capacity: ~675 MW
- Average unrecovered plant balance: ~$336/kW
- Average unrecovered balance as a percentage of Total Plant Balance: 50%

Presence or absence of State IRP rules and procurement plan filing requirements



Source: Peterson & Wilson 2011

Poor electric system planning practice

- Passive attitude toward information
- Rely on out-of-date construction cost estimates
- Consider only “existing” environmental regulations
- Ignore CO_2 price, or treat it “at the end” as a sensitivity case
- Assume existing plants continue to operate
- Overly constrain alternatives such as renewables and energy efficiency

IMPRUDENT!

Good electric system planning practice

- Actively seek out relevant information
- Rely on up-to-date and realistic construction cost estimates
- Anticipate reasonably likely future environmental regulations
- Include reasonable CO_2 price forecast in the reference case, and analyze high and low sensitivities
- Evaluate continued operation vs. retirement options for existing plants
- Include full consideration of alternatives

PRUDENT

What should be done?

- **Utilities** should save their customers money by retiring the coal units that are uneconomic on a forward-cost basis
- Prudent utility system planners must:
  - collect current and relevant information (don't wait for information to come to you)
  - anticipate reasonably expected market conditions and environmental regulations (not piecemeal or head-in-the-sand approach)
  - consider a reasonably wide range of resource options

What should be done?

- **Regulators** should:
  - insist on prudent planning
  - open comprehensive compliance planning dockets
  - include retrofit versus retire analysis in all planning dockets
  - consider prudence and "used and useful" in rate cases
  - disallow imprudently incurred costs
  - disallow costs that are not used and useful, unless there's good reason not to disallow

What should be done?

- **Consumer and environmental advocates** should:
  - encourage the utilities and regulators to do their jobs (see previous slides)
  - insist on retirement of uneconomic plants
  - argue for disallowance of imprudently incurred retrofit investment(s)
  - argue to remove from rate base existing plant that is not "economically used and useful" (whether or not the plant is operating)