# Outlook for coal retirements

Coal Finance 2013 March 18-19, 2013,
NYU Law School

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# About SNL Energy

- **Leading energy news and data provider based in Boulder, CO**
- **Focus on power, coal, and natural gas sectors**
- **10,000+ stories published each year**
- **In-depth data ranging from company financials to plant operational data to a suite of traded and proprietary commodities indexes**
- **Continuous coverage of the development space with daily tracking of generation, transmission, emissions controls, pipeline, storage, and coal retirement developments**

# The current environment for coal plants

## Plants face challenges primarily on two fronts

### Economics

- Competition from CCGT fleet
- Depressed wholesale power prices and oversupplied market
- Rising coal transport costs and productive decline for Appalachian coal
- Rising fixed O&M for an aging fleet

### Environmental regulations

- MATS
- CAIR/CSAPR
- Haze rule
- 316(b) and wastewater rules

# Southern Company's 3.2 GW Bowen coal plant Cartersville, GA

www.reuters.com

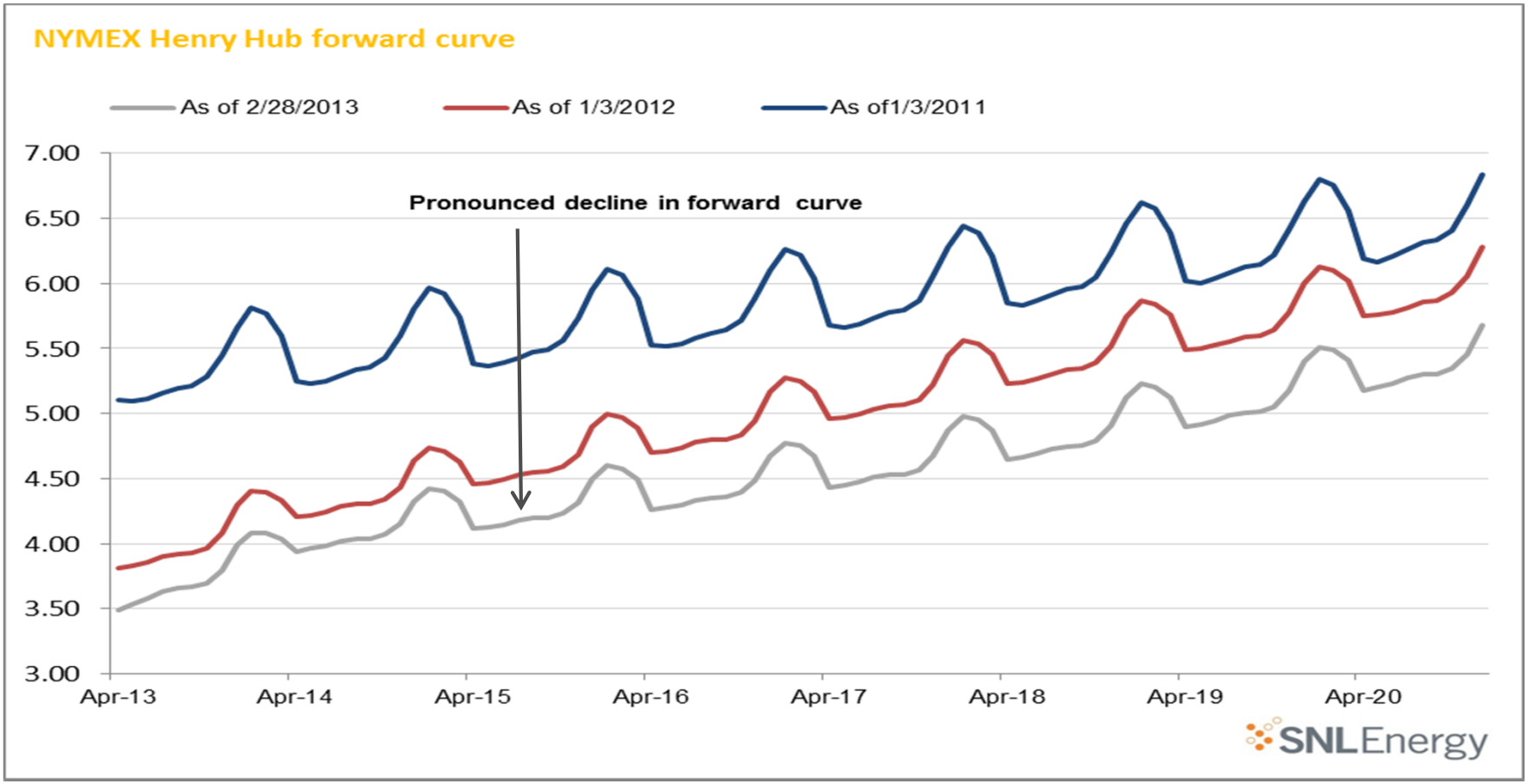
2006-2010 generated over 21 million MWh with utilization at ~80%

In 2012 generated less than 10 million MWh with utilization at ~34%

In 2012 SOCO's CCGT fleet saw an average 65% capacity factor

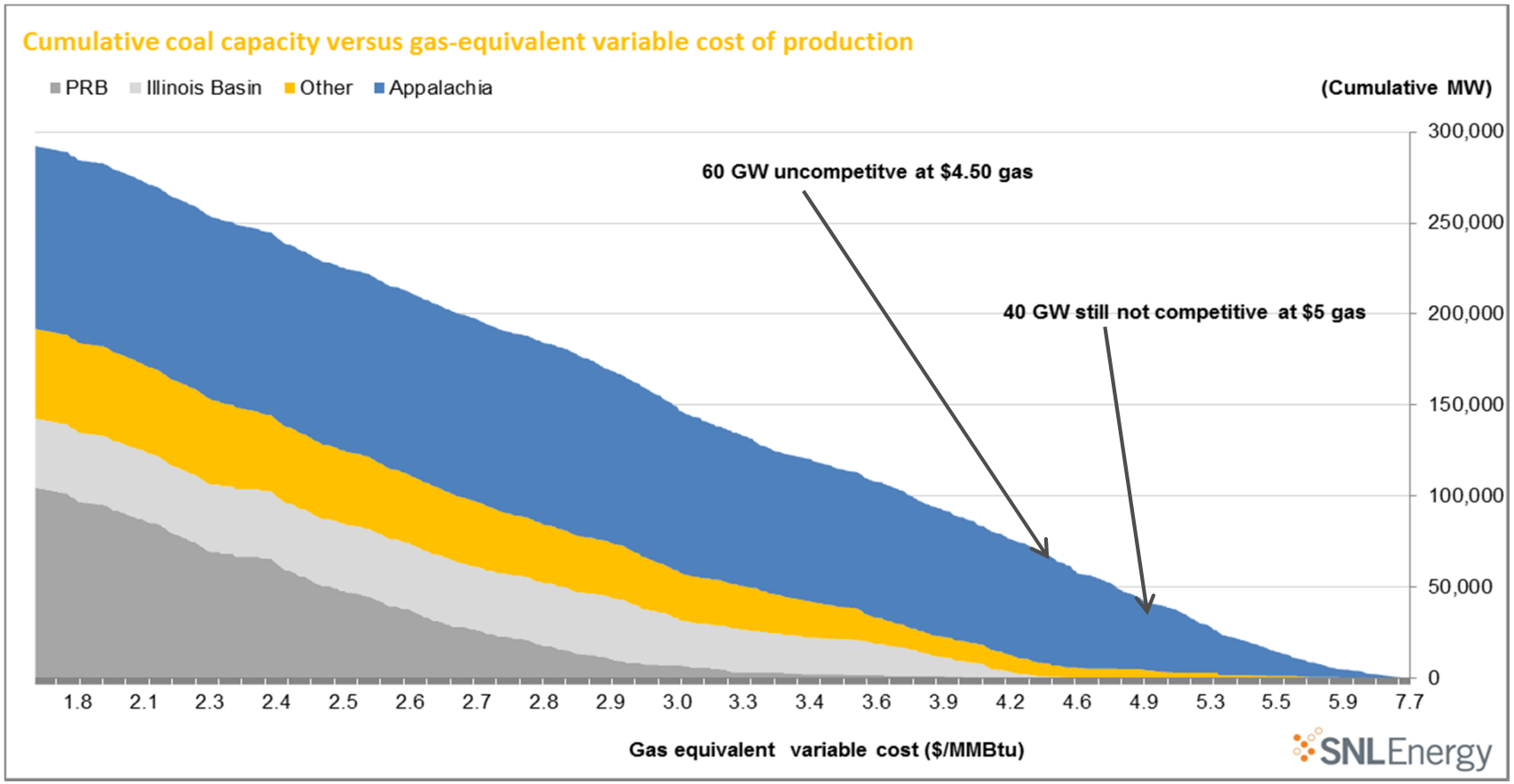
# Falling natural gas price outlook

- Pronounced decline in forward curve since 2011
- Gap between forward curves tightens in later years but decline is persistent



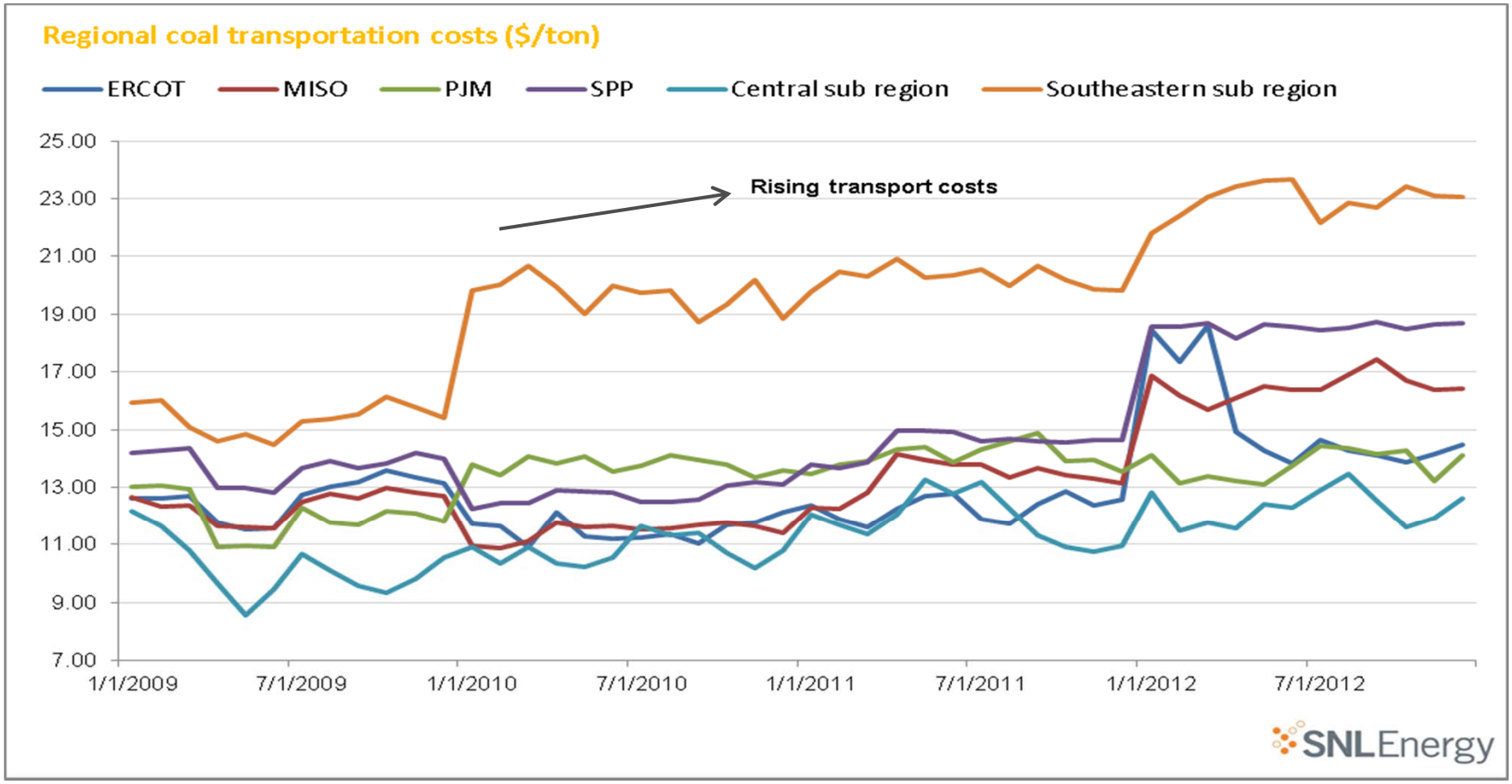
# Coal variable production costs (gas equivalent)

- Sub $5 gas into 2019 keeps continued pressure on least efficient of Eastern fleet
- PRB and ILB burners largely in the clear under current gas forwards



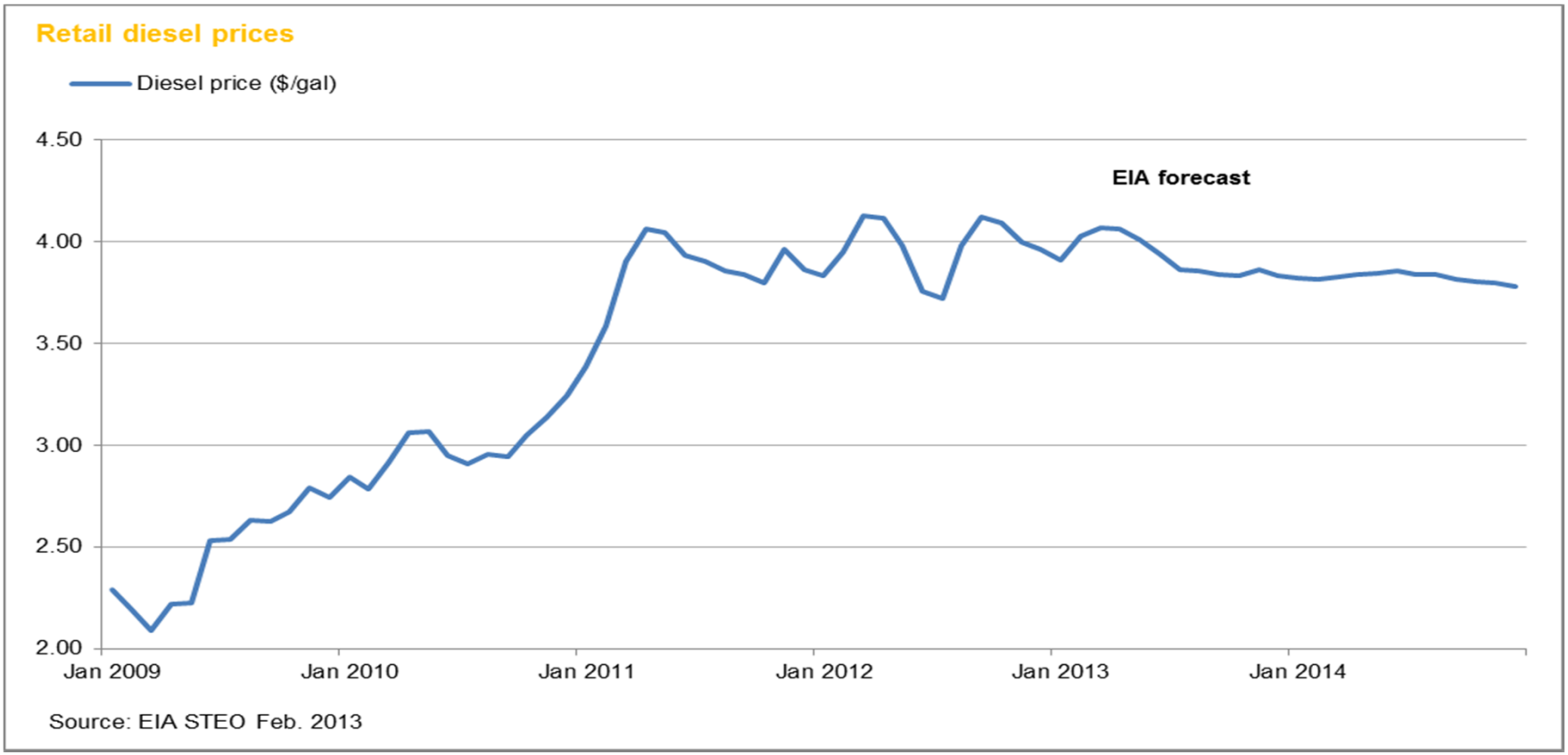
# Rising coal transportation costs

- Coal transportation costs have been rising
- Costs increases exacerbated by switch to longer haul PRB coal
- Increased competition on rails for transportation of drilling equipment

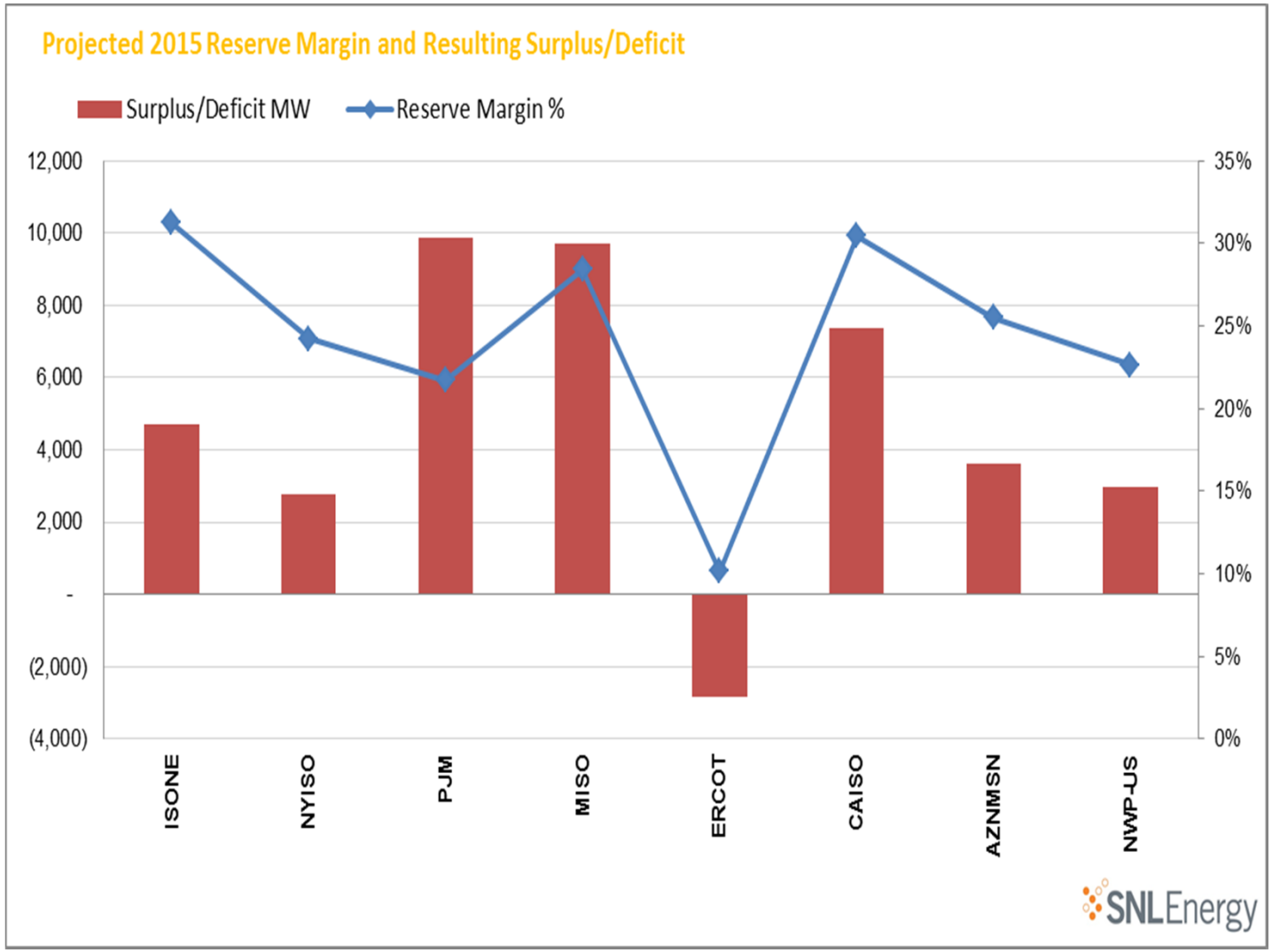


# Diesel prices

- Sharp rise in diesel prices since 2009 = upward pressure on transport costs
- Slight decline in prices through 2014 but price levels remain elevated



# Projected 2015 reserve margins

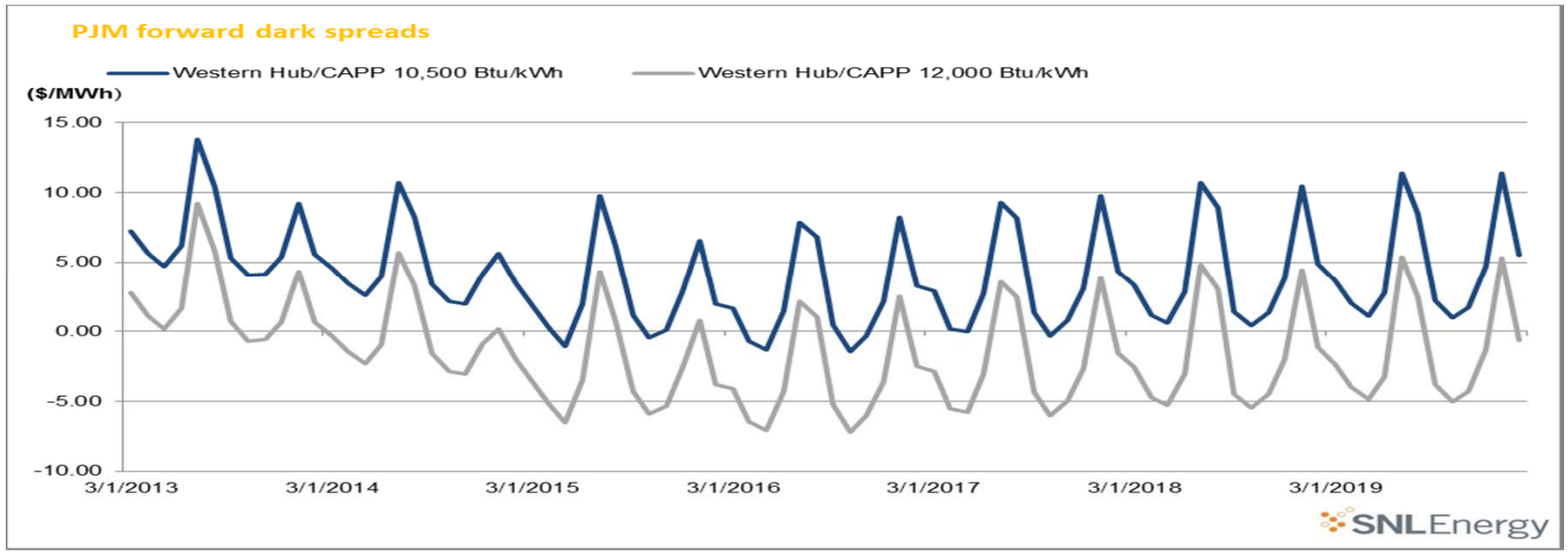


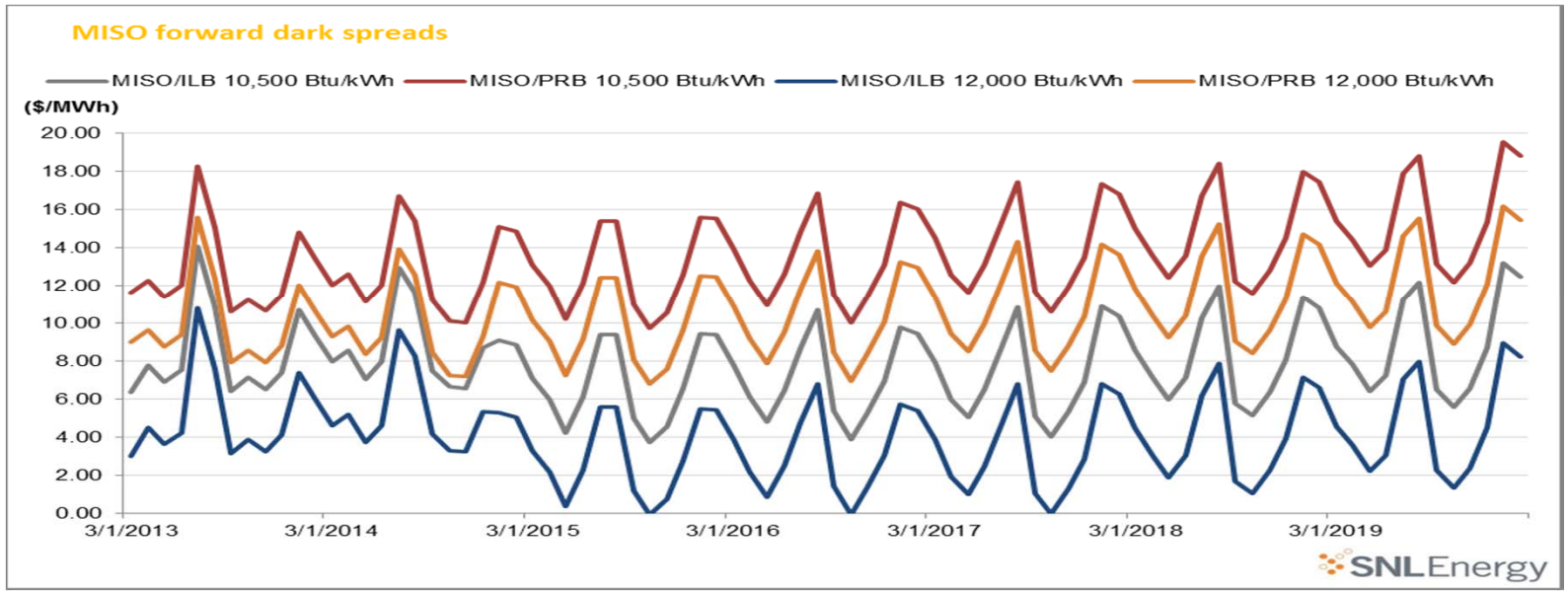

Most markets well oversupplied going into 2015

Reserve margin of 22% in PJM, 28% in MISO

On a regional level, most markets can absorb significant retirements

# Forward dark spreads



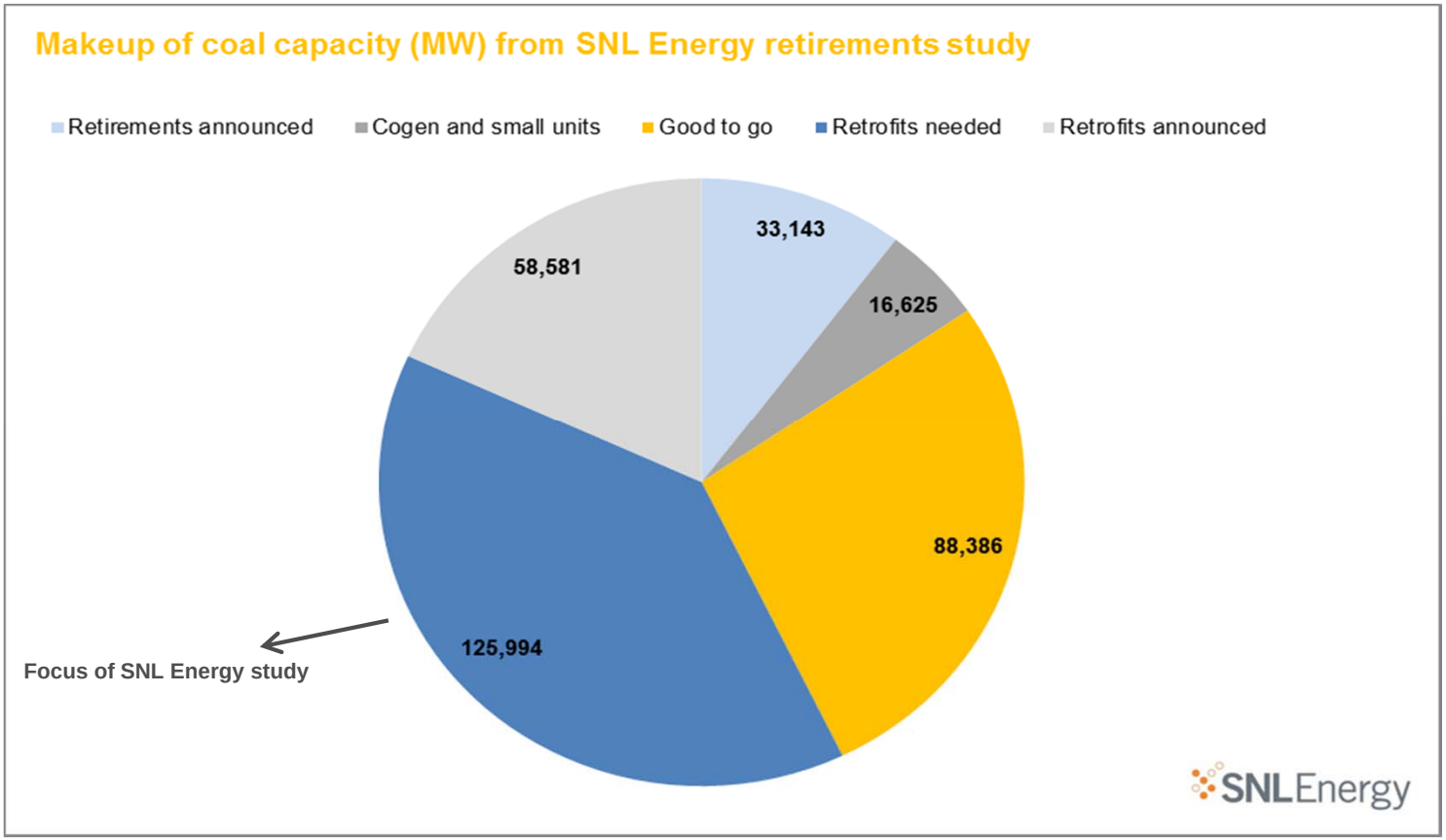



# Regulations facing coal plants

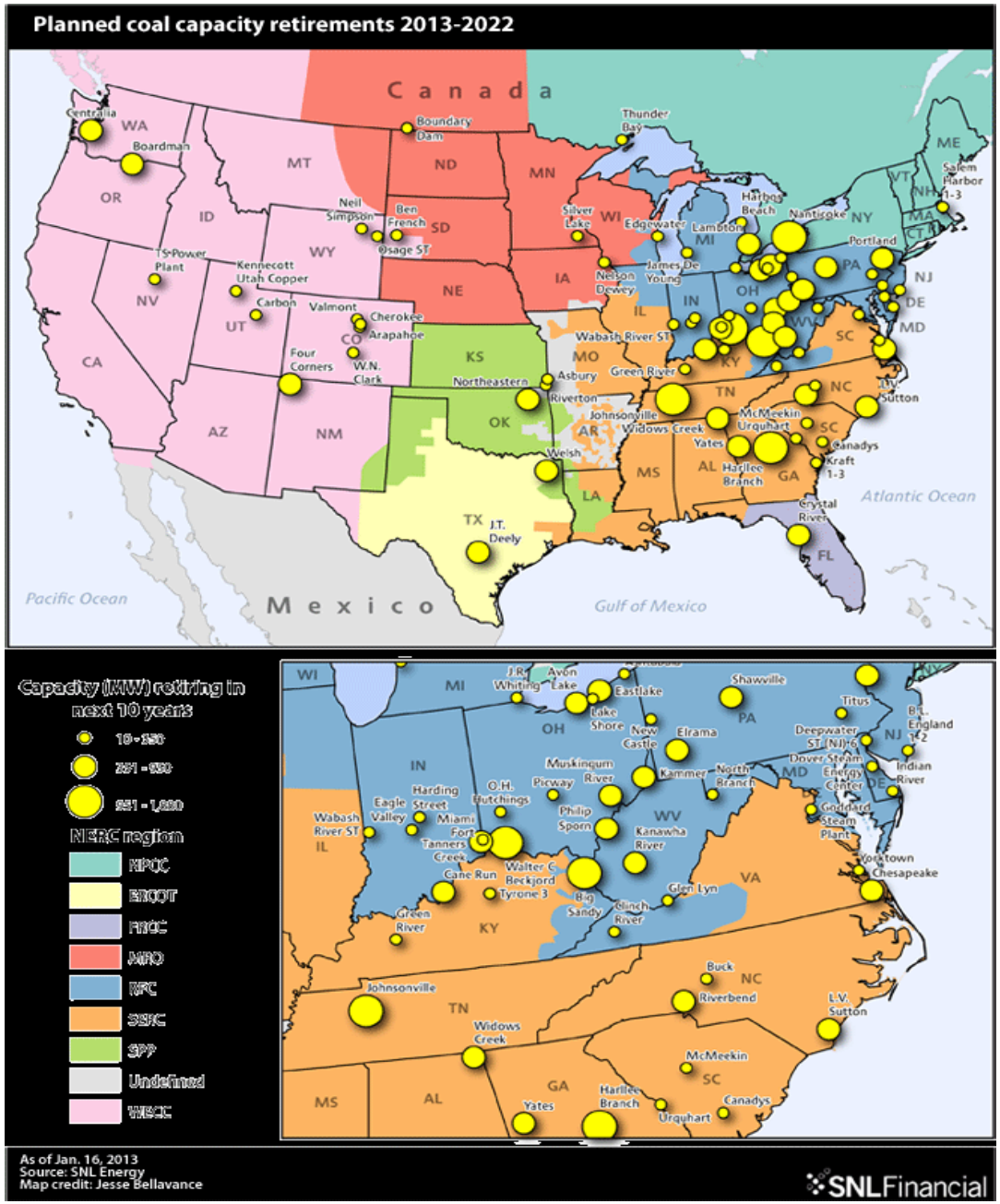
- **EPA MATS-** Control of acid gases, particulate and mercury (2015 compliance)
- **CAIR/CSAPR-** Control of NOx and SO2, CAIR currently in place and CSAPR return uncertain
- **Regional haze rule-** Uncertain outcome after CSAPR stay
- **Coal ash and water "effluent guidelines"-**Update to wastewater guidelines and coal ash disposal rules
- **316(b)-**Cooling water intake structures rule (not finalized, expected June 2013)
- **Carbon regulation-** ? Let's not go there for the moment!

# Makeup of coal fleet

- Of ~320 GW fleet 88 GW appear fully MATS compliant
- Nearly 59 GW have announced retrofit plans and 33 GW announced to retire
- 126 GW need some retrofits and have no announced compliance plans



# Announced coal retirements through 2022



# Makeup of announced retirements

- 33 GW announced to retire in 2012-2021
- Units are smaller in size with lower average utilization
- Generated ~3% of the nation's electricity in 2011

Vital stats for announced coal retirements (2012-2021) in select regions

| Region | 2011 capacity factor (%) | 2011 net gen (MWh) | 2011 avg. heat rate (Btu/kWh) | Avg. age at retirement | Average size (MW) | Capacity retiring (MW) |
|---|---|---|---|---|---|---|
| MISO | 51.02 | 8,385,505 | 11,283 | 57 | 75 | 2,333 |
| SOU | 40.19 | 8,820,138 | 10,605 | 51 | 203 | 2,638 |
| SPP | 82.09 | 7,195,771 | 10,330 | 35 | 335 | 1,005 |
| PJM | 49.83 | 48,569,720 | 10,619 | 55 | 170 | 15,908 |
| CENTRL | 51.60 | 10,091,411 | 11,419 | 57 | 133 | 3,097 |
| VACAR | 36.72 | 10,121,179 | 10,825 | 53 | 113 | 3,729 |
| **All regions** | **53.98** | **116,885,984** | **10,741** | **53** | **147** | **33,143** |

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# Retrofits considered in SNL Energy study

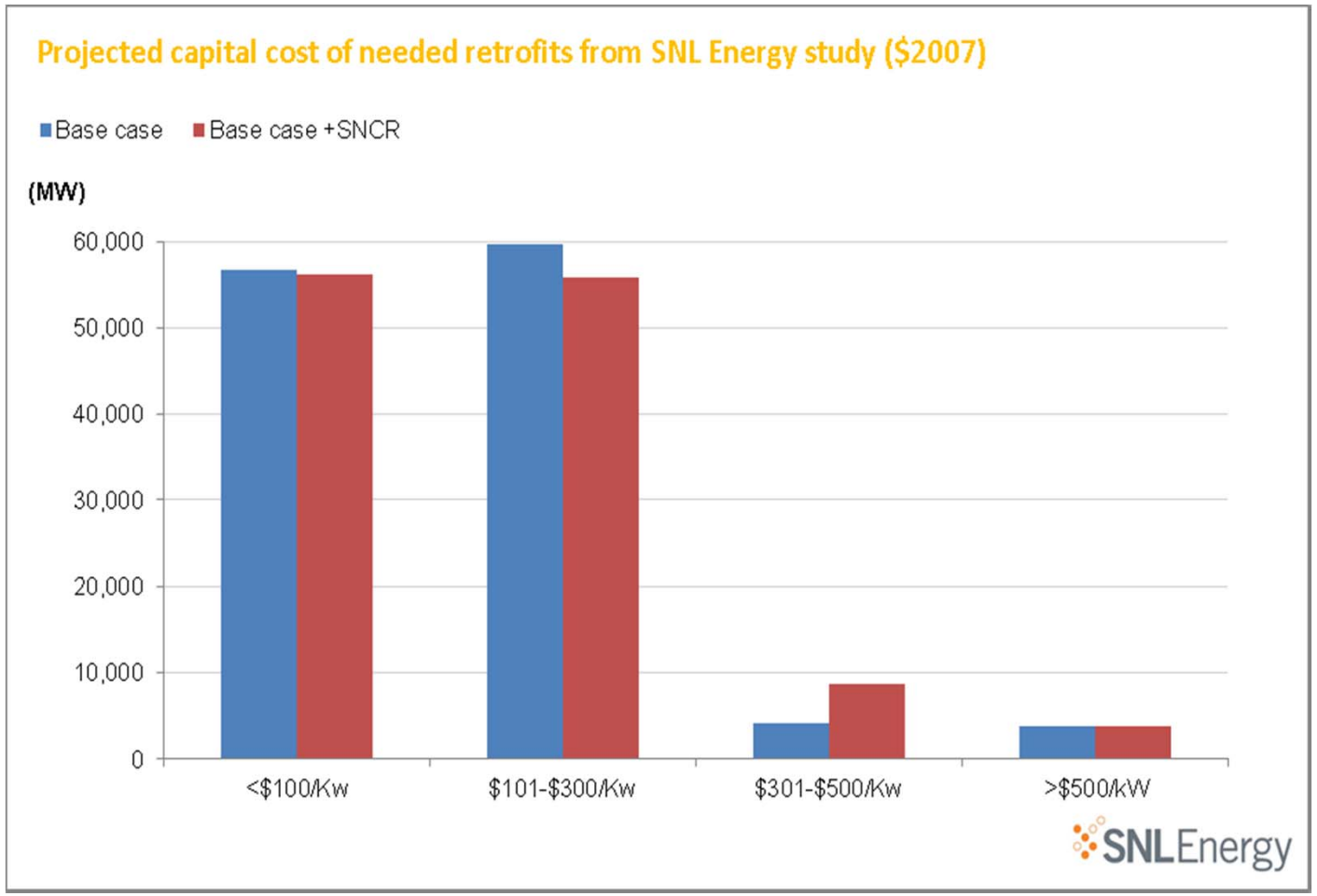
- **Acid gases:**
  Dry scrubbers, DSI or scrubber upgrade

- **Particulate:**
  Fabric filter or ESP upgrade (3 types)

- **Mercury:**
  Combination of controls, ACI, or halogen additives for PRB coal

- **Fuel switching:**
  Not explicitly modeled but accounted for where known

# Retrofit costs under SNL Energy study



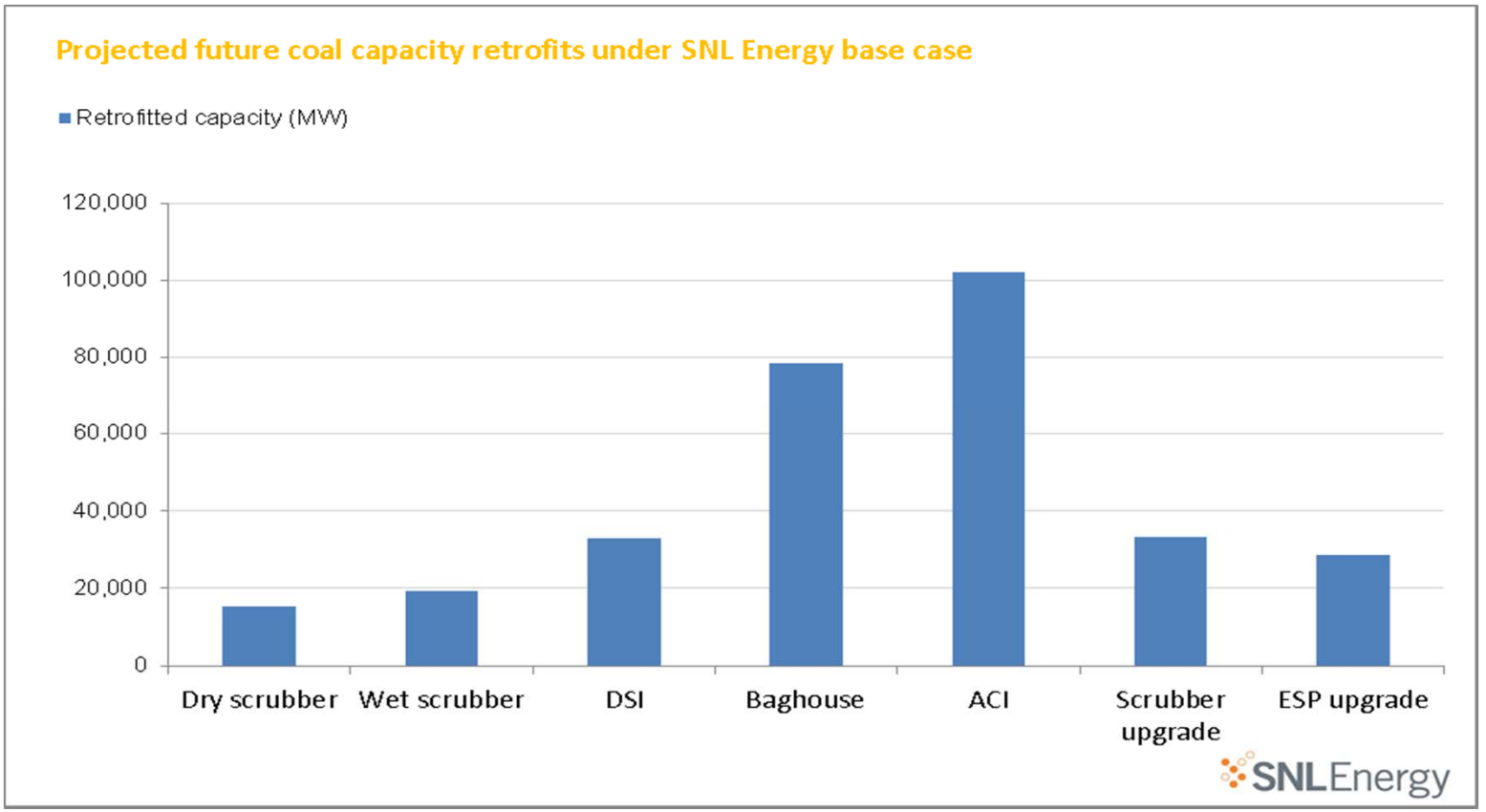

Most units need less than $300/kW for compliance

Less than 10 GW require more than $300/kW

Only small difference with SNCR required

# Projected retrofits under SNL Energy base case

- 104 GW appear economic to retrofit
- 33 GW of DSI, 19 GW wet scrubbers, 15 GW of dry scrubbers
- ~100 GW install activated carbon injection for mercury control
- 80 GW of fabric filters installed + 29 GW upgrade ESP



# Summary of results from coal retirements study

- Base case- Nearly 22 GW of incremental at-risk retirements, 55 GW including announced
- Total potential retirements drops to 46.6 GW with a $1/MMBtu rise in NG prices
- Total potential retirements rises to ~60GW with a $.050/MMBtu drop in NG prices
- SNCR requirement adds ~4GW to at-risk retirements

Announced and at risk coal capacity identified in SNL Energy's coal retirements analysis

| | Base | Base + SNCR | Base +$1 gas | Base +$1 gas + SNCR | Base -$0.50 gas | Base -$0.50 gas +SNCR |
|---|---|---|---|---|---|---|
| At risk (MW) | 21,700 | 25,900 | 13,400 | 14,700 | 27,000 | 30,900 |
| Announced (MW) | 33,100 | 33,100 | 33,100 | 33,100 | 33,100 | 33,100 |
| **At risk + announced (MW)** | **54,800** | **59,000** | **46,600** | **47,900** | **60,100** | **64,100** |

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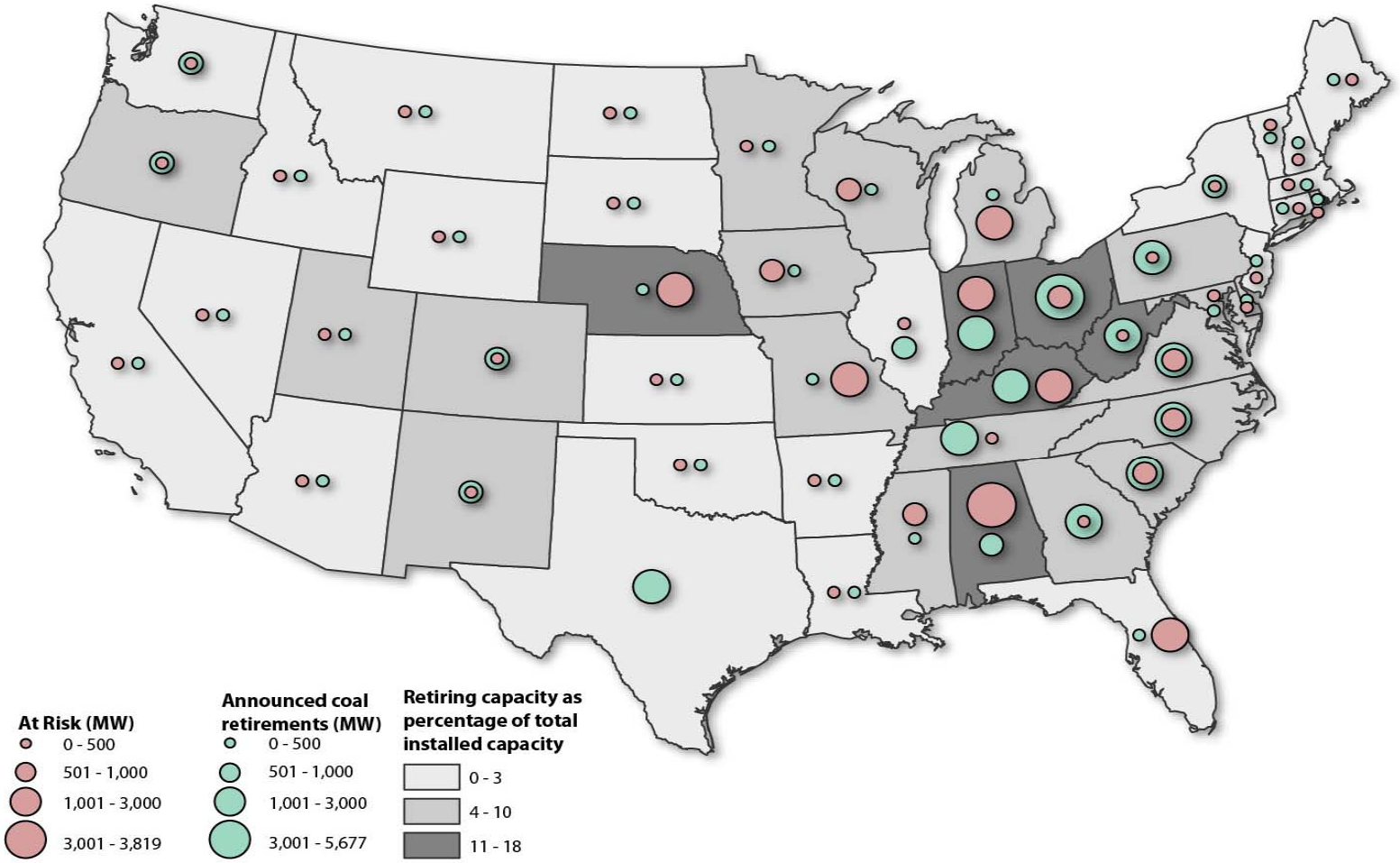
# Map of at-risk coal retirements vs. announced retirements

**U.S. summary of announced coal retirements and capacity at risk of retiring/repowering**




States are shaded by total at-risk and announced coal retirements (2012-2021) as a percentage of the state's total installed capacity (adjusted for wind availability)
As of Mar. 7, 2013
Source: SNL Energy
Map Credit: Whit Varner/Jesse Bellavance

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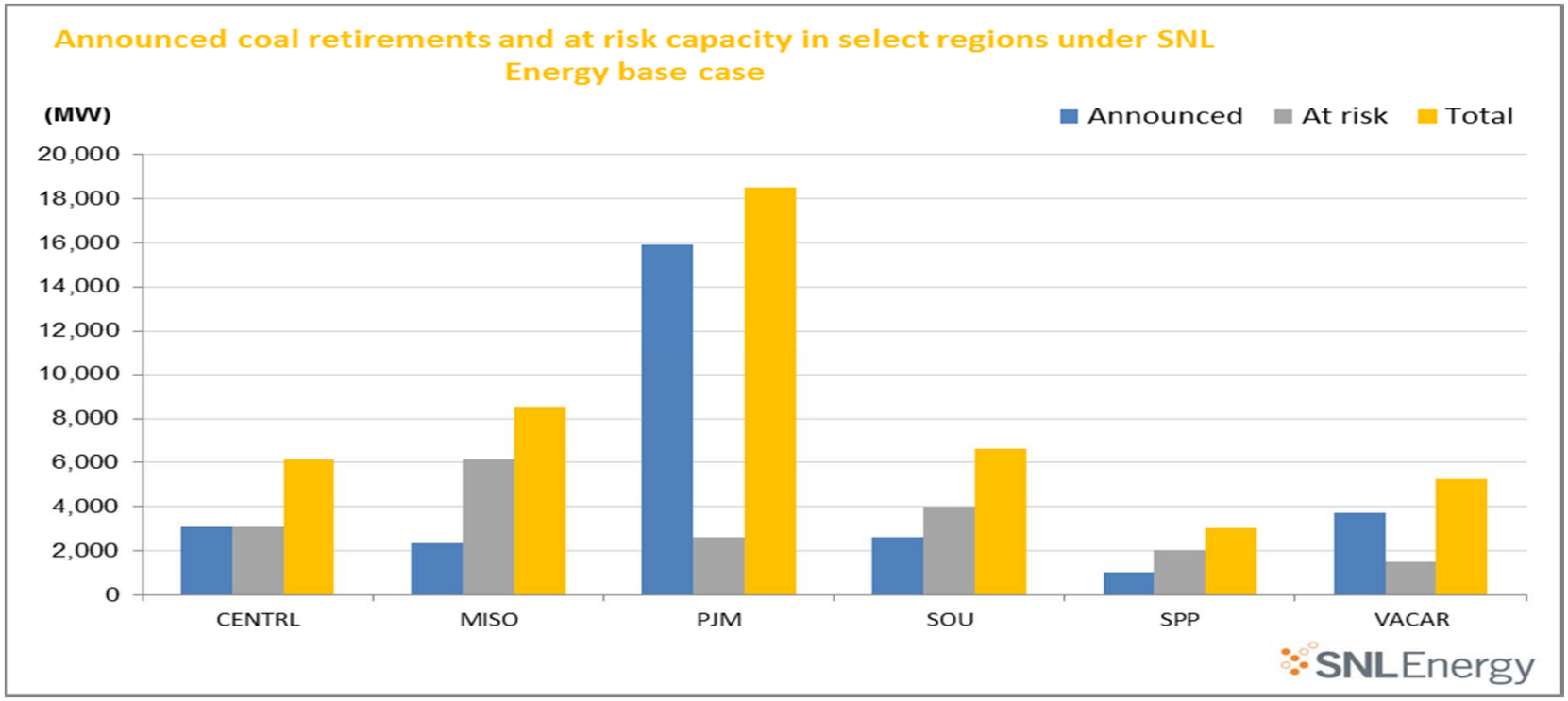
# Regional summary of announced and at-risk coal retirements

- In PJM, most retirements already announced (16 GW) versus 2.5 GW incremental
- Substantial potential increase for MISO (6 GW) with nearly 9 GW total
- Big increase in Southeast with 4 GW in SOU sub region and 3 GW in CENTRL



# Makeup of at-risk coal retirements vs. announced retirements

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Low hanging fruit already announced

Vital stats for at-risk coal retirements for select regions under SNL Energy's base case

| Region | 2011 capacity factor (%) | 2011 net gen (MWh) | 2011 avg. heat rate (Btu/kWh) | Avg. age at retirement | Average size (MW) |
|---|---|---|---|---|---|
| MISO | 59.67 | 29,182,456 | 11,147 | 49 | 119 |
| SOU | 52.60 | 15,385,706 | 10,194 | 51 | 191 |
| SPP | 60.75 | 10,487,152 | 11,331 | 49 | 113 |
| PJM | 48.93 | 8,898,725 | 10,376 | 53 | 194 |
| CENTRL | 60.61 | 15,180,895 | 10,745 | 58 | 162 |
| VACAR | 48.22 | 3,023,368 | 10,851 | 52 | 170 |
| **All regions** | **55.69** | **89,868,261** | **10,823** | **50** | **153** |

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Overall, at risk coal units are similar in size, age, heat rate and utilization to already announced retirements

# So why is all of this not announced yet?

- **Theory 1: Option theory problem-** The greater the uncertainty, the greater the value of the firm's options to invest, and the greater the incentive to keep these options open.

  **Major Sources of uncertainty:**

  - Regulation: Not clear how cooling rule and haze rules will play out or what a return of CSAPR would look like

  - Natural gas prices-Many utilities considering conversion to NG and uncertainty remains (i.e. LNG exports) so wait and see strategy may have value

  - Economic uncertainty- Uncertain future for U.S. fiscal policy, economic growth, and the resulting impact on power demand

- **Theory 2: Game theory problem-** Value to not being the first mover and change in outlook once others have made decisions

# Thank you!