



# **Some Unconventional Thoughts on Regional Unconventional Gas and Power Generation Requirements**

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**SERC/MISO Reserve Margins**

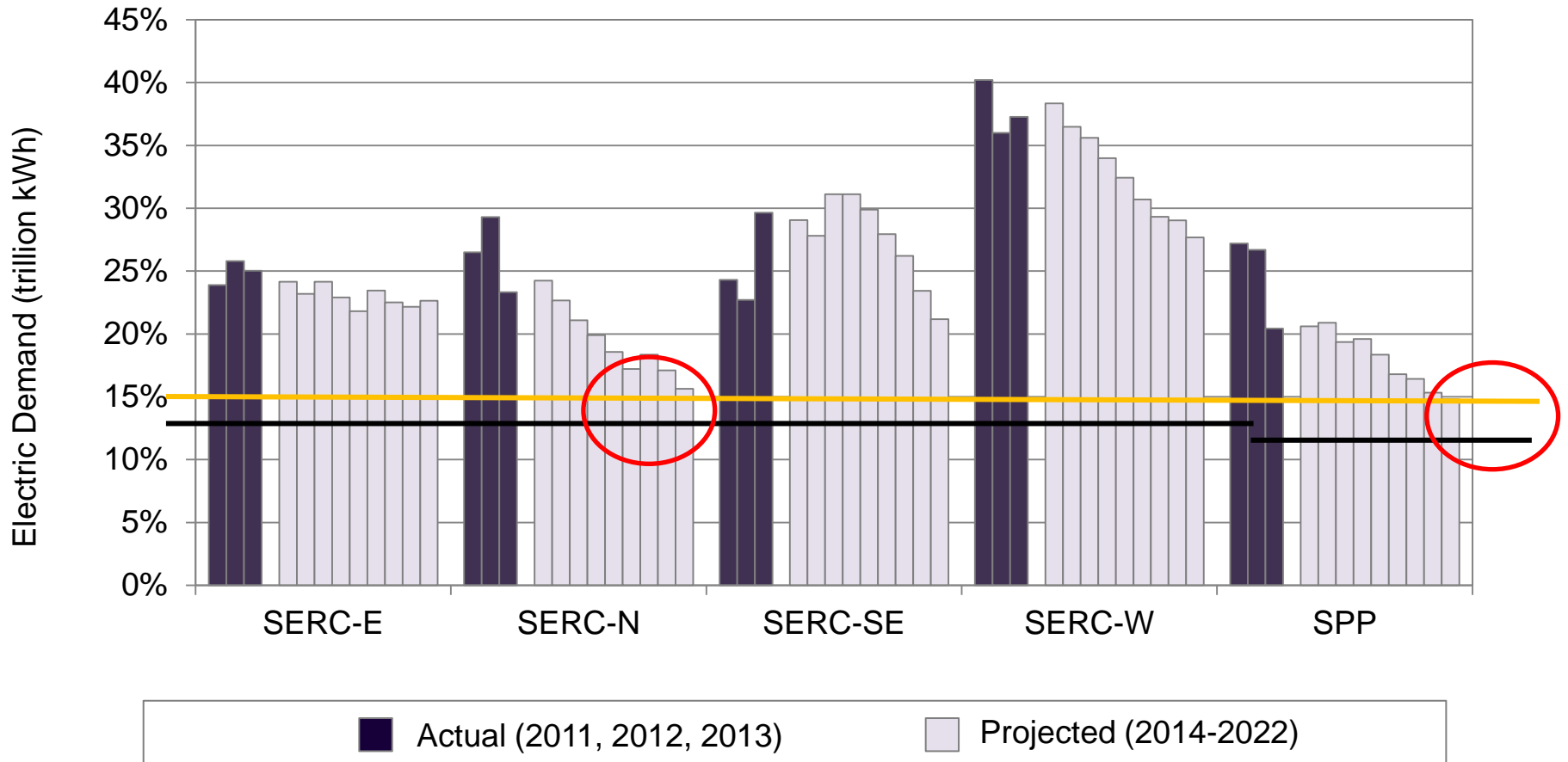
**Reserve margins in MISO are much tighter than SERC, creating an opportunity for excess merchant generation to meet new MISO load requirements and potentially displace less efficient generation in that region.**





## SERC/SPP Historic and Projected Reserve Margins

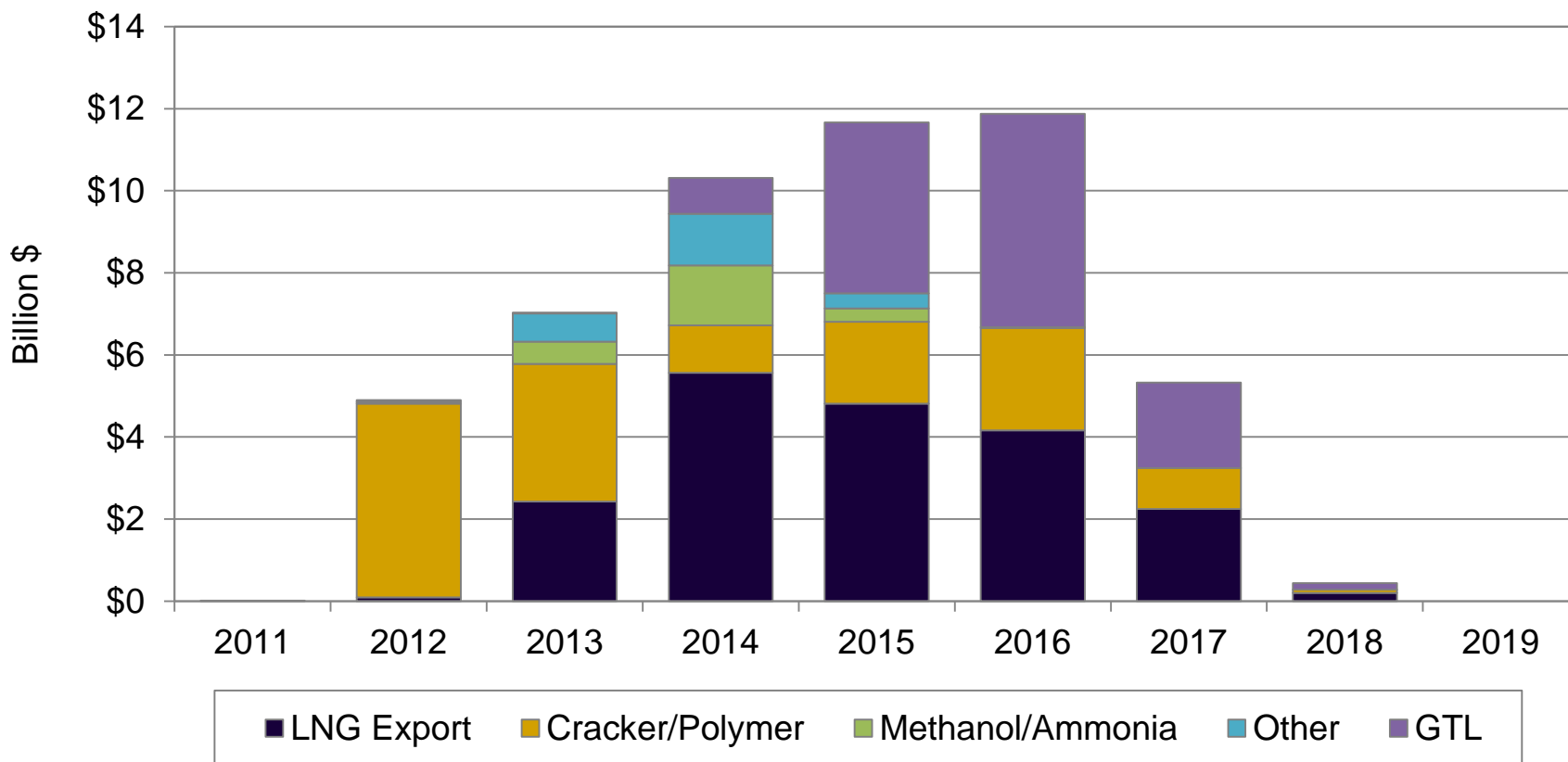
**While margins are anticipated to fall, the conventional wisdom is the decrease will be slow.**



Source: NERC; SERC planning standard line at 15 percent; SPP planning standard line at 13.6 percent.

**Total Capital Expenditures by Sector**

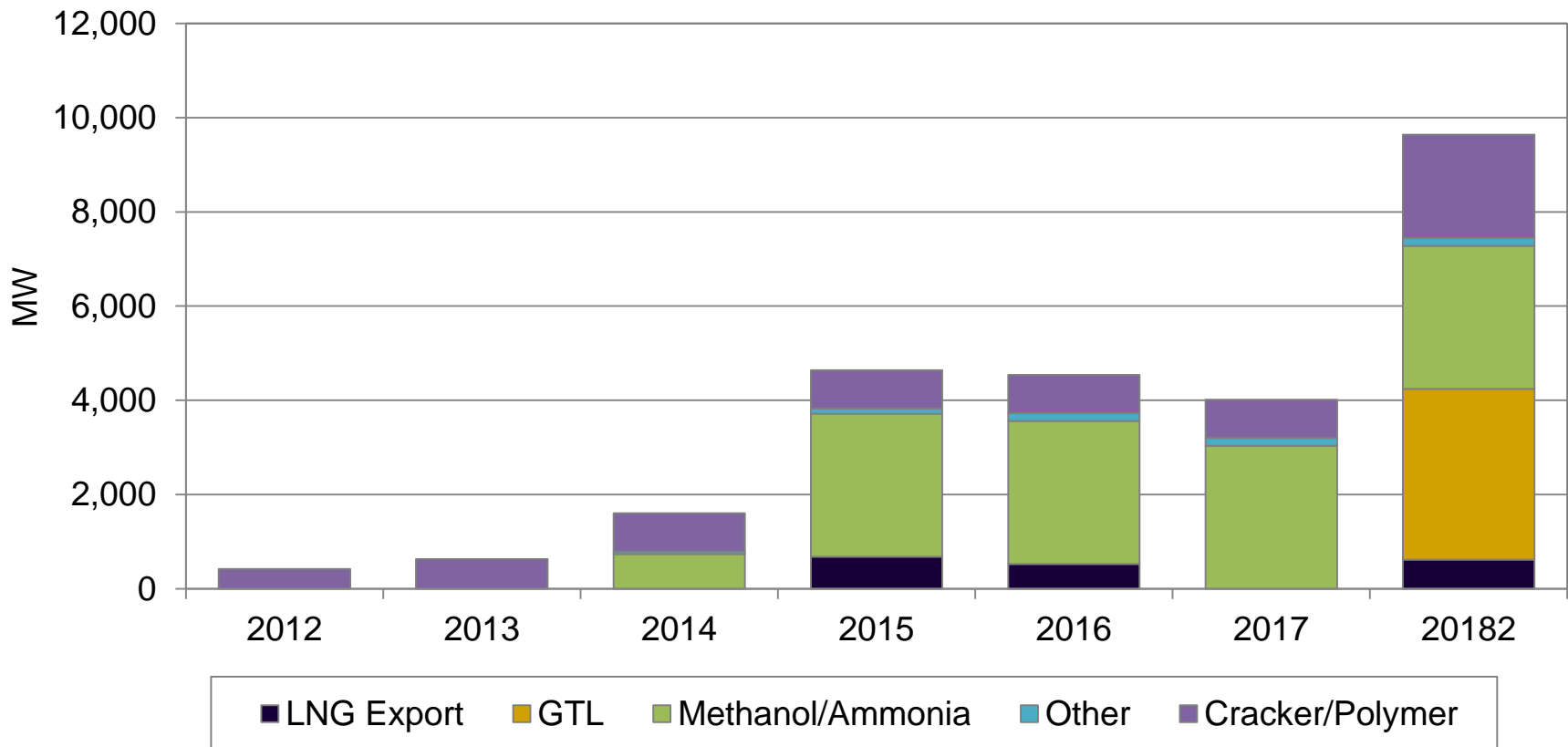
**The total capital investment associated with all announced natural gas-driven manufacturing investments in Louisiana totals over \$61 billion. Most of the investment is anticipated to occur between 2014 and 2017.**





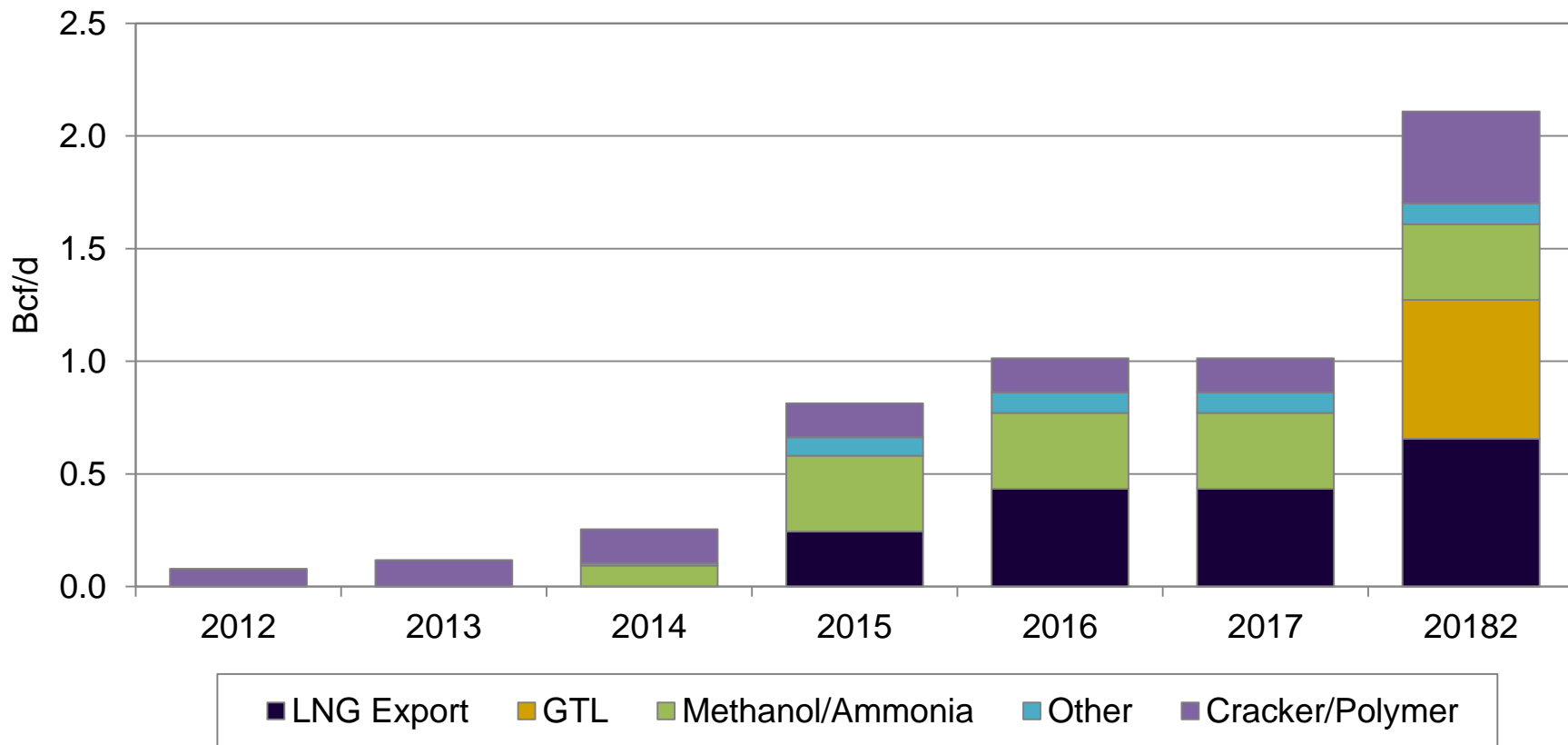
## Electric Capacity by Sector and Online Date

Capacity requirements associated with all currently-announced projects would come close to doubling in-state generation capacity.



**Total Natural Gas Capacity by Sector and Online Date**

**Industrial gas demand could also double given current project announcements.**

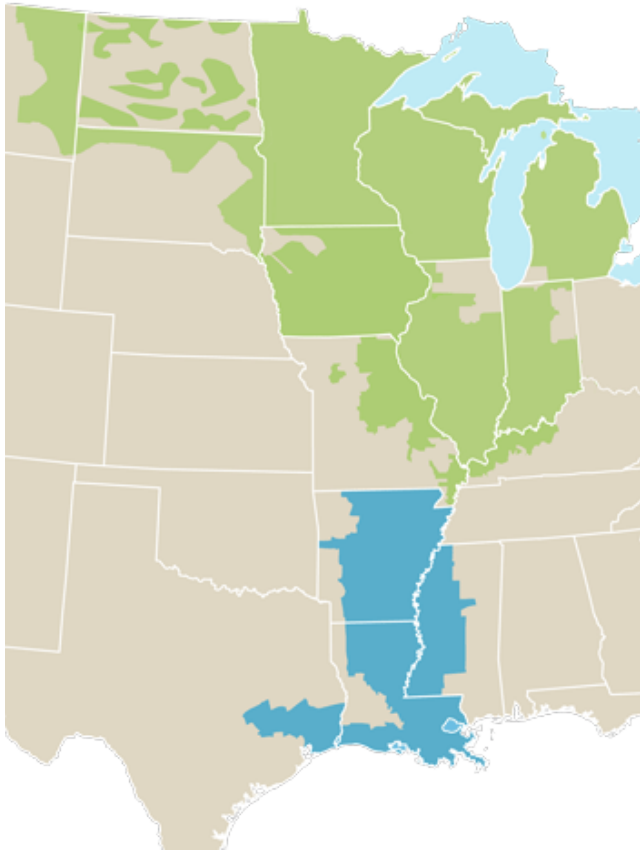


**Potential Economic Impacts/Benefit: Construction, State**

**Not quiet as clear will be the additional power/gas requirements for all the new residential and commercial activities supporting development/operation. Should elevate regional usage trends relative to national averages.**

|                            | Construction Impacts |               |                   |                   |                   |                   |                   |                   |                 |             |
|----------------------------|----------------------|---------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-----------------|-------------|
|                            | Total                | 2011          | 2012              | 2013              | 2014              | 2015              | 2016              | 2017              | 2018            | 2019        |
| <b>Output (million \$)</b> |                      |               |                   |                   |                   |                   |                   |                   |                 |             |
| Direct                     | \$ 17,080.2          | \$ 4.4        | \$ 1,715.4        | \$ 2,458.1        | \$ 3,535.5        | \$ 3,765.0        | \$ 3,764.9        | \$ 1,696.2        | \$ 140.7        | \$ -        |
| Indirect                   | \$ 2,742.2           | \$ 0.7        | \$ 275.4          | \$ 394.6          | \$ 567.6          | \$ 604.5          | \$ 604.4          | \$ 272.3          | \$ 22.6         | \$ -        |
| Induced                    | \$ 5,315.3           | \$ 1.4        | \$ 533.8          | \$ 765.0          | \$ 1,100.2        | \$ 1,171.7        | \$ 1,171.6        | \$ 527.9          | \$ 43.8         | \$ -        |
| <b>Total</b>               | <b>\$ 25,137.6</b>   | <b>\$ 6.4</b> | <b>\$ 2,524.6</b> | <b>\$ 3,617.7</b> | <b>\$ 5,203.3</b> | <b>\$ 5,541.1</b> | <b>\$ 5,540.9</b> | <b>\$ 2,496.4</b> | <b>\$ 207.0</b> | <b>\$ -</b> |
| <b>Employment (jobs)</b>   |                      |               |                   |                   |                   |                   |                   |                   |                 |             |
| Direct                     | 115,726              | 30            | 11,623            | 16,655            | 23,955            | 25,510            | 25,509            | 11,493            | 953             | -           |
| Indirect                   | 18,500               | 5             | 1,858             | 2,662             | 3,829             | 4,078             | 4,078             | 1,837             | 152             | -           |
| Induced                    | 47,241               | 12            | 4,745             | 6,799             | 9,779             | 10,414            | 10,413            | 4,692             | 389             | -           |
| <b>Total</b>               | <b>181,468</b>       | <b>47</b>     | <b>18,225</b>     | <b>26,116</b>     | <b>37,563</b>     | <b>40,001</b>     | <b>40,000</b>     | <b>18,022</b>     | <b>1,495</b>    | <b>-</b>    |
| <b>Wages (million \$)</b>  |                      |               |                   |                   |                   |                   |                   |                   |                 |             |
| Direct                     | \$ 5,566.6           | \$ 1.4        | \$ 559.1          | \$ 801.1          | \$ 1,152.3        | \$ 1,227.1        | \$ 1,227.0        | \$ 552.8          | \$ 45.8         | \$ -        |
| Indirect                   | \$ 804.7             | \$ 0.2        | \$ 80.8           | \$ 115.8          | \$ 166.6          | \$ 177.4          | \$ 177.4          | \$ 79.9           | \$ 6.6          | \$ -        |
| Induced                    | \$ 1,493.1           | \$ 0.4        | \$ 150.0          | \$ 214.9          | \$ 309.1          | \$ 329.1          | \$ 329.1          | \$ 148.3          | \$ 12.3         | \$ -        |
| <b>Total</b>               | <b>\$ 7,864.5</b>    | <b>\$ 2.0</b> | <b>\$ 789.8</b>   | <b>\$ 1,131.8</b> | <b>\$ 1,627.9</b> | <b>\$ 1,733.6</b> | <b>\$ 1,733.5</b> | <b>\$ 781.0</b>   | <b>\$ 64.8</b>  | <b>\$ -</b> |

**Competitive Wholesale Market Changes/Benefits**



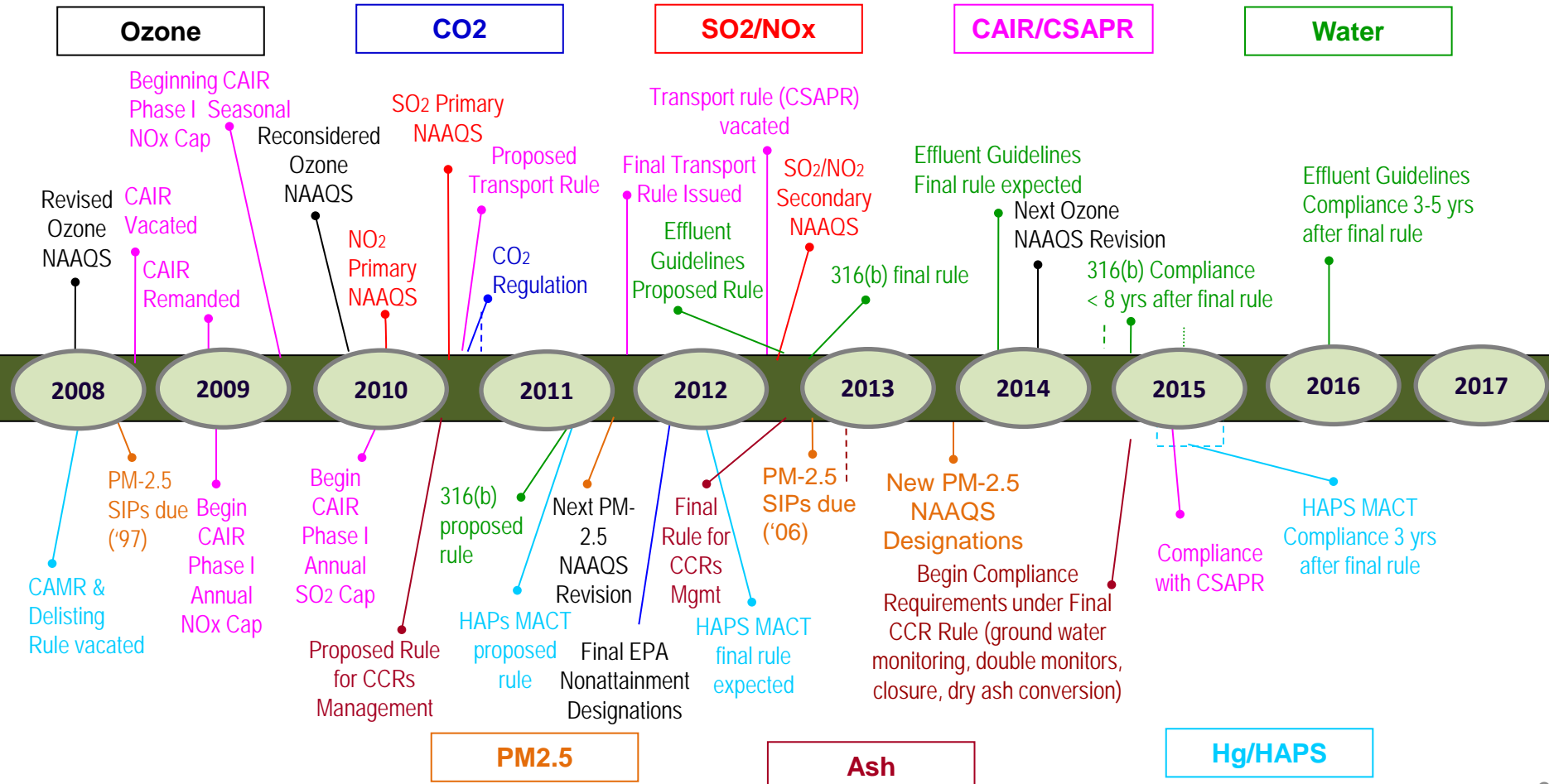
- There are a number of wholesale market benefits that can arise from the expansion of MISO to the Gulf Coast that include:
- Greater power generation market efficiencies.
- The ability to move highly-efficient and environmentally-friendly natural gas fired generation into an area historically dominated by coal-fired generation.
- Greater market scope opportunities by providing lower-cost, highly efficient natural gas generators easier access to quickly growing mid-western electric power markets.





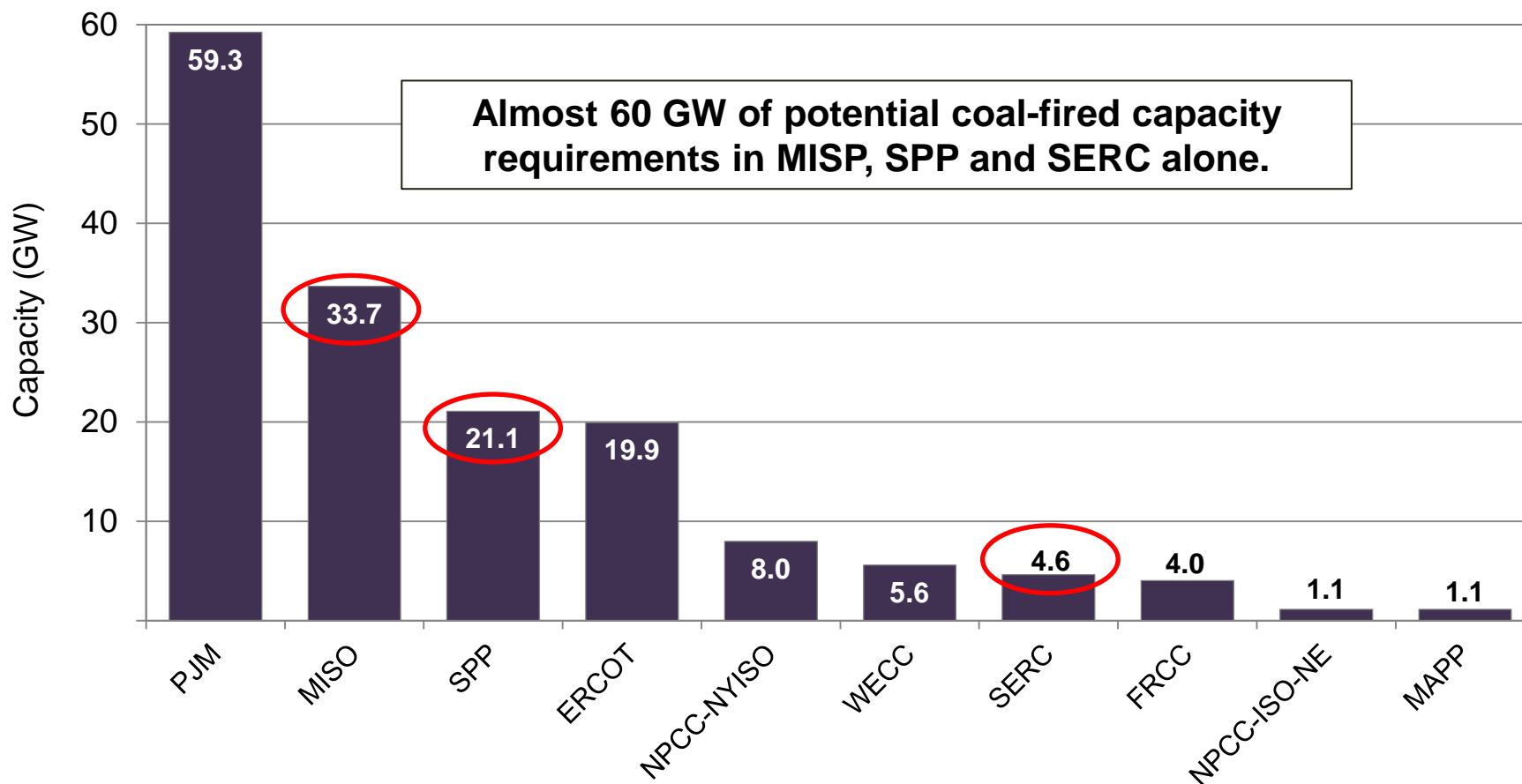
## Changes in Environmental Regulations

EPA has made a number of rulemaking and rule changes that will dramatically change power generation and shift generation preferences away from coal. Natural gas and renewables will benefit from these changes.

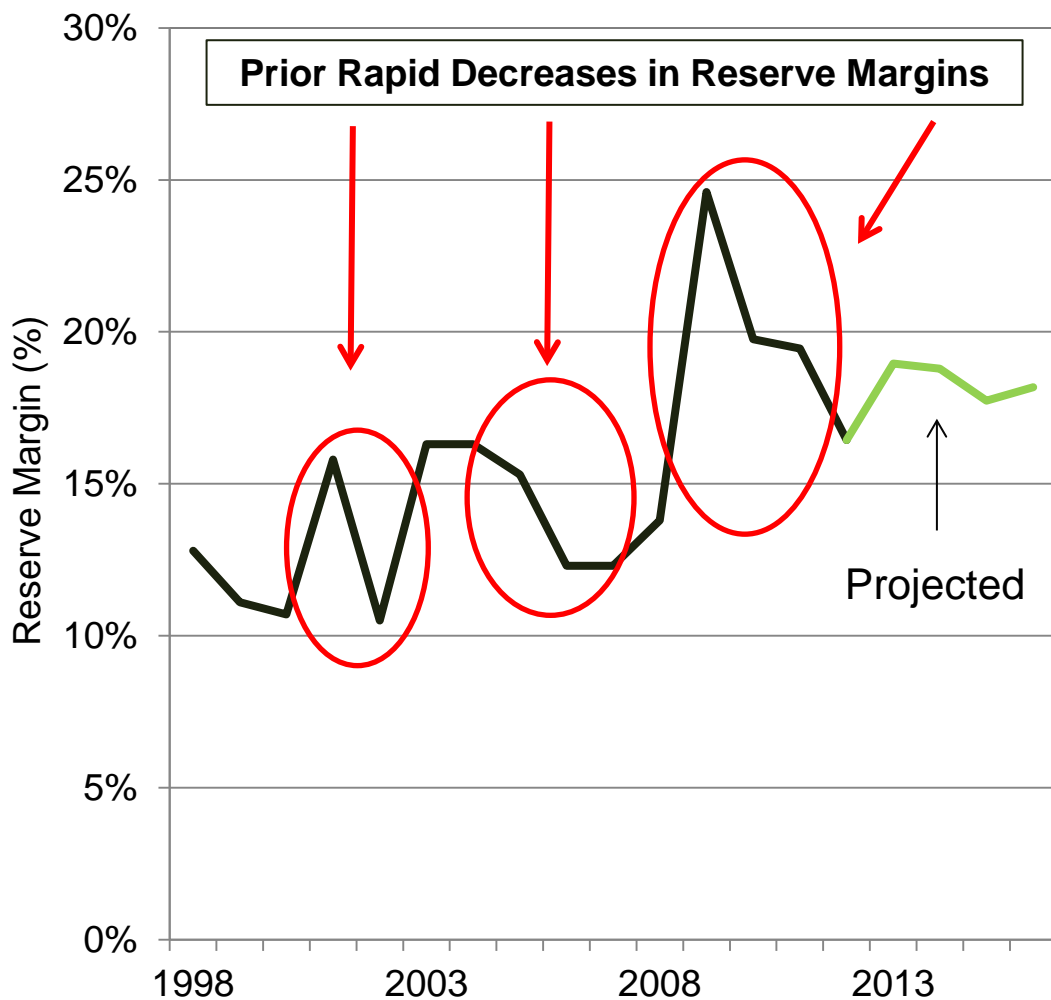


**Estimated Environmental Retirements by NERC Region**

**NERC estimates that 160 GWs (339 units) will need retrofits by 2016. NERC also estimates that MISO will need to control over 33 GW of fossil-fueled generation to comply with new EPA regulations.**



**Historic and Projected Reserve Margin Changes**



**Have seen examples in the past where excess generation can be burnt off relatively quickly.**

**Conclusions**

- So – while conventional wisdom suggests markets are amply supplied, some surprising changes could arise over the next several years.
- This is a large and unprecedented level of industrial development/activity. While some projects may get cancelled, the nature of these projects differs from past infrastructure trends.
- The “multiplier” impacts on energy not often considered but could move what has been flat to decreasing power and gas use upward for smaller use customer classes.
- Environmental regulations will preference more gas.
- History shows how quickly reserve/capacity margins can evaporate.



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