



Combined Heat & Power in Louisiana: Status, Potential, and Policies.

Phase 4 Report: Policy and Market Opportunity and Challenges for CHP Development

Prepared for the Louisiana Department of Natural Resources

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August 11, 2014



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Section 1: Policy Issues



CHP Policy Issues

CHP developers and utilities have considerable differences of opinion in CHP policy issues that became more prominent during the period of increased merchant power development experienced over the past decade.

From a developer's perspective, past policy and market barriers have historically centered around the same three primary problems:

- (1) lack of price transparency (on CHP market/utility sales);
- (2) having an open and objective transmission operations, planning, and longer-run development process; and
- (3) lack of market institutions to support expanded sales of CHP output into wholesale markets.



CHP Outlook

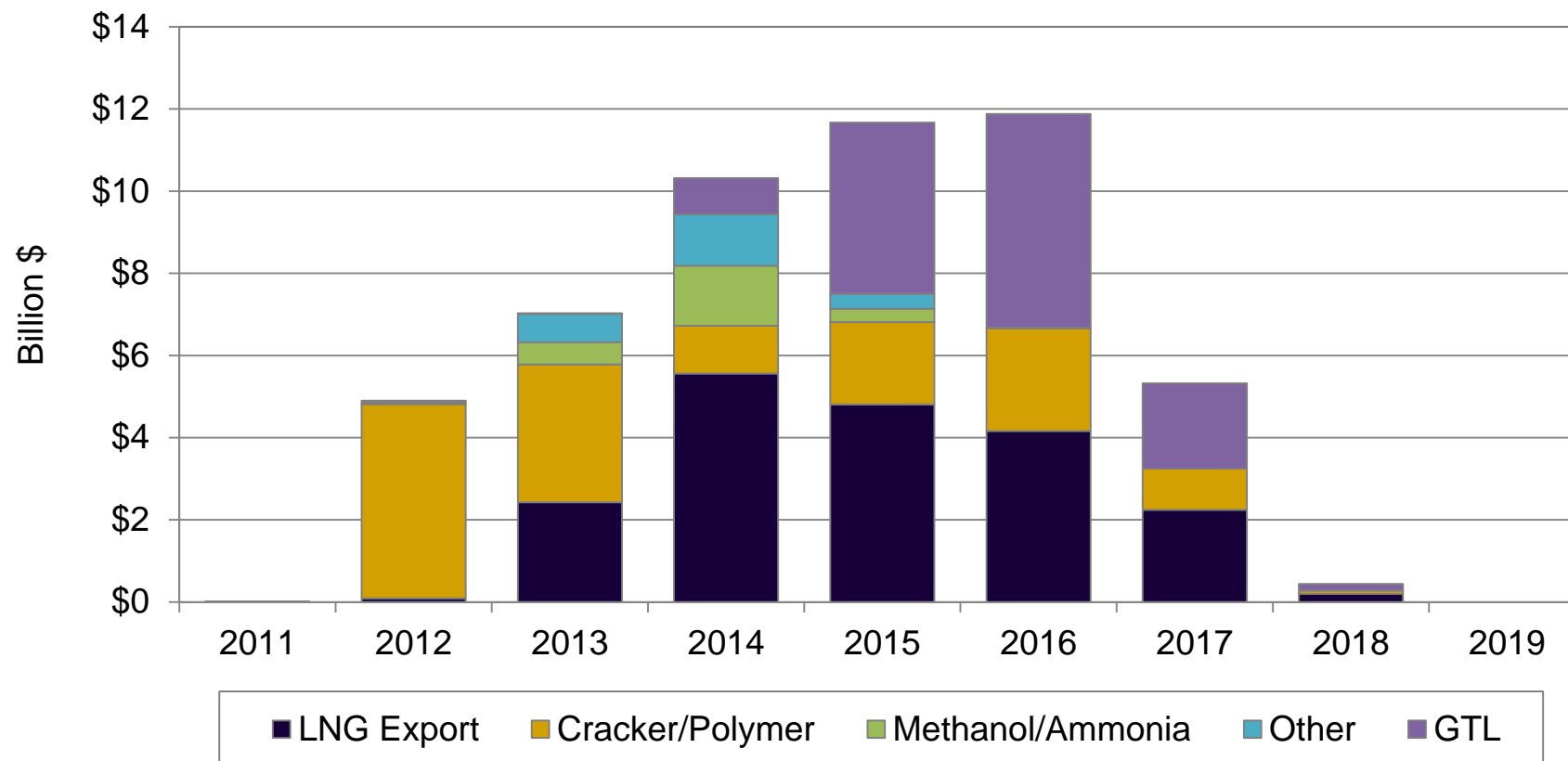
The current Louisiana “industrial renaissance,” coupled with Entergy’s recent move to the Mid-continent Independent System Operator (“MISO”), should help to alleviate many of the developers’ perceived problems associated with in-state CHP expansion.

- Over \$61 billion in industrial, energy-intensive capital expenditures (“capex”), will result in the need for considerable new generation capacity, some of which will likely be CHP-oriented.
- Having the main Louisiana industrial corridor included in the MISO footprint will help to provide:
 - (1) price discovery and transparency;
 - (2) open access transmission operations and planning; and
 - (3) greatly expanded market scope for all suppliers.



Total Capital Expenditures by Sector

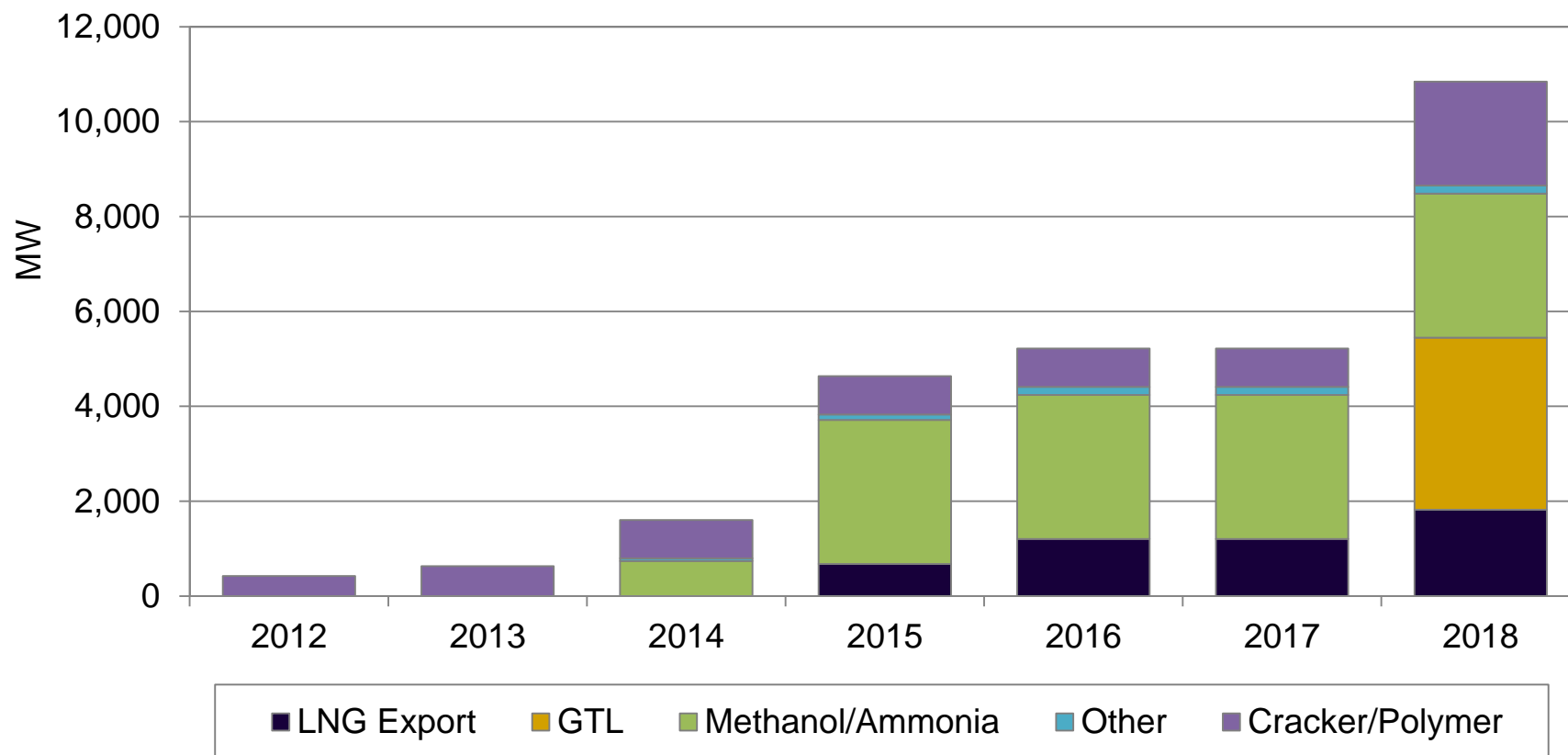
The total capital investment associated with all announced natural gas-driven manufacturing investments in Louisiana totals over \$61 billion. Most of the investment is anticipated to occur between 2014 and 2017.





Electric Capacity by Sector and Online Date

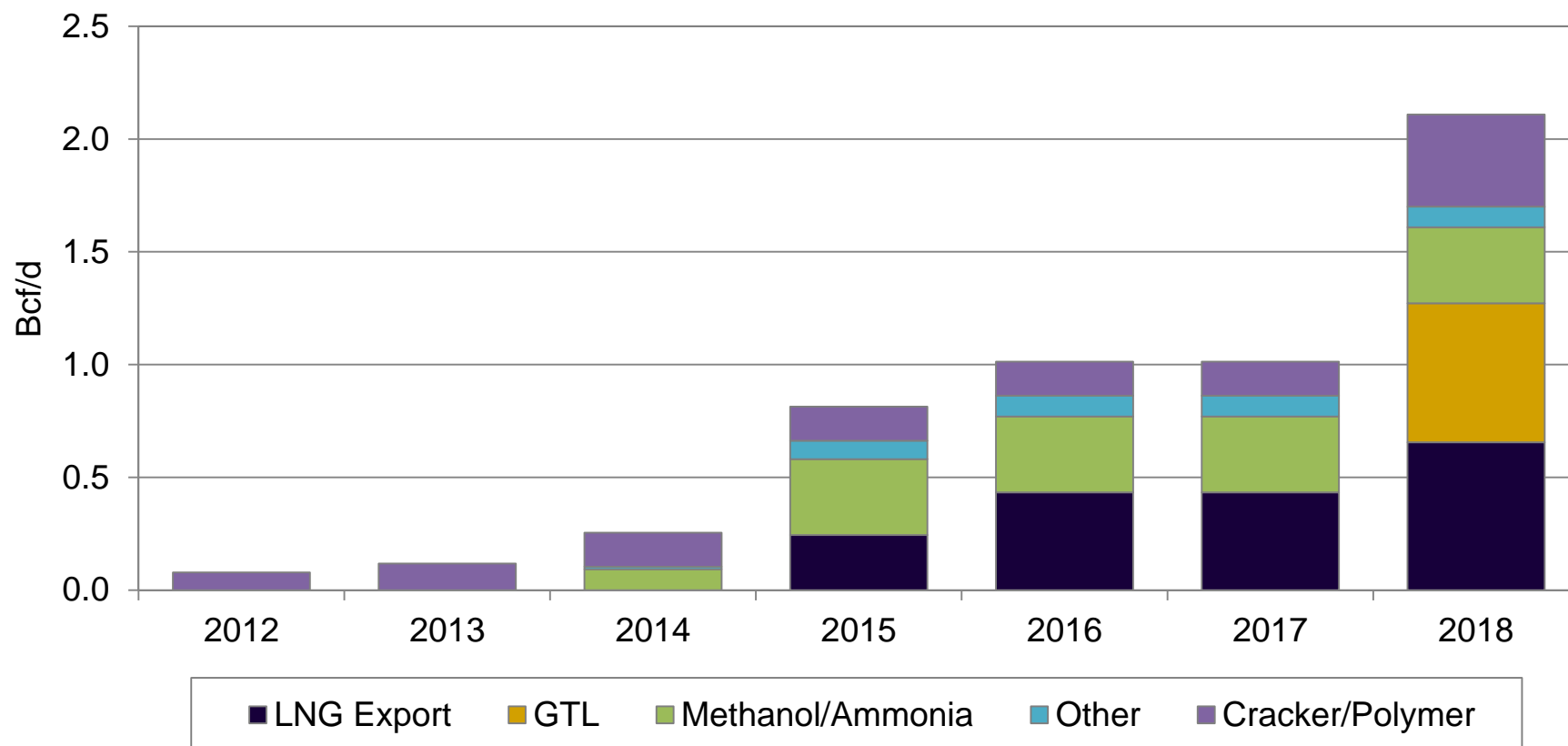
Capacity requirements associated with all currently-announced projects would come close to doubling in-state generation capacity. All of this capacity has the technical capabilities for CHP development. The extent of CHP development will be a function of final project development, which is unknown at this time.





Total Natural Gas Capacity by Sector and Online Date

Industrial gas demand could also double given current project announcements.



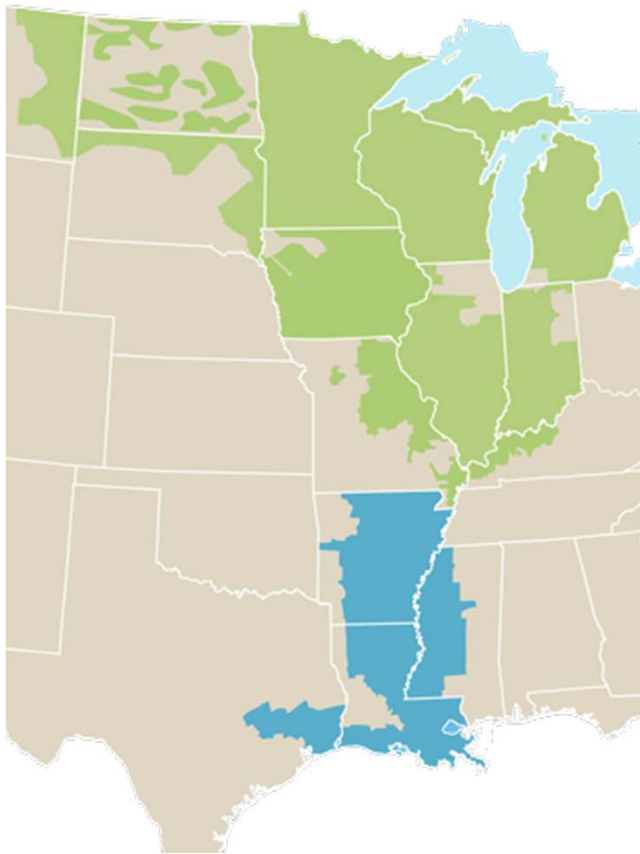
Potential Economic Impacts/Benefit: Construction, State

Not quite as clear will be the additional power/gas requirements for new residential and commercial activities supporting development/operation. This should elevate regional usage trends relative to national averages and provide for additional opportunities to sell currently-underutilized CHP capacity to host utilities.

	Construction Impacts									
	Total	2011	2012	2013	2014	2015	2016	2017	2018	2019
Output (million \$)										
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	\$ -
Total	\$ 25,137.6	\$ 6.4	\$ 2,524.6	\$ 3,617.7	\$ 5,203.3	\$ 5,541.1	\$ 5,540.9	\$ 2,496.4	\$ 207.0	\$ -
Employment (jobs)										
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	-
Total	181,468	47	18,225	26,116	37,563	40,001	40,000	18,022	1,495	-
Wages (million \$)										
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	\$ -
Total	\$ 7,864.5	\$ 2.0	\$ 789.8	\$ 1,131.8	\$ 1,627.9	\$ 1,733.6	\$ 1,733.5	\$ 781.0	\$ 64.8	\$ -



MISO Integration: Competitive Wholesale Market Changes/Benefits



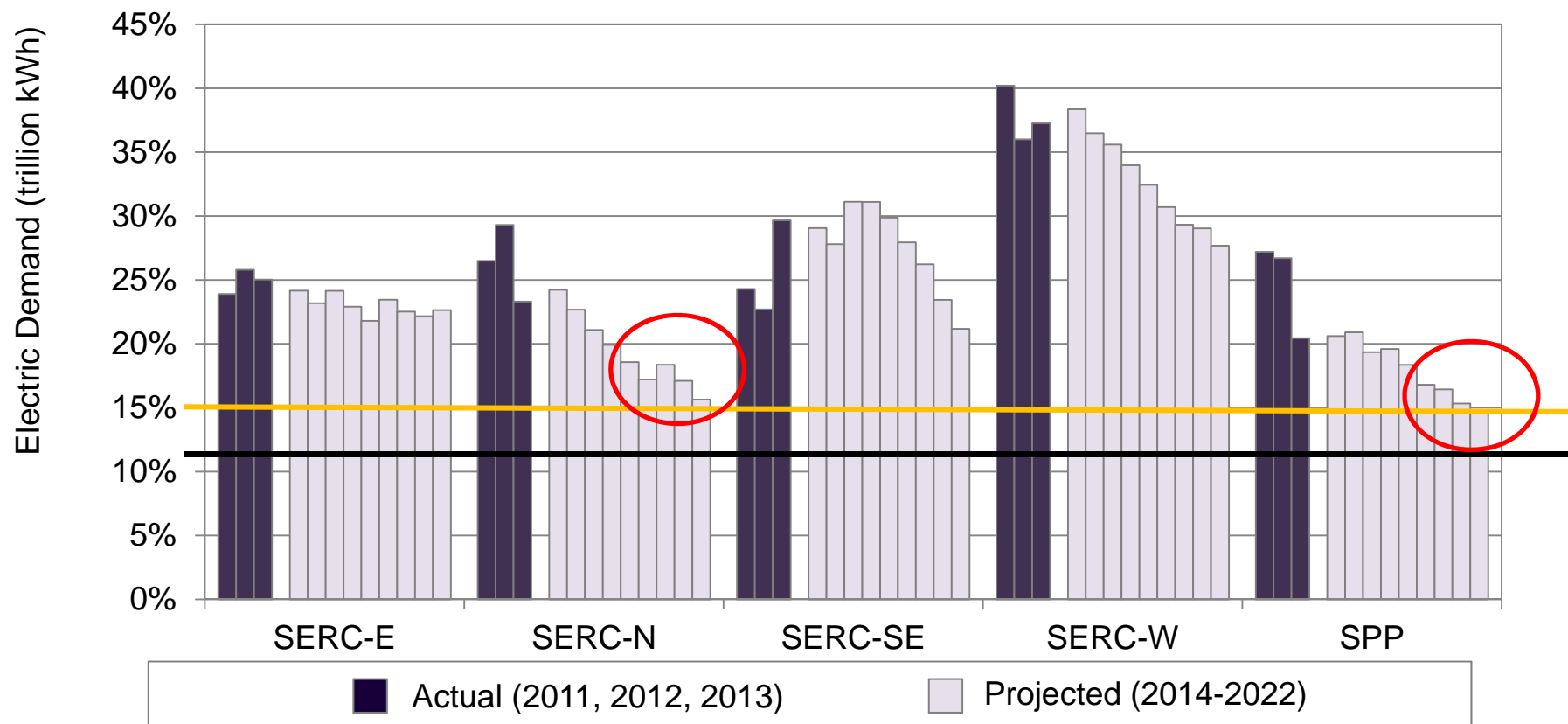
There are a number of wholesale market benefits that can arise from the expansion of MISO to the Gulf Coast that include:

- 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.



SERC/SPP Historic and Projected Reserve Margins

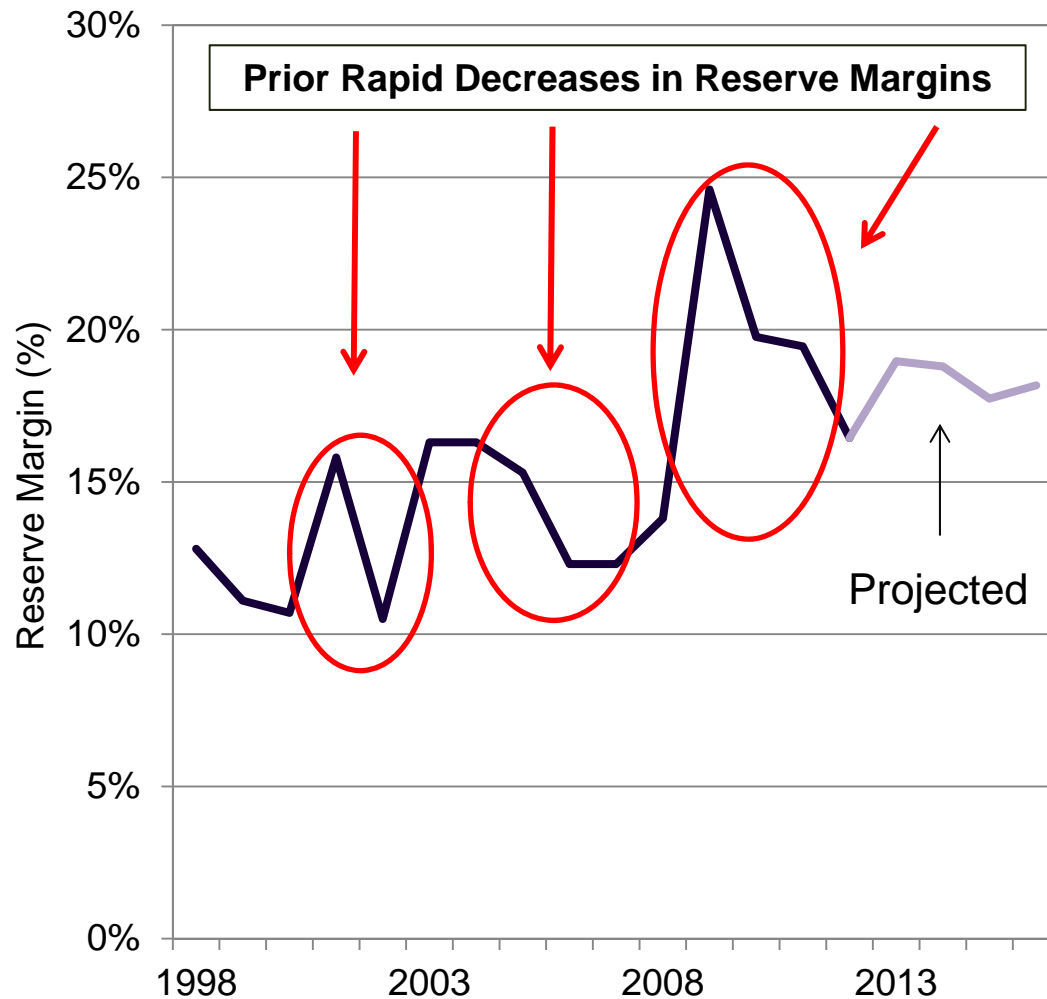
While margins are anticipated to fall, conventional wisdom is that this decline will be slow. It does not appear these forecasts include the exceptional increases in power generation requirements that will be needed from new industrial expansions.



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



Historic and Projected Reserve Margin Changes



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

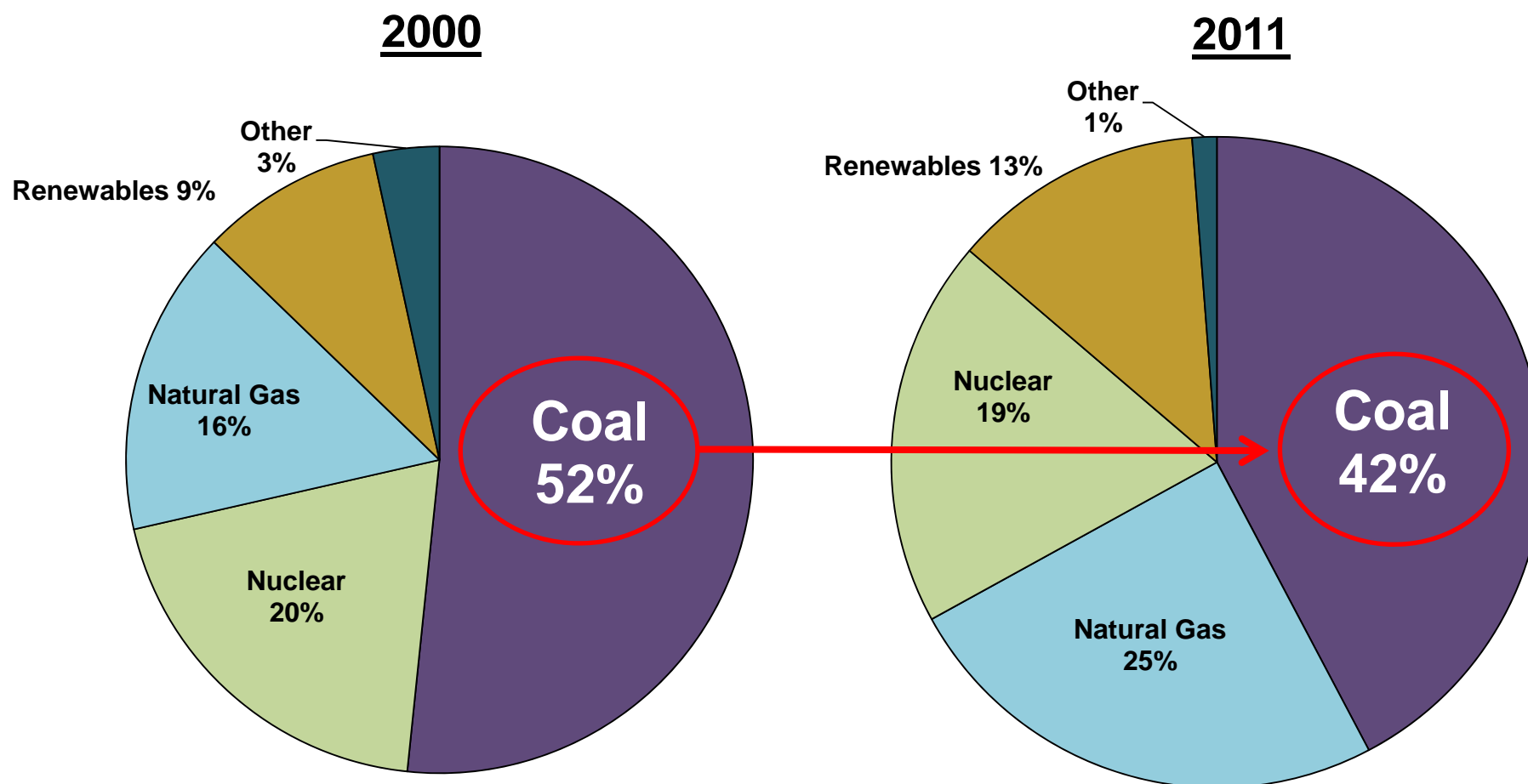


EPA Regulatory Rulemakings Discouraging Coal Generation

- Over the past several years, the EPA has entered into a number of different rulemaking proceedings that will have the net effect of discouraging coal-fired generation.
- These new EPA regulations come onto of a series of regulatory changes that arose during the 1990s that discouraged coal fired generation by increasing a number of acid rain-based regulations.
- Collectively, these new regulations, governing air emissions, water emissions, and waste materials, will impact both new and existing coal-fired power generation.
- More recently, EPA has proposed a series of new rules on carbon emissions that will likely eliminate traditional coal-fired power generation as a future resource to meet utility electricity requirements.

U.S. Power Generation Fuel Mix

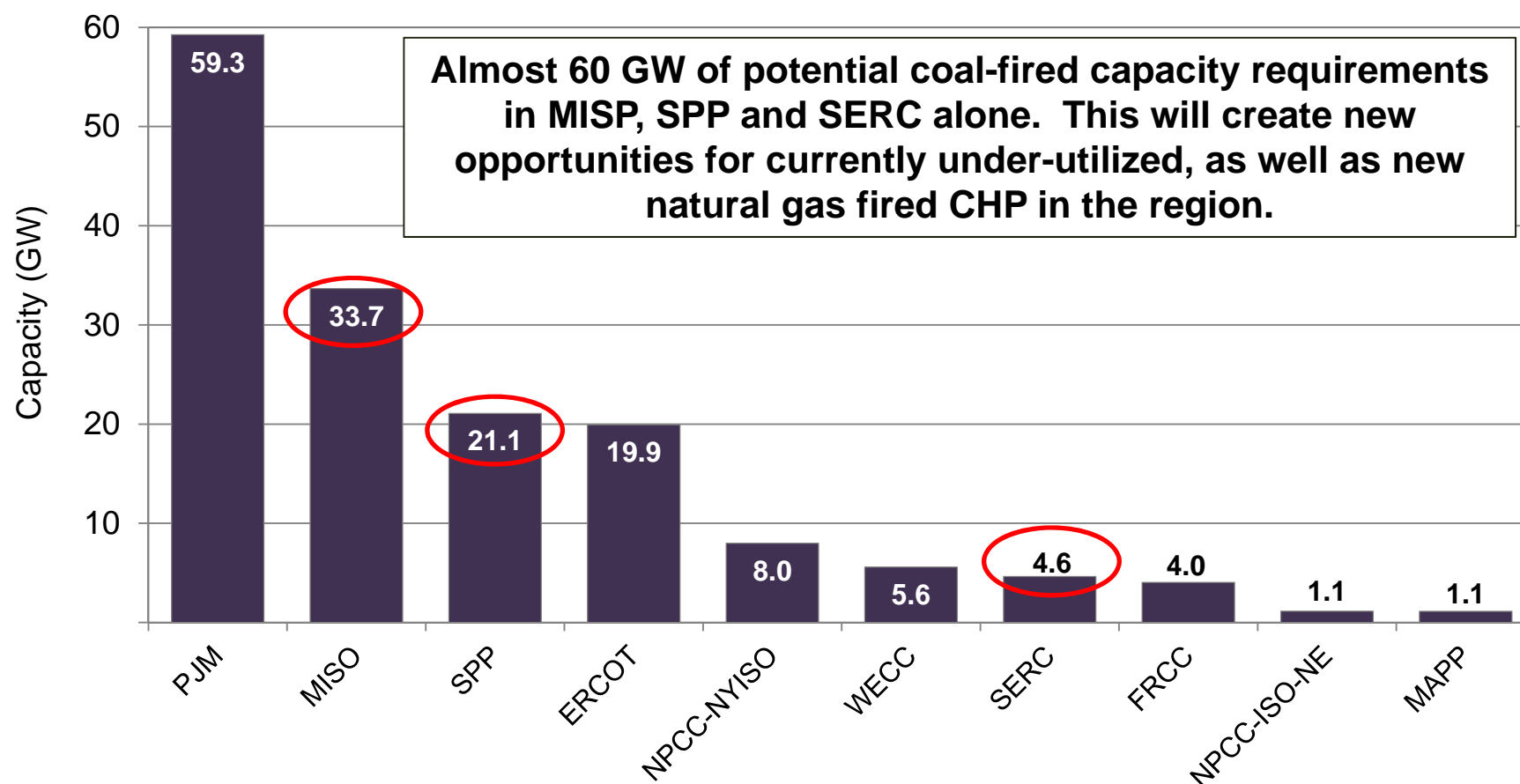
Over 250,000 MWs of natural gas and renewable power generation capacity has been added over the past decade at the expense of coal-fired power generation.





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.





Policy Summary

- Projected industrial development is large and unprecedented and will create new opportunities for CHP.
- The “multiplier” impacts associated with this economic activity and its impacts on electricity use are not often considered but could move what has been flat to decreasing power and gas use upward for smaller use customer classes (increasing the opportunities for CHP off-system sales).
- Environmental regulations will preference more gas: movement to MISO will facilitate the movement of gas-by-wire, including (new/existing) CHP-based gas-by-wire.
- MISO will provide better price and transmission planning transparency and will likely lead to a considerable re-investment in transmission assets opening up historic bottlenecks that have restricted past CHP output flows.
- History shows how quickly reserve/capacity margins can evaporate: new economic growth could result in the need for capacity quickly.



Conclusions



Conclusions

- Louisiana has a long historic with CHP development. Over 24 percent of all in-state generation capacity is CHP-based.
- Some additional industrial plants have the technical capability for CHP (~1,500 MW), while a smaller number of plants have the ability to cost-effectively generate CHP-based electricity (~600 MW), but for some reason, are not employing this potential efficiency opportunity. Thus, most of those facilities that can cogenerate, do.
- Considerable future CHP opportunities given \$61 billion in new industrial capex: results in estimated power requirement of close to 10 GW (assuming all is developed).
- MISO integration will likely eliminate decades-old issues associated with price discovery; transmission operations/planning transparency; and market scope.
- The future looks bright for the operation of existing CHP, and the development of new CHP, in Louisiana.