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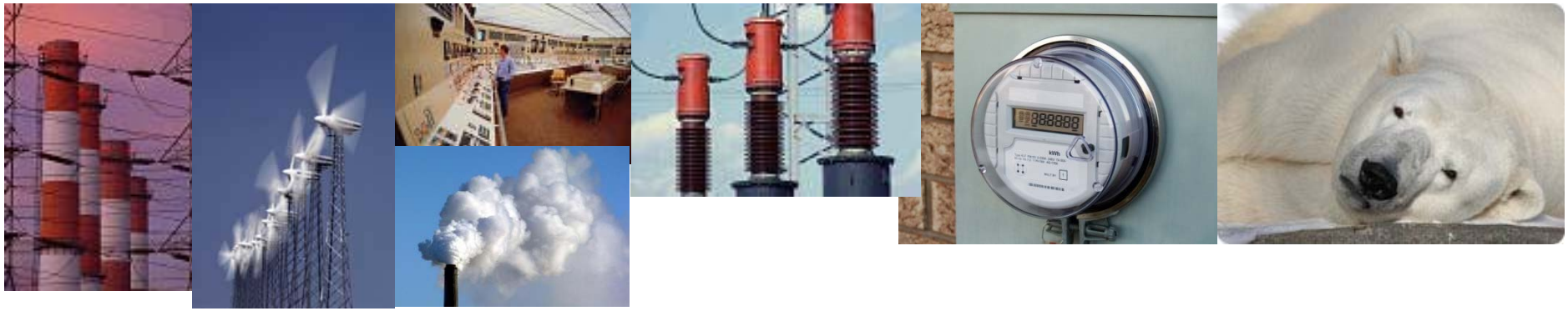

Overview EPA's Proposed Clean Power Plan and Impacts for Louisiana

Clean Cities Coalition Meeting
November 5, 2014

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Center for Energy Studies
Louisiana State University

CAVEAT: The views and opinions provided in this presentation are those of the author and do not necessarily reflect the official position of the State of Louisiana or any Louisiana executive agency.

Take Away Points

EPA proposed the Clean Power Plan ("CPP") in June 2014 with the goal of reducing carbon emissions by an average of 38 percent in 2020 (interim target) and 42 percent by 2030, both from 2012 levels.

The CPP is primarily based upon a target rate (lbs/MWh), not a level; although there is a potential "mass-based" conversion.

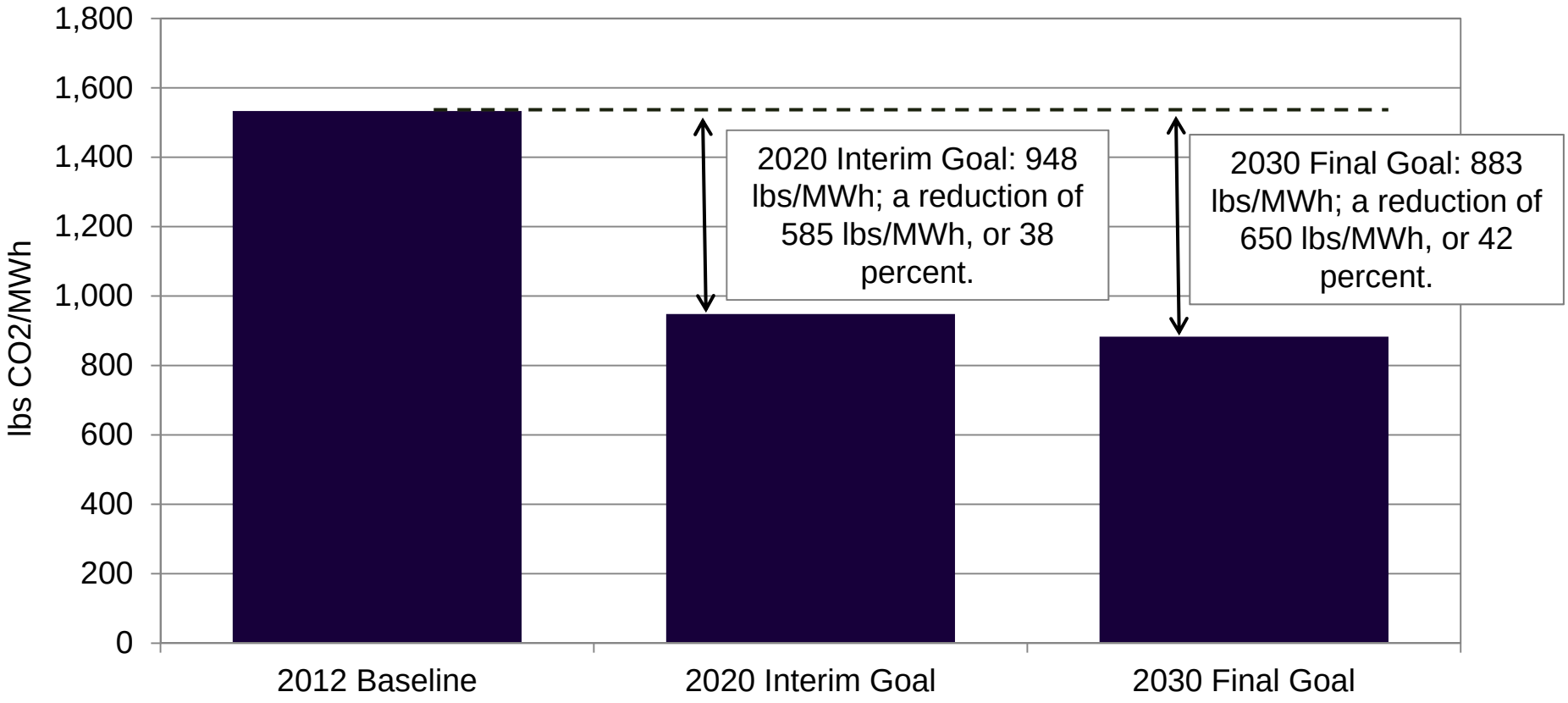
Rule differs from many past EPA approaches since it:

a) is primarily based on a target rate (lbs/MWh), not emissions level reduction;
b) Is not based on a market-based mechanism or a fixed technology method of emissions reductions;
c) Defines a range of potential compliance options; and
d) Has ambiguous non-compliance provisions (at this point).

Final comments on the proposed rule are due on December 1, 2014.

Proposed Louisiana CO2 State-wide Emission Rate Reduction

Louisiana's 2012 baseline is set at 1,533 lbs/MWh and will be required to decrease to 948 lbs/MWh by 2020 and to 883 lbs/MWh by 2030.



Source: EPA Clean Power Plan Proposed Rule Technical Documents, available at: http://www2.epa.gov/carbon-pollution-standards/clean-power-plan-proposed-rule-technical-documents.

Total Annual CO2 Emission Reductions Needed

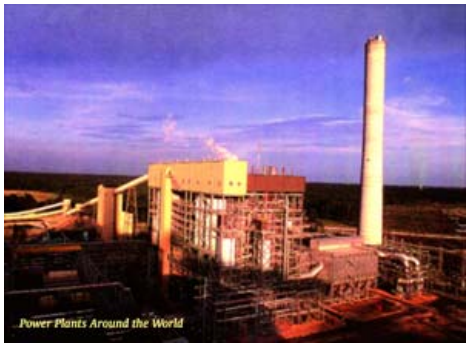
Proposed rule will require Louisiana to reduce its power sector annual CO_2 emissions by over 27 million short tons of CO2 by 2030.

Over 27 million tons of CO_2 per year

Big Cajun 2: 11 mllion tons CO_2

Brame Energy Center: 5.9 million tons CO_2

Dolet Hills: 5.7 million tons CO_2

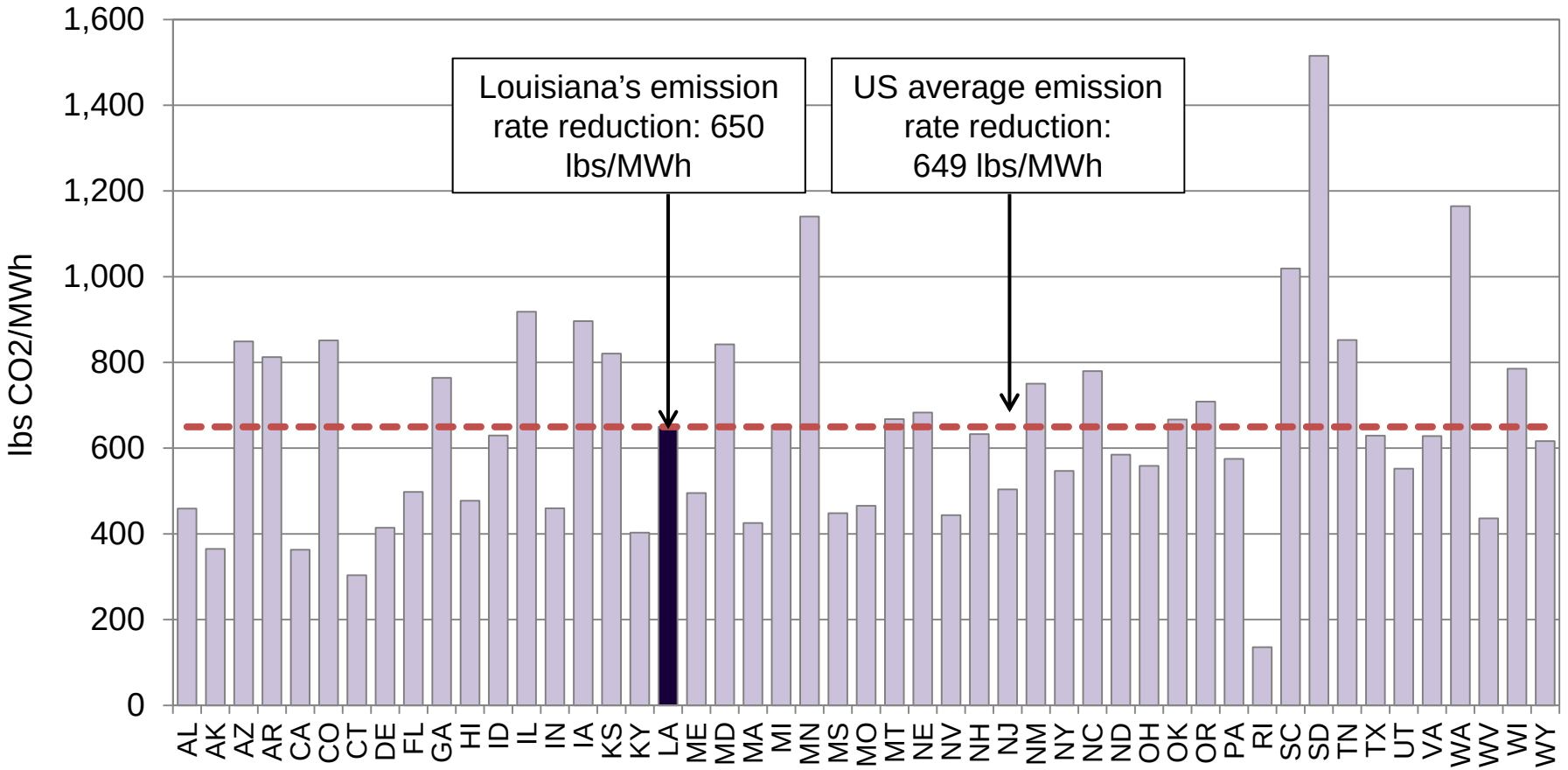


RS Nelson: 6 million tons CO_2

Note: Plant emissions are for 2012.
Source: 2012 EPA Clean Air Markets database.

State Comparison of Emission Rate Reductions

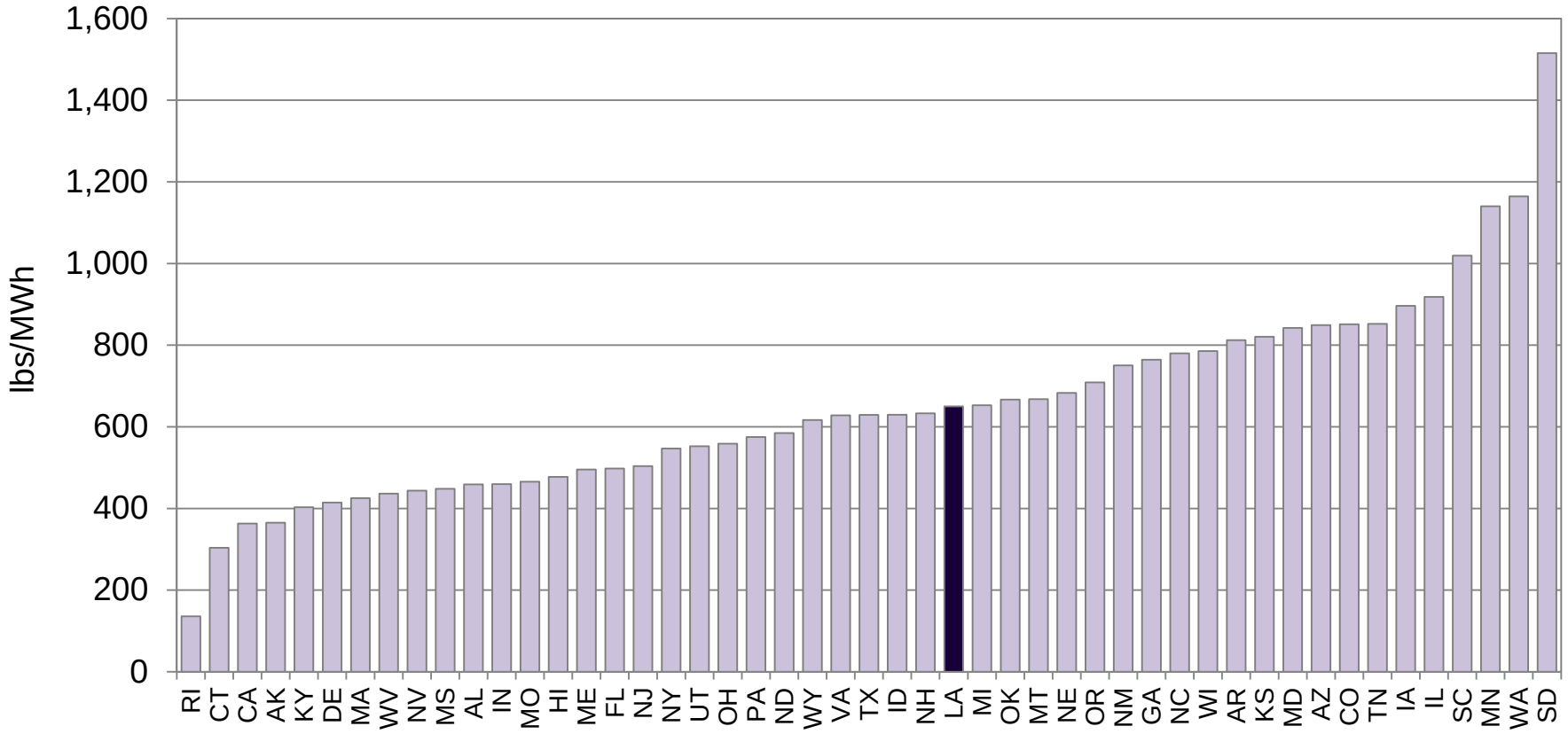
Louisiana's rate reduction of 650 lbs/MWh is close to the overall U.S. average of 649 lbs/MWh.



Source: EPA Clean Power Plan Proposed Rule Technical Documents, available at: http://www2.epa.gov/carbon-pollution-standards/clean-power-plan-proposed-rule-technical-documents.

State Comparison of Total Annual CO2 Emission Reductions

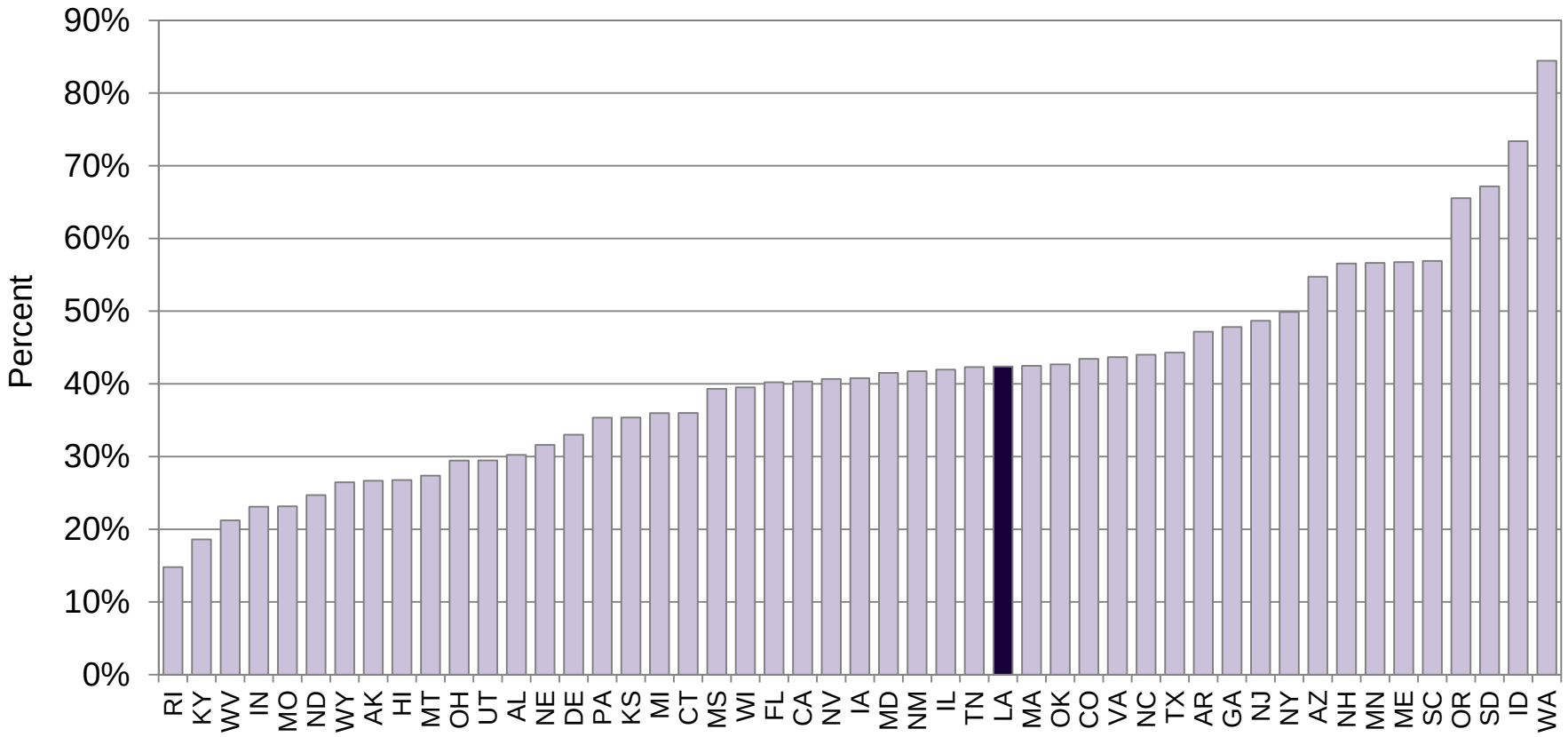
Louisiana requirement is 22nd most stringent state goal under the proposed rule. Top five states account for five percent of the required reduction; top ten states account for 12 percent of the required reduction.



Source: EPA Clean Power Plan Proposed Rule Technical Documents, available at: http://www2.epa.gov/carbon-pollution-standards/clean-power-plan-proposed-rule-technical-documents.

State Comparison of Total Annual CO2 Emission Reductions

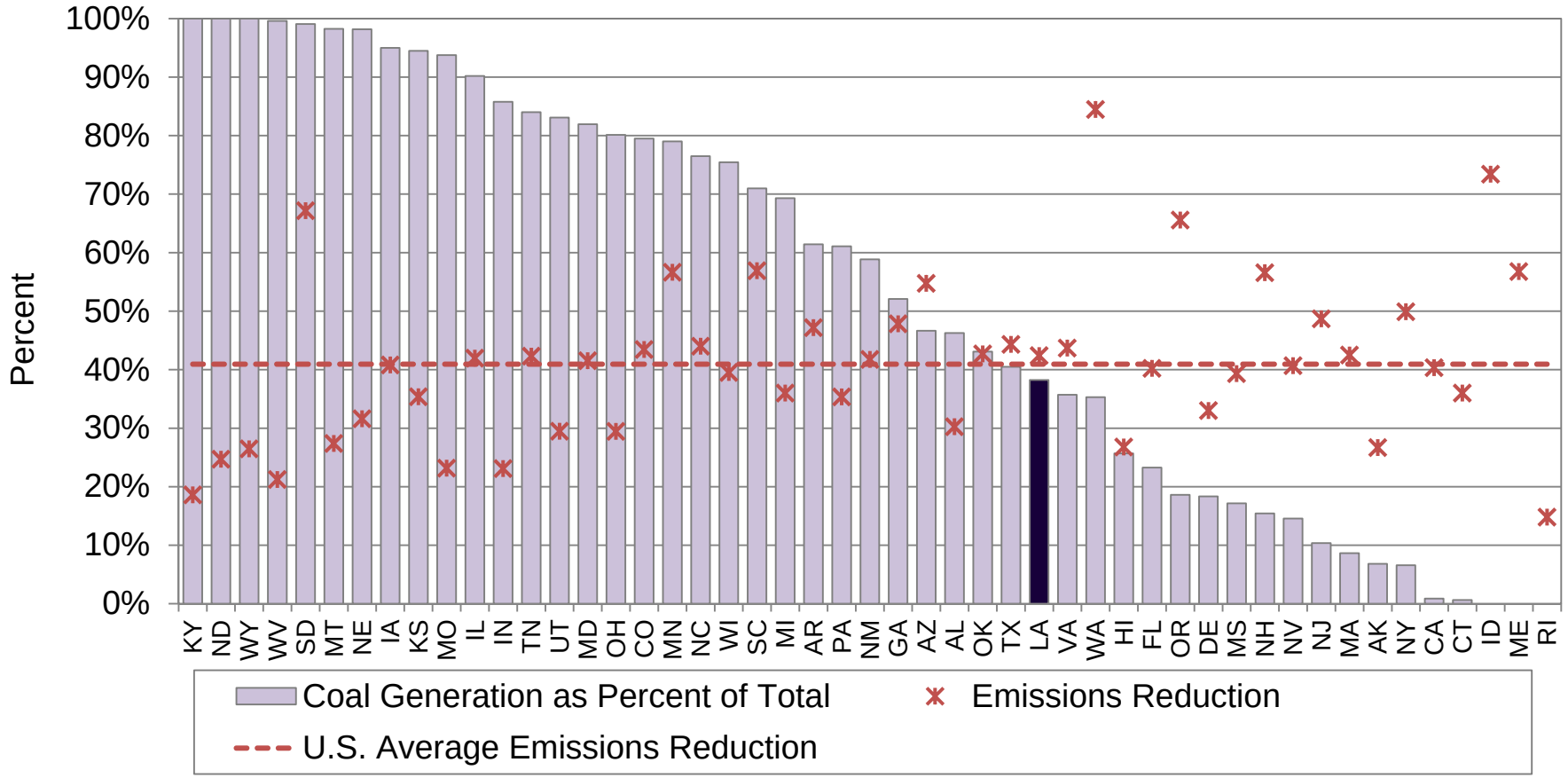
On a percentage basis, Louisiana's required reduction of 42 percent ranks 20th overall.



Source: EPA Clean Power Plan Proposed Rule Technical Documents, available at: http://www2.epa.gov/carbon-pollution-standards/clean-power-plan-proposed-rule-technical-documents.

Myth: Louisiana Will Not be Impacted Much Since it is a Natural Gas State

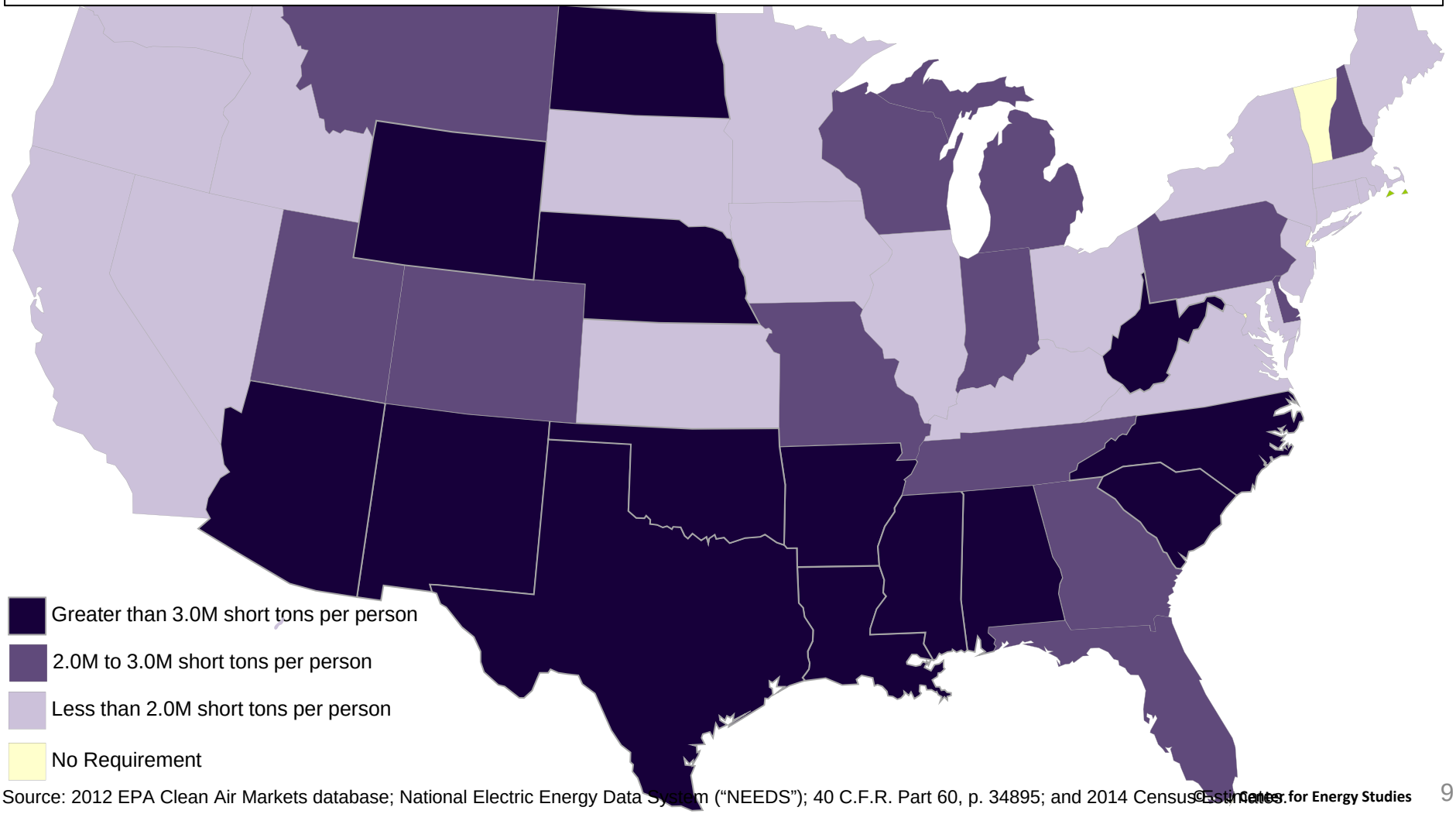
States with large shares of coal-fired generation have reduction rates lower than the U.S. average, and lower than many states with larger shares of natural gas-fired generation.



Source: EPA Clean Power Plan Proposed Rule Technical Documents, available at: http://www2.epa.gov/carbon-pollution-standards/clean-power-plan-proposed-rule-technical-documents.

Comparative Impacts: Emission Reductions Per-Capita

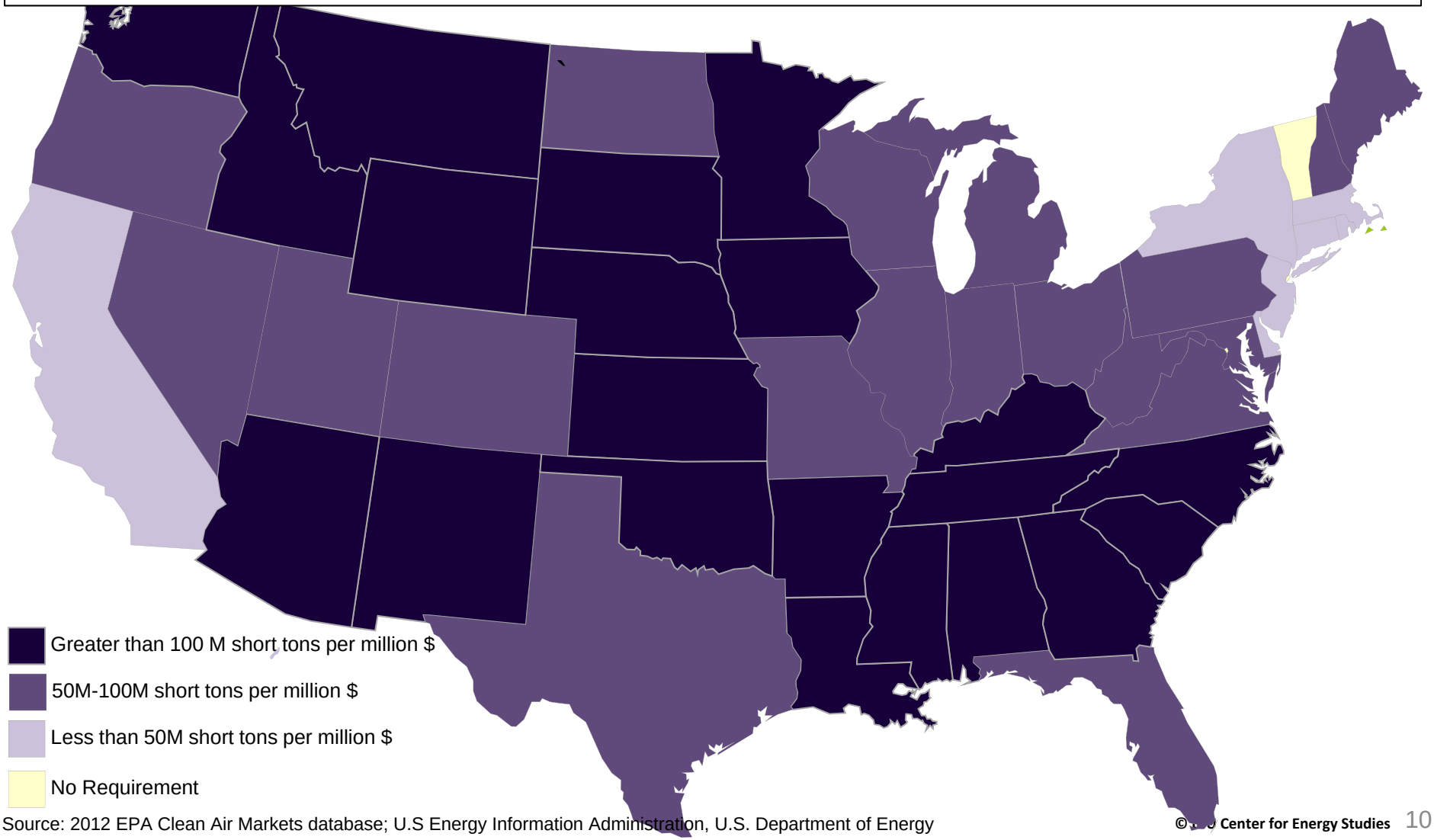
Louisiana is the 8th hardest impacted state requiring 4.04M short tons of CO2 reductions per capita person by 2030.



Source: 2012 EPA Clean Air Markets database; National Electric Energy Data System ("NEEDS"); 40 C.F.R. Part 60, p. 34895; and 2014 Census Estimates.

Comparative Impacts: Emission Reductions Per State GDP

Louisiana is the 16th hardest impacted state in terms of reduction of CO2 per state GDP.



Source: 2012 EPA Clean Air Markets database; U.S Energy Information Administration, U.S. Department of Energy

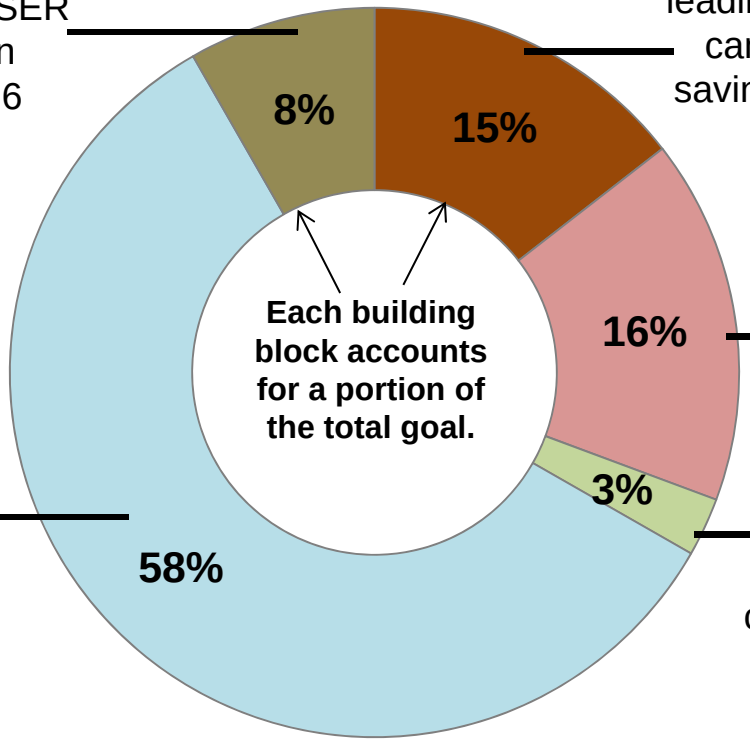
BSER and EPA's Building Block Approach

EPA's Proposed Clean Power Rule – Louisiana BSER Targets

The EPA's Proposed Clean Power Rule is based on a Best System of Emissions Reductions ("BSER") that includes four "building blocks."

Building Block 1: EPA reviewed the opportunity for coal-fired plants to improve their heat rates. BSER assumes all coal plants can increase their efficiency by 6 percent.

Building Block 4: EPA estimated energy efficiency deployment in 12 leading states and assumes all states can increase their current annual savings rate to reach annual savings of 1.5 percent by 2030.

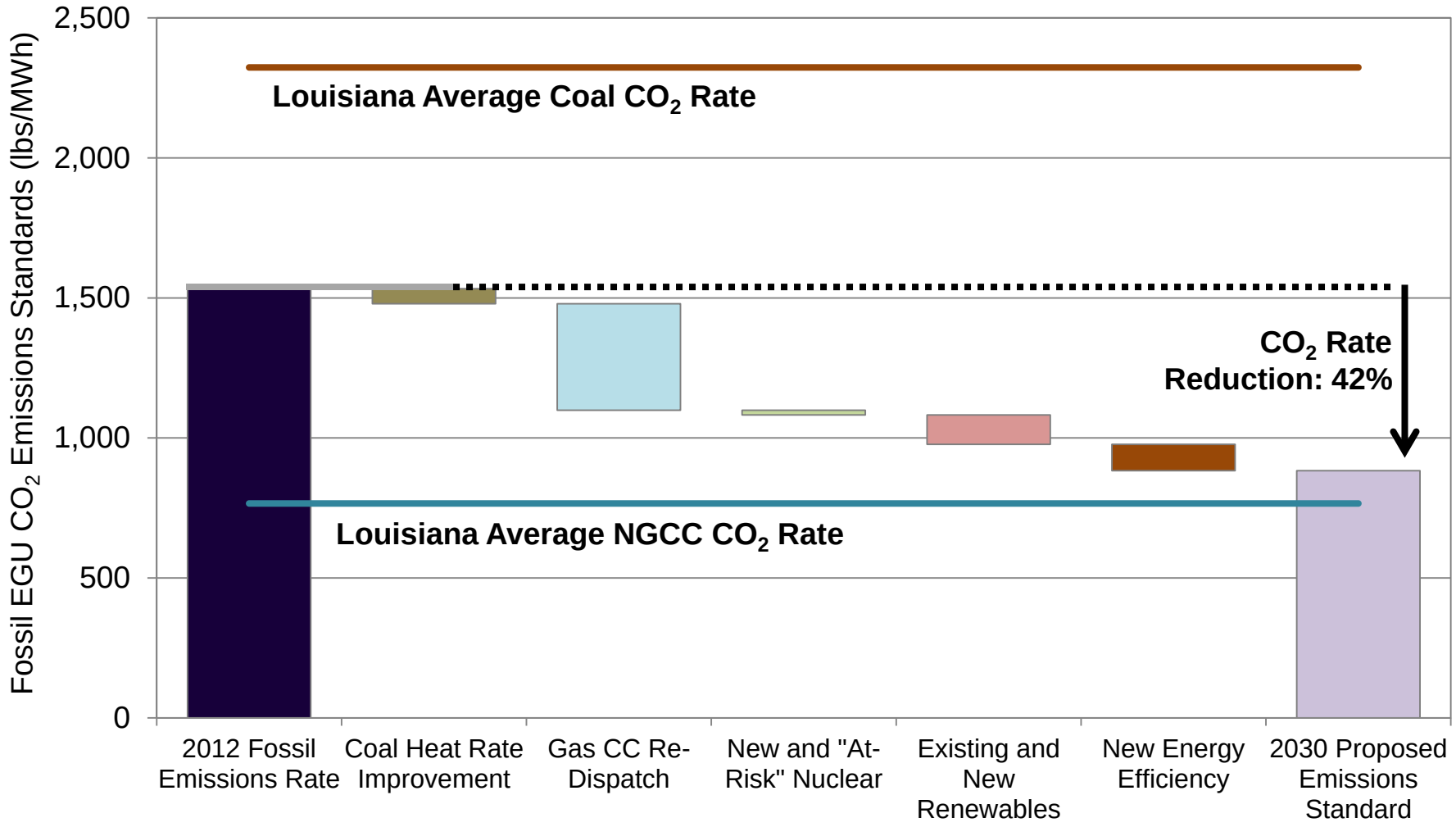


Building Block 3b: EPA developed targets for renewable energy penetration in six regions and calculated regional growth factors to achieve each target by 2030.

Building Block 2: EPA found an average availability of 70 percent for natural gas CCs to be technically feasible.

Building Block 3a: EPA identified five nuclear units currently under construction and assumes that 5.8 percent of existing nuclear capacity is 'at-risk" but can be retained.

Louisiana Average Fossil EGU CO2 Emissions Standard based on BSER



Source: LA 111(d) EGU Computation.xlsx.

Building Block 1: Coal Plant Efficiency Improvements

Building Block 1: 4-6 Percent Lower Emissions from Existing Coal Generation

- EPA notes that several studies have examined the potential to improve heat rates as coal-fired power plants, noting specifically a 2009 study by the engineering firm Sargent & Lundy.
- Based on the 2009 Sargent & Lundy study, EPA estimated that potential heat rate improvements are in the order of approximately 4 to 12 percent. Furthermore, based on review of EPA and DOE EIA generation data, EPA estimates that historically EGUs have experienced heat rate improvements from 3 to 8 percent.
- Based on a review of prior studies and generation trends, EPA estimates the potential for improvements in heat rates of between 4 and 6 percent, which mirrors a reduction in CO2 emissions by the same.
- EPA notes that improvements in heat rates decrease fuel consumption and thus costs, and that a 6 percent improvement would be sufficient to cover costs associated with improvement.

Source: 40 C.F.R. Part 60, pp. 34859-34861.

Building Block 1, Coal-Fired Heat Rate Efficiency

EPA applies a six percent thermal efficiency improvement factor for each coal generation facility, setting a 139 lbs/MWh reduction target.

Facility	Generator ID	2012 Emissions Rate (lbs/MWh)	Thermal Efficiency Improvement Factor (%)	Adjusted Emissions Rate (lbs/MWh)	2012 Net Output (MWh)
Dolet Hills	1	2,460	6.0%	2,312	4,616,823
R S Nelson	1	2,693	6.0%	2,531	821,331
R S Nelson	2	2,683	6.0%	2,522	802,645
R S Nelson	6	2,493	6.0%	2,344	3,118,384
Big Cajun 2	1	2,192	6.0%	2,061	3,273,725
Big Cajun 2	2	2,140	6.0%	2,012	3,408,652
Big Cajun 2	3	2,114	6.0%	1,987	3,594,632
Brame Energy Center	2	2,257	6.0%	2,121	2,677,857
Brame Energy Center	3	2,439	6.0%	2,292	1,992,364
Average Emissions Rate:		**2,323**	→	**2,184**	

Source: EPA Clean Power Plan Proposed Rule Technical Documents, available at: http://www2.epa.gov/carbon-pollution-standards/clean-power-plan-proposed-rule-technical-documents.

Building Block 1 Issues

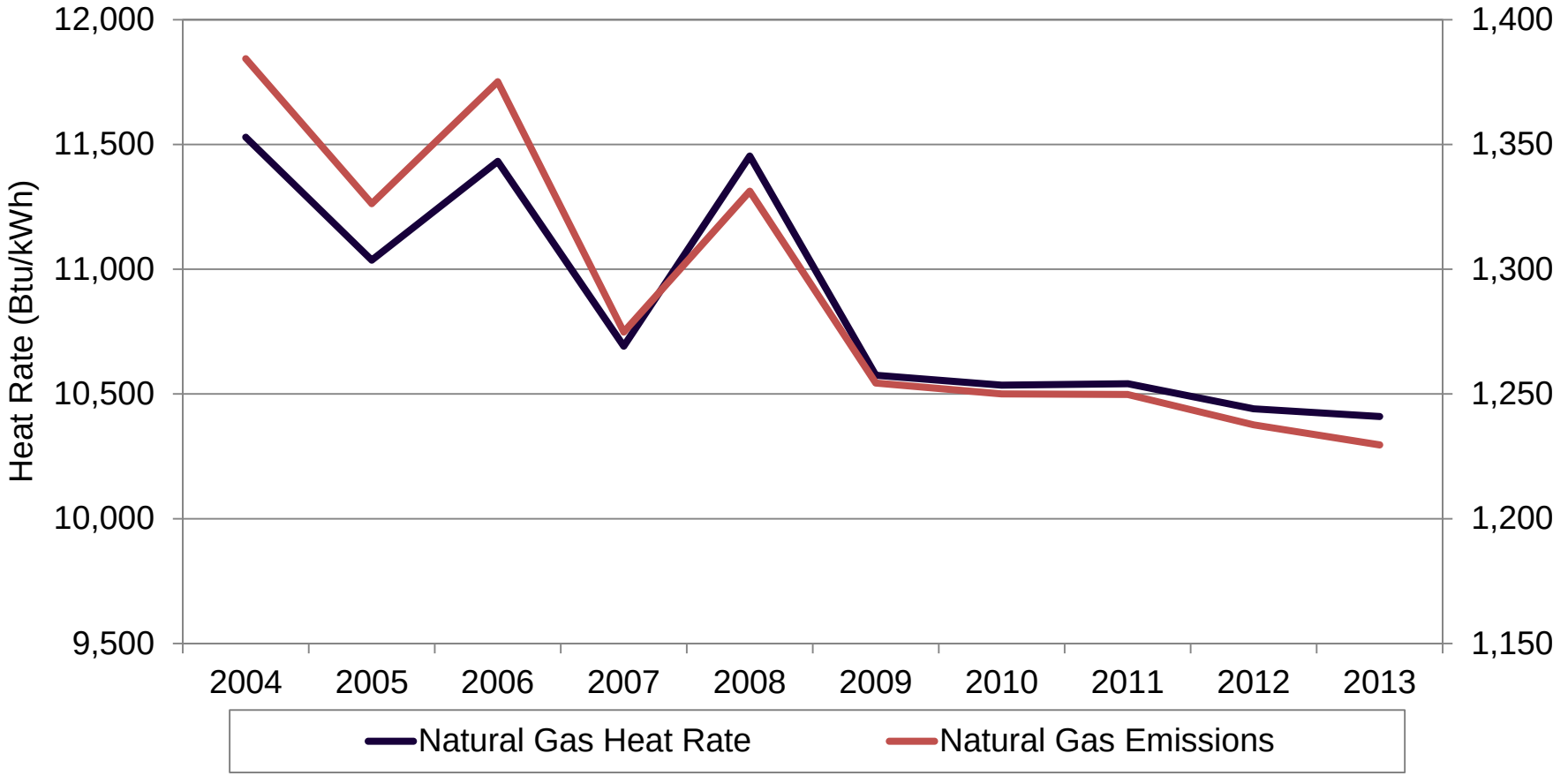
There are a number of incorrect and problematic assumptions included in the development of this building block:

- Use of gross rather than net heat rate reductions.
- Statistical modeling used for heat rate analysis is flawed.
- Fails to consider recent efficiency gains/new pit technologies.
- Fails to consider efficiency losses of control technologies from other EPA rules.
- Cannot be practically done given new source review standards.
- Fails to examine or consider stranded generator costs (rate impacts).

Building Block 2: Increased NGCC Utilization

Recent Trends in Louisiana Gas-Fired Generation

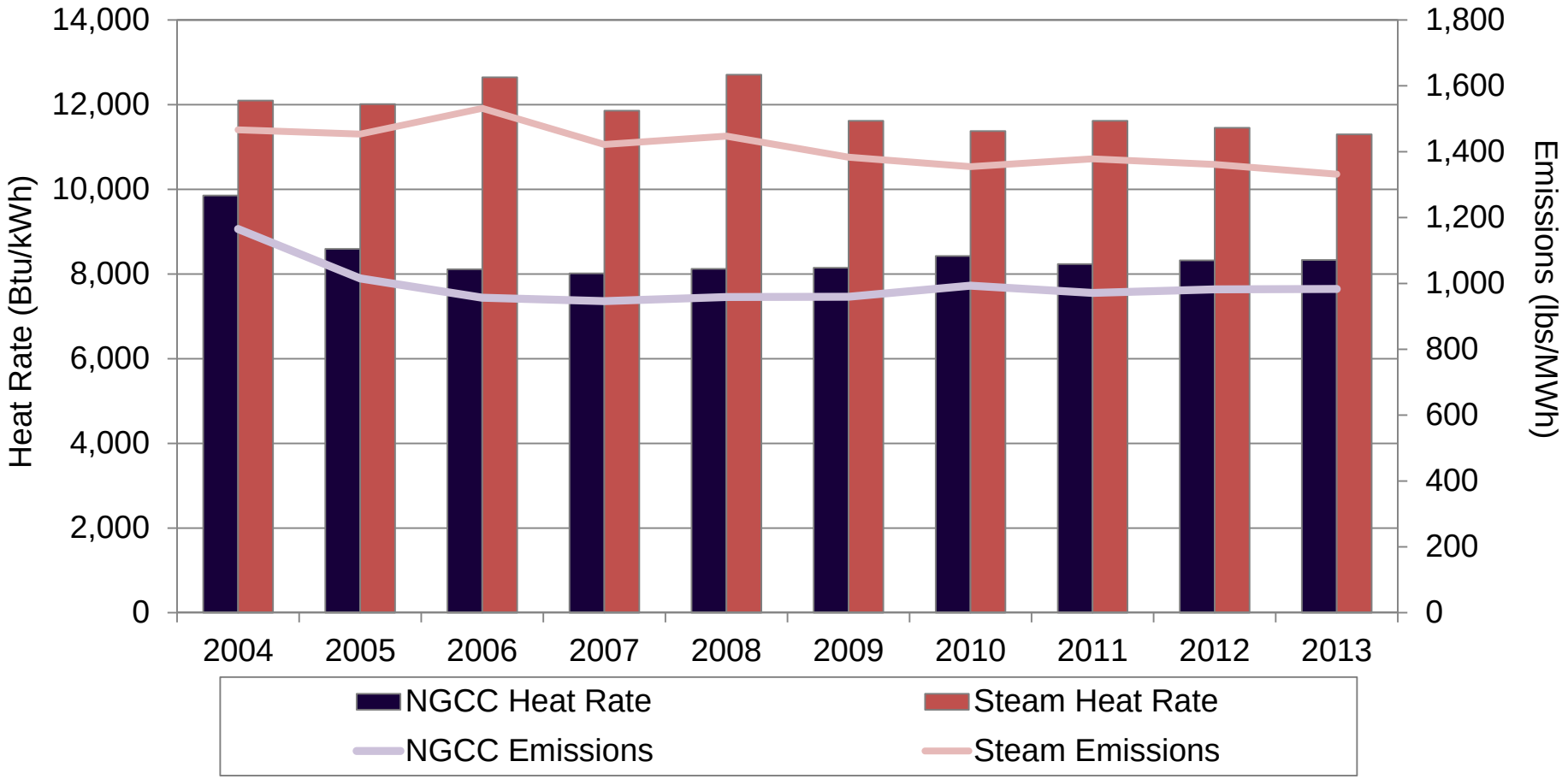
Louisiana's natural gas heat rates have fallen 9.7 percent in the last 10 years (at an average annual rate of one percent); and natural gas-fired emissions have fallen 11.2 percent (at an average annual rate of 1.2 percent).



Source: 2012 EPA Clean Air Markets database.

Louisiana NGCC Efficiencies and Utilization

On average, Louisiana's NGCC units operate at heat rates that are 29 percent lower than Louisiana's steam units and emit 30 percent less emissions.



Building Block 2, Natural Gas CC Dispatch

EPA assumes all natural gas-fired combined cycle units can be re-dispatched at a rate of 70 percent. This increases the NGCC generation from 19.8 million MWh to over 40 million MWh, an increase of 102 percent.

	Nameplate Capacity (MW)	2012 Generation ------ (MWh) ------	EPA Estimated Generation	Capacity Factor: EPA Assumed Increase (%)	Capacity Factor: Highest in Last 10 Years	Capacity Factor: Highest in Last 5 Years
Louisiana 1	406.3	2,949,067	2,498,257	-12.6%	99.5%	99.3%
Coughlin Power Station	922.8	1,434,842	5,674,113	52.3%	26.9%	26.3%
Sterlington	226.3	4,610	1,391,473	69.8%	15.6%	1.4%
Acadia Energy Center	1,376.0	4,785,503	8,460,749	30.4%	40.8%	40.8%
Carville Energy LLC	570.0	2,899,630	3,504,816	12.1%	62.6%	62.6%
Ouachita	903.9	1,658,025	5,557,900	49.1%	20.8%	20.8%
Washington Parish Energy Center	655.0	-	4,027,464	70.0%	0.0%	0.0%
Perryville Power Station	824.1	2,486,523	5,067,226	35.7%	29.4%	29.4%
J Lamar Stall Unit	624.0	3,552,982	3,836,851	5.2%	43.0%	43.0%
Total	**6,508**	**19,771,182**	**40,018,850**	**34.7%**		

Source: 2012 EPA Clean Air Markets database.

Building Block 2 Deficiencies

There are a number of errors and problems with the EPA methodology:

- Incorrect data. For instance, the EPA includes Washington Parish Energy Center (655 MW) in Louisiana's NGCC capacity totals. Other items include Louisiana 1, Perryville's 2 CT unit and the omission of NGCCs under construction (Ninemile 6 and Morgan City 14-01).
- The EPA incorrectly uses nameplate capacity rather than net summer capacity to estimate the total NGCC potential.
- Fails to understand the gravity of the change on the use and operation of these units.
- Fails to examine ripple impacts to natural gas markets. The EPA does not consider the increased use of natural gas associated with a 102 percent increase in natural-gas fired capacity (in Louisiana alone).
- Does not adequately examine transmission constraints.
- Fails to examine or consider stranded generator costs (rate impacts).

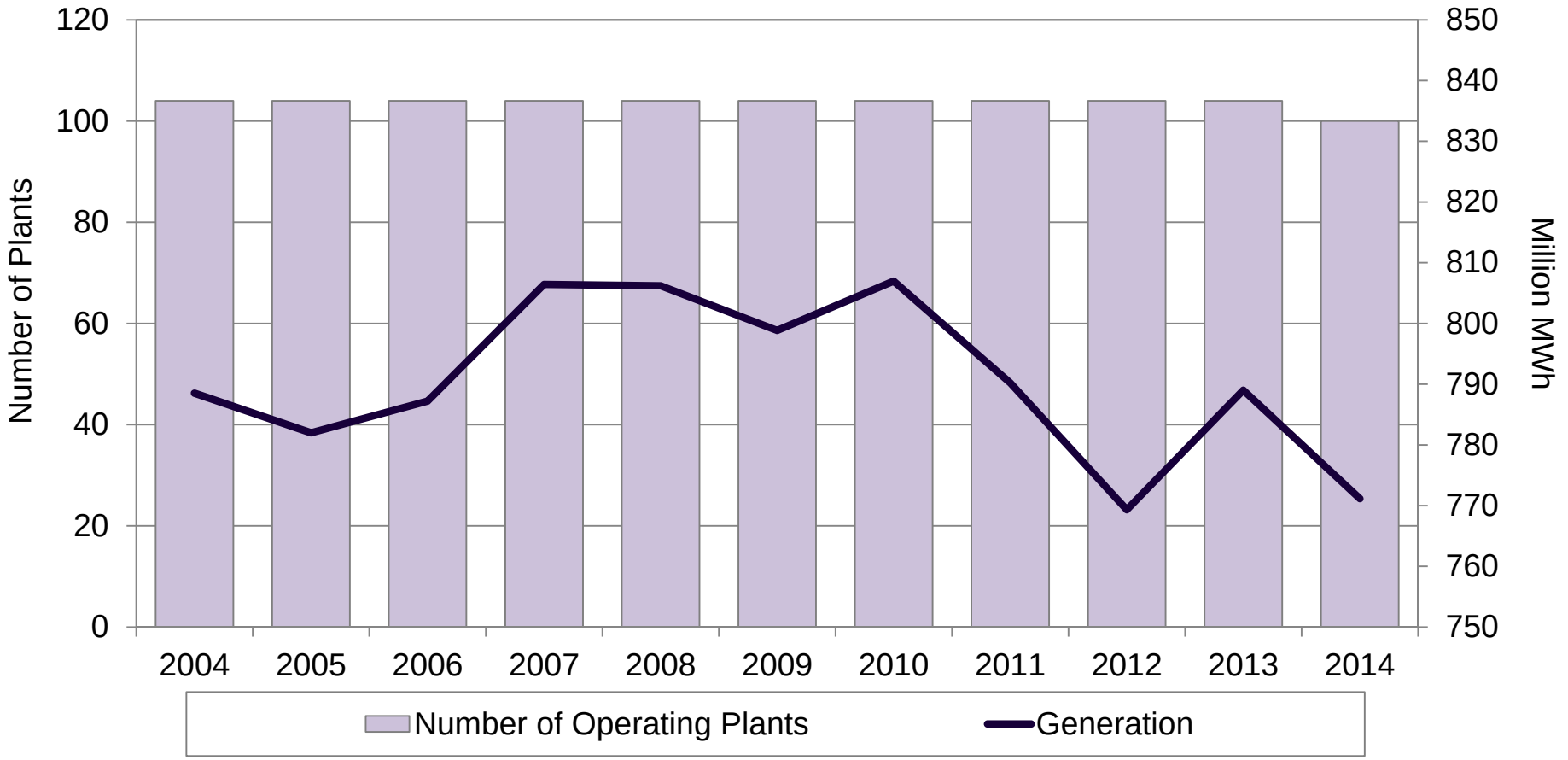
Building Block 3a: "At Risk" Nuclear Power Generation

Building Block 3a, "At Risk" Nuclear Capacity

- In Building Block 3a, the EPA assumes 5.8 percent of the current nuclear fleet is "at risk." This nuclear capacity is incorporated into state goals as zero emitting generation (at a 90 percent capacity factor).
- Nuclear is not considered a "dispatchable" resource as is NGCC capacity; and instead of redispatching from coal to nuclear like in Building Block 2, the expected generation is simply added to the state goal denominator – lowering the state goal emission rate.
- For Louisiana, this amounts to 985,225 MWh being added to the denominator (generation) to calculate the emissions rate.

Historic Trends in Nuclear Generation, Operating Plants and Generation

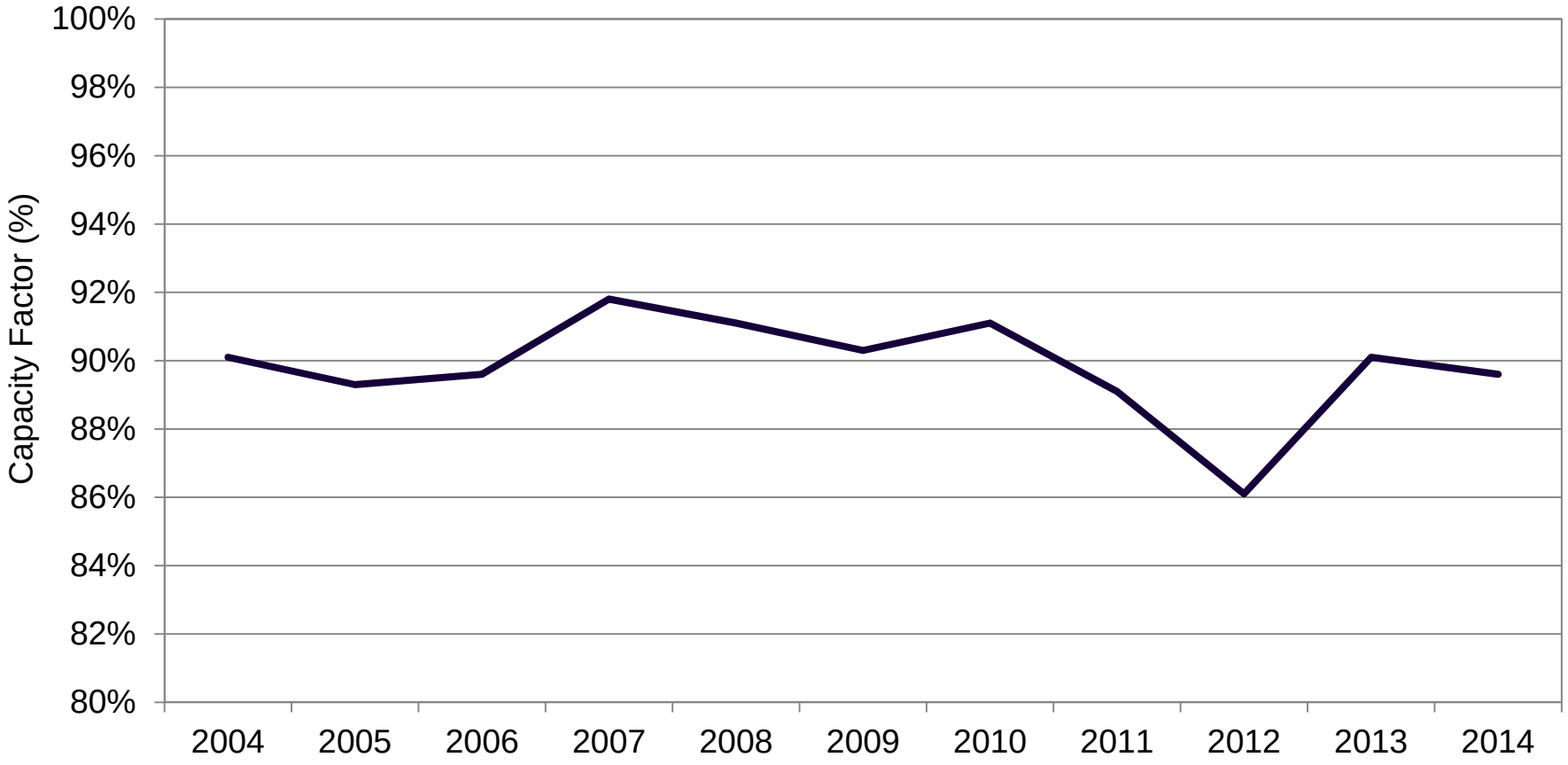
The number of operating nuclear plants in the U.S. remained constant until this year, when four plants were retired. Nuclear generation has been falling in the last five years.



Source: Energy Information Administration, U.S. Department of Energy.

Historic Trends in Nuclear Generation, Average Annual Capacity Factor

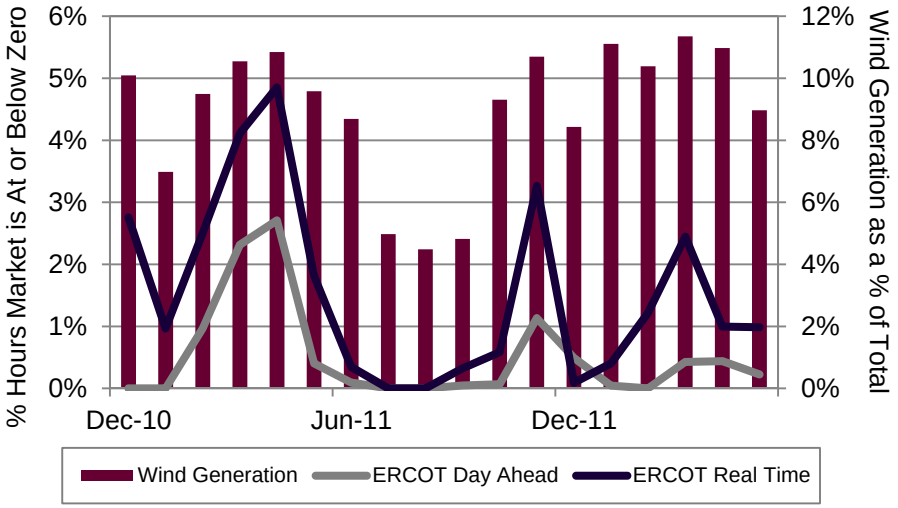
The average annual capacity factor of nuclear facilities has been between 86 percent and 92 percent.



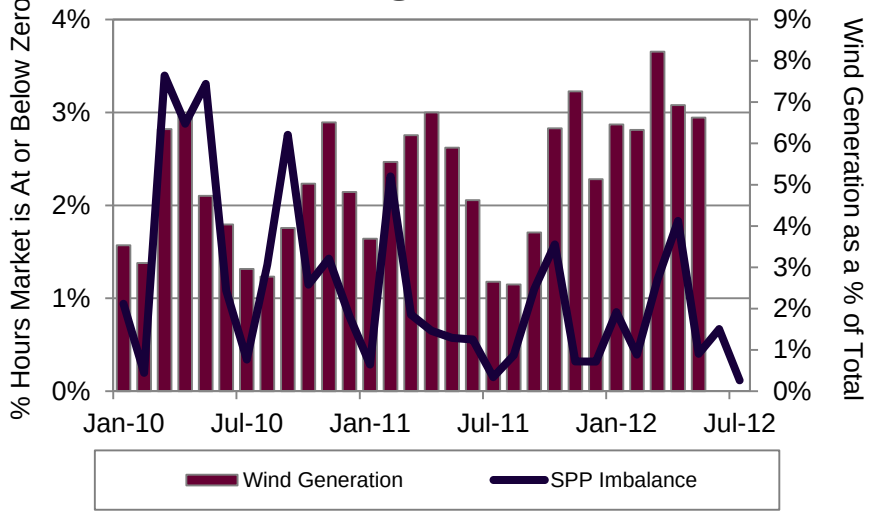
Source: Energy Information Administration, U.S. Department of Energy.

Nuclear Power Plant Operating Challenges: Zero Dispatch

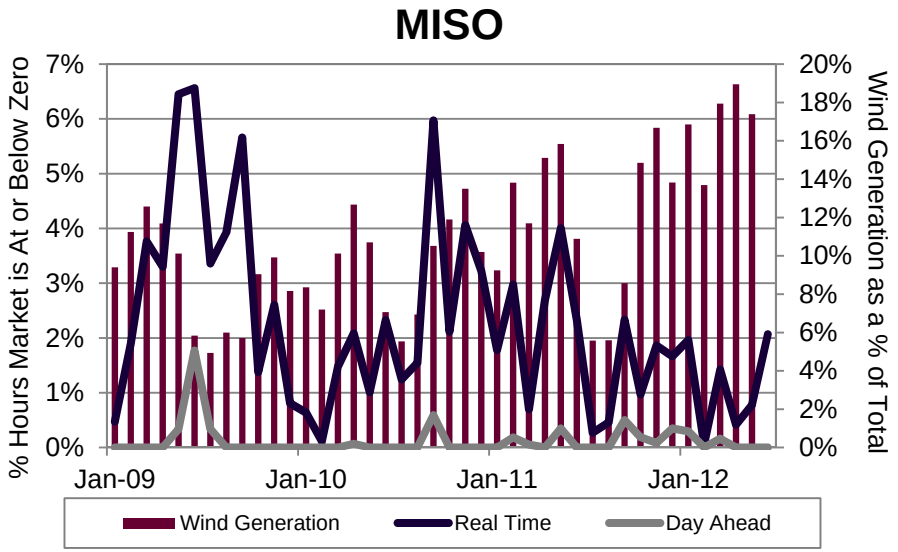
ERCOT



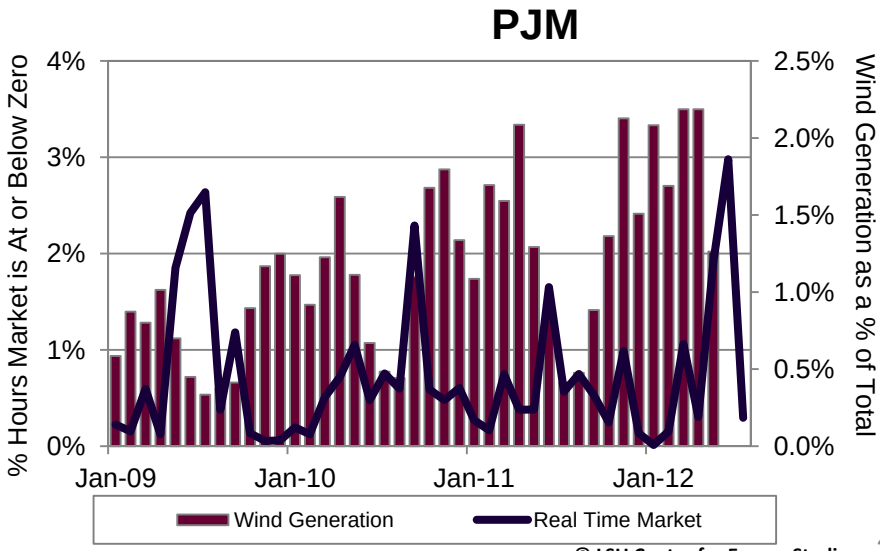
SPP



MISO



PJM



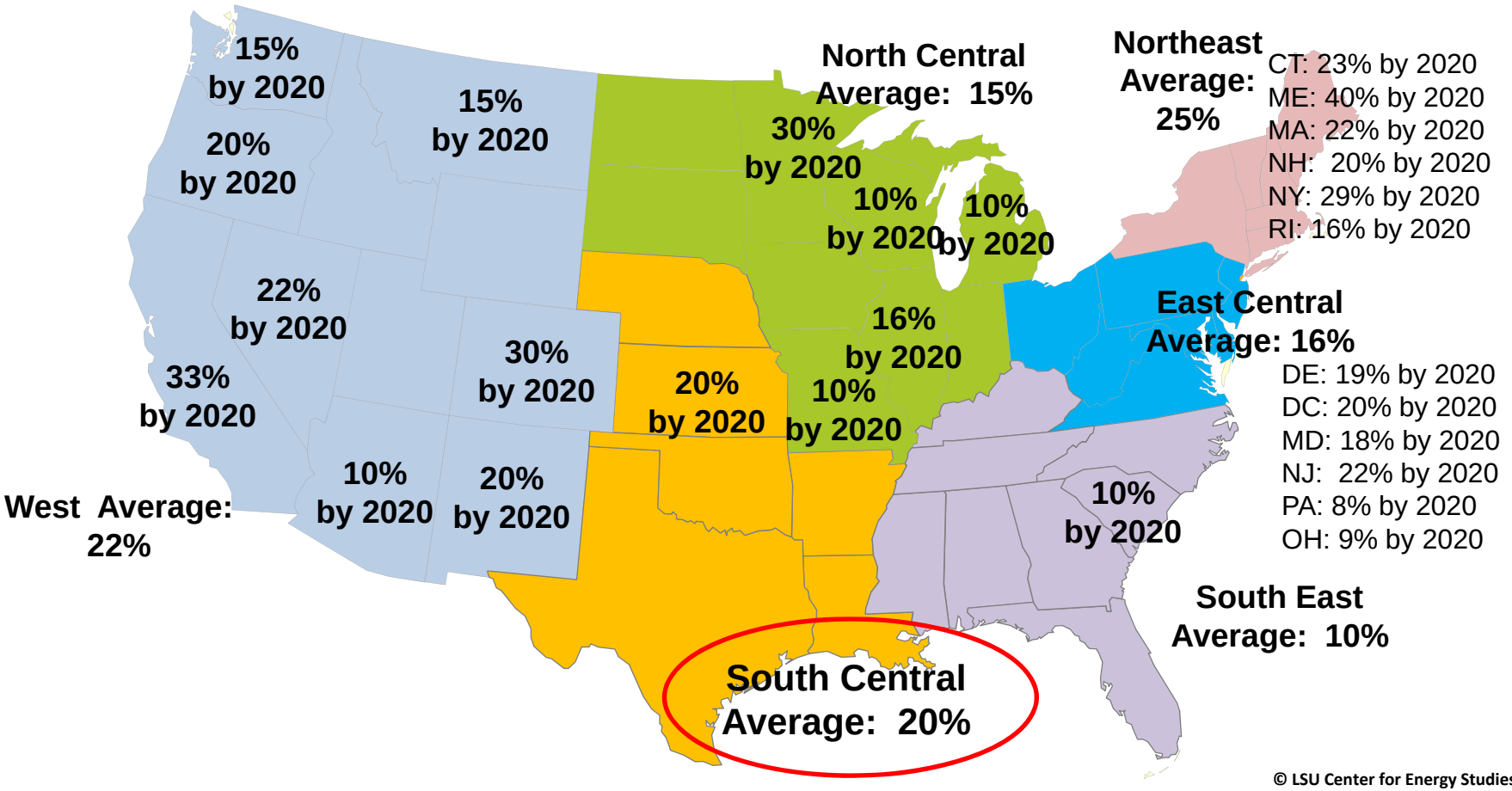
Building Block 3a Deficiencies

- EPA's allowance for "at risk" nuclear capacity effectively subsidizes unprofitable generation
- The basis for EPA's "at risk" nuclear capacity estimates is weak and not well supported
- EPA's "at risk" nuclear proposals are ambiguous on how nuclear generation will be treated for compliance purposes
- Unintended consequences of EPA's Proposed Rule on nuclear generation.
- EPA should not expand its definition of "at risk" nuclear capacity.

Building Block 3b: Renewable Generation

Building Block 3b, RE Potential

EPA assigns the states to one of six regions and sets a RE target for each, based on an average of all 2020 RPS requirements of the states in that region.



Louisiana's Existing Biomass Capacity

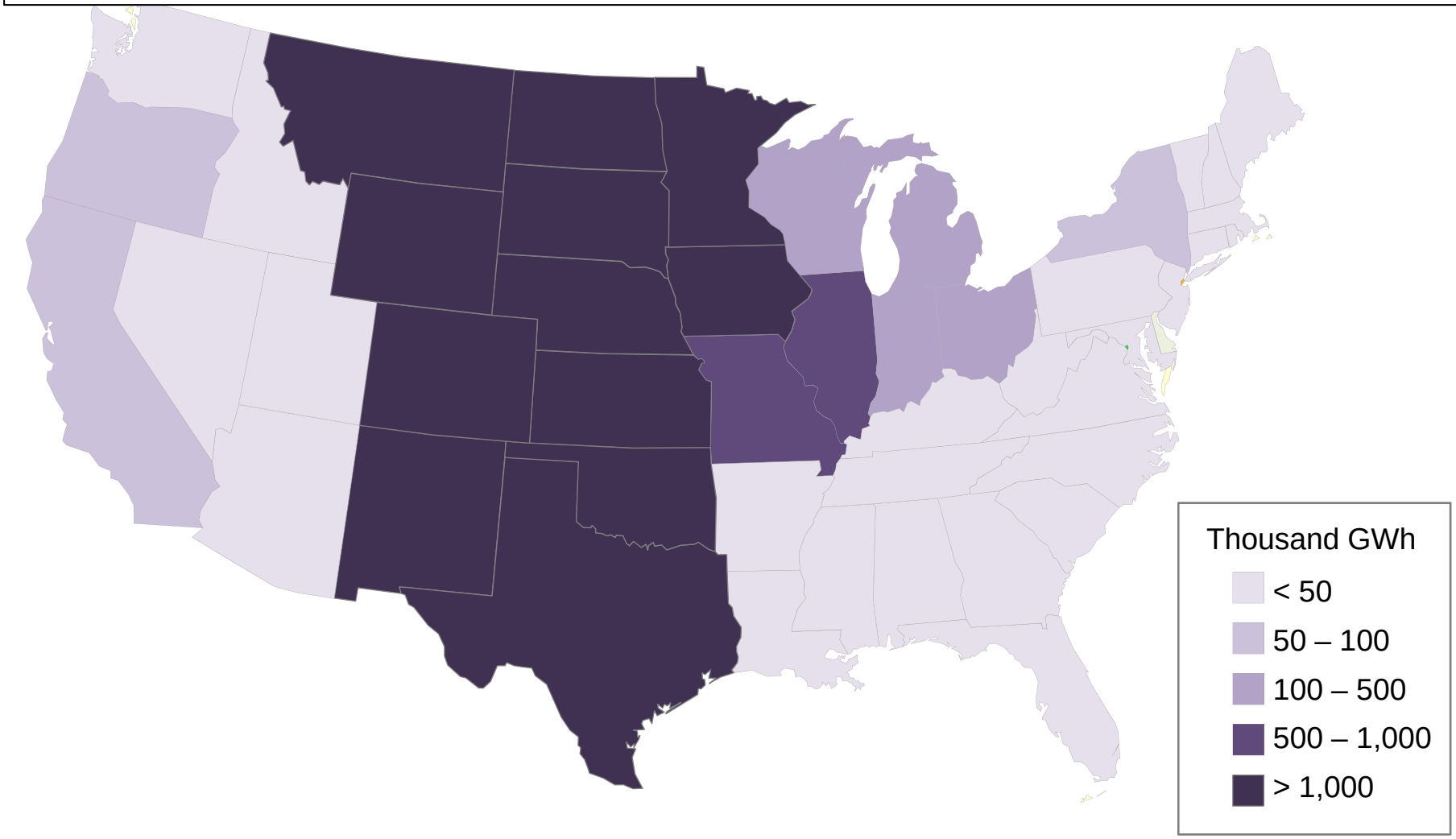
Louisiana's biomass capacity totals 445 MW. However, almost 60 percent of this capacity (262 MW) is over 30 years old.

Company Name	Generator Id	Capacity (MW)	Online Date	Facility Age (years)	Fuel
Agrilectric Power Partners Ltd	GEN1	12.1	1984	30	Agricultural Byproduct
Boise Packaging & Newsprint LLC	TG	61.5	1969	45	Wood/Waste Wood
Temple-Inland Corp	NO10	37.0	1999	15	Wood/Waste Wood
Temple-Inland Corp	NO8	25.0	1981	33	Wood/Waste Wood
Temple-Inland Corp	NO9	37.5	1979	35	Wood/Waste Wood
IPC-Mansfield Mill	GEN1	40.0	1981	33	Black Liquor
IPC-Mansfield Mill	GEN2	40.0	1981	33	Black Liquor
IPC-Mansfield Mill	GEN3	30.0	1981	33	Black Liquor
M A Patout & Sons Ltd	1000	1.0	1981	33	Agricultural Byproduct
M A Patout & Sons Ltd	2000	2.0	1981	33	Agricultural Byproduct
Georgia-Pacific Consr Ops LLC-Port Hudson	GEN1	67.7	1986	28	Black Liquor
KPAQ Industries LLC	GEN2	12.5	1966	48	Black Liquor
Red River Mill Intl Paper Company	3 T-G	78.8	2008	6	Black Liquor
Total		**445.1**			

Source: Energy Information Administration, U.S. Department of Energy.

NREL Estimated Technical Potential for Onshore Wind Power by State

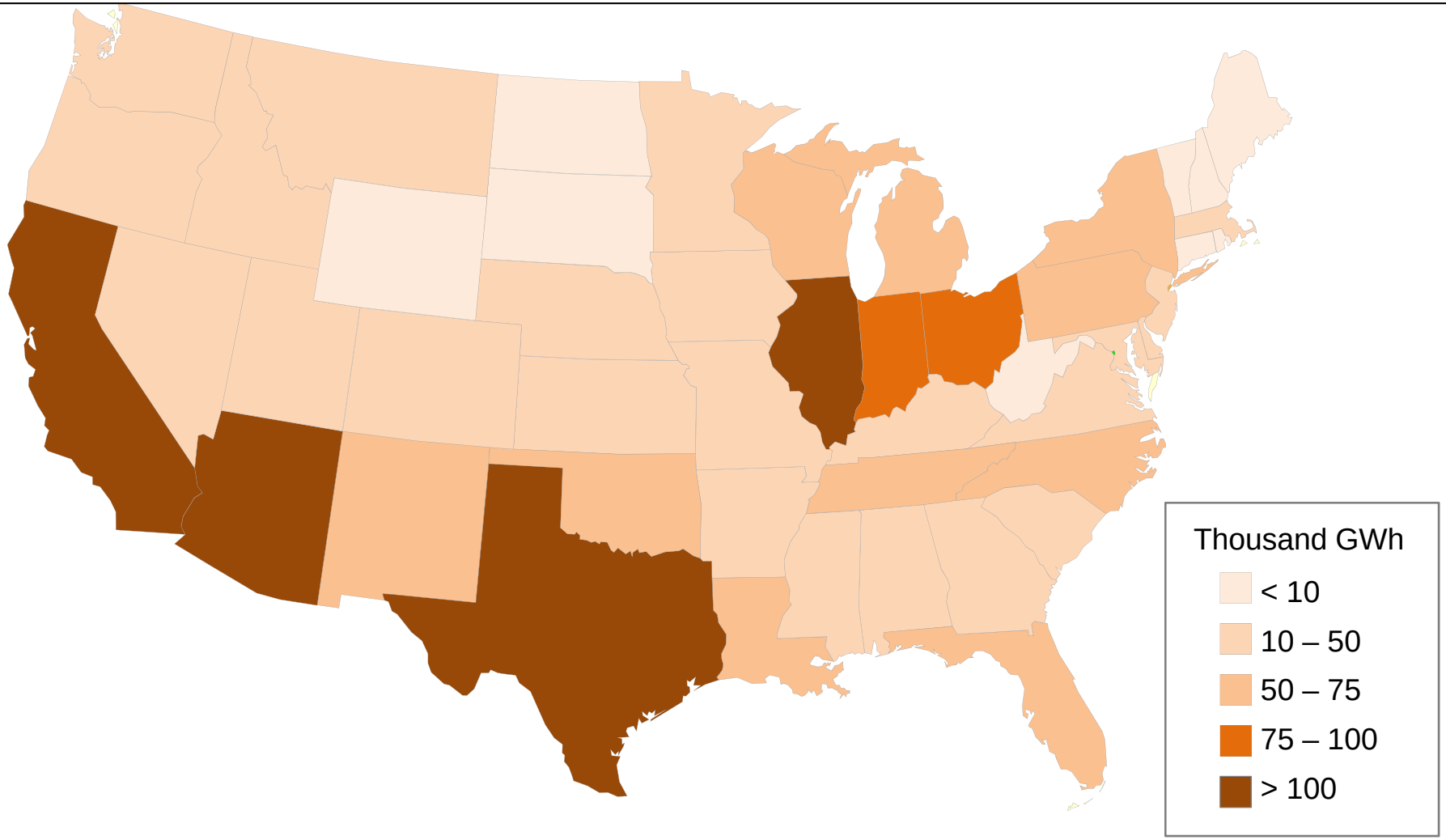
Louisiana is not likely to be installing much onshore wind power.



Source: National Renewable Energy Laboratory, U.S. Department of Energy.

NREL Estimated Technical Potential for Utility-Scale Solar PV by State

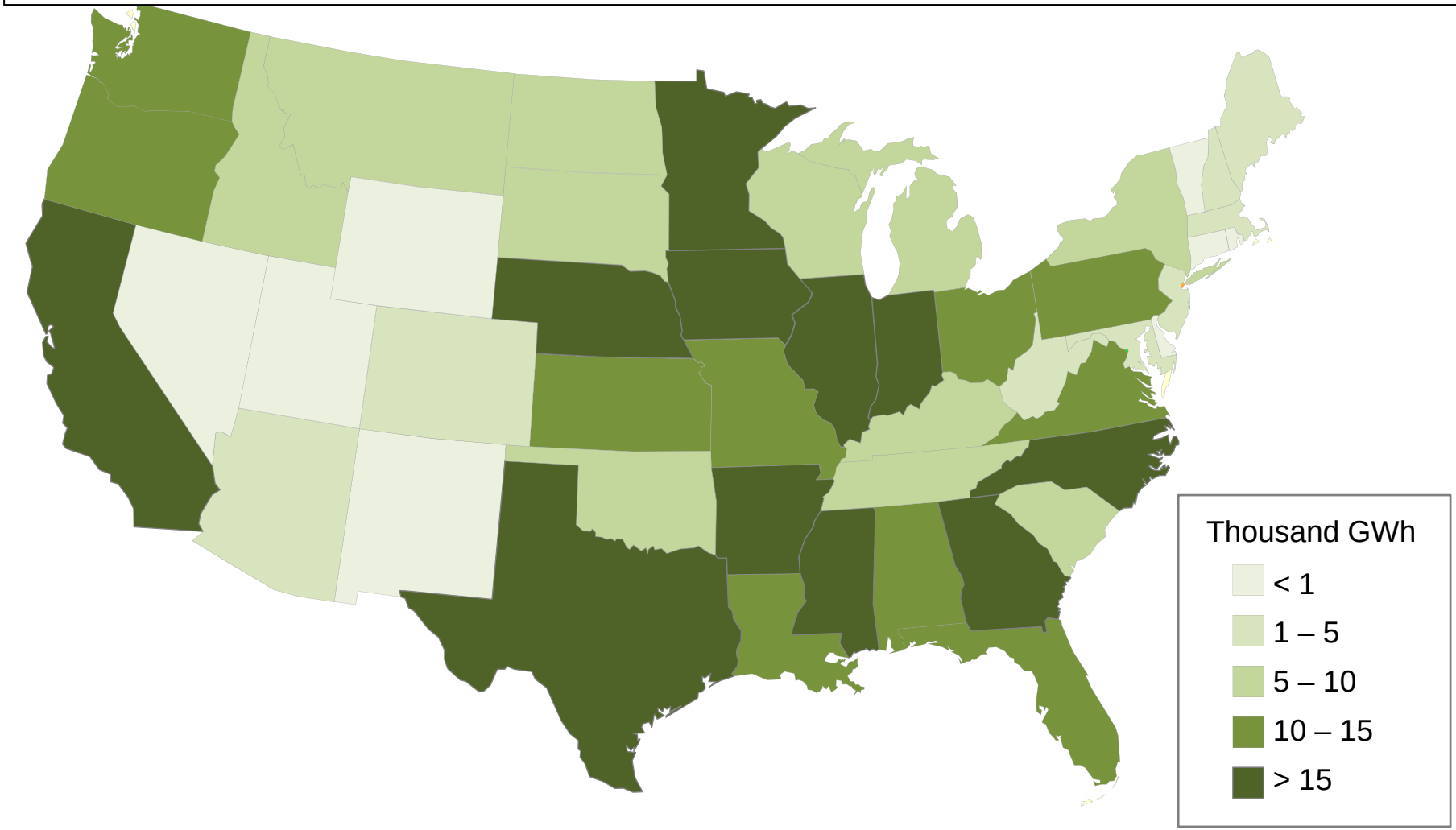
Large amounts of solar is unlikely as well.



Source: National Renewable Energy Laboratory, U.S. Department of Energy.

NREL Estimated Technical Potential for Biopower by State

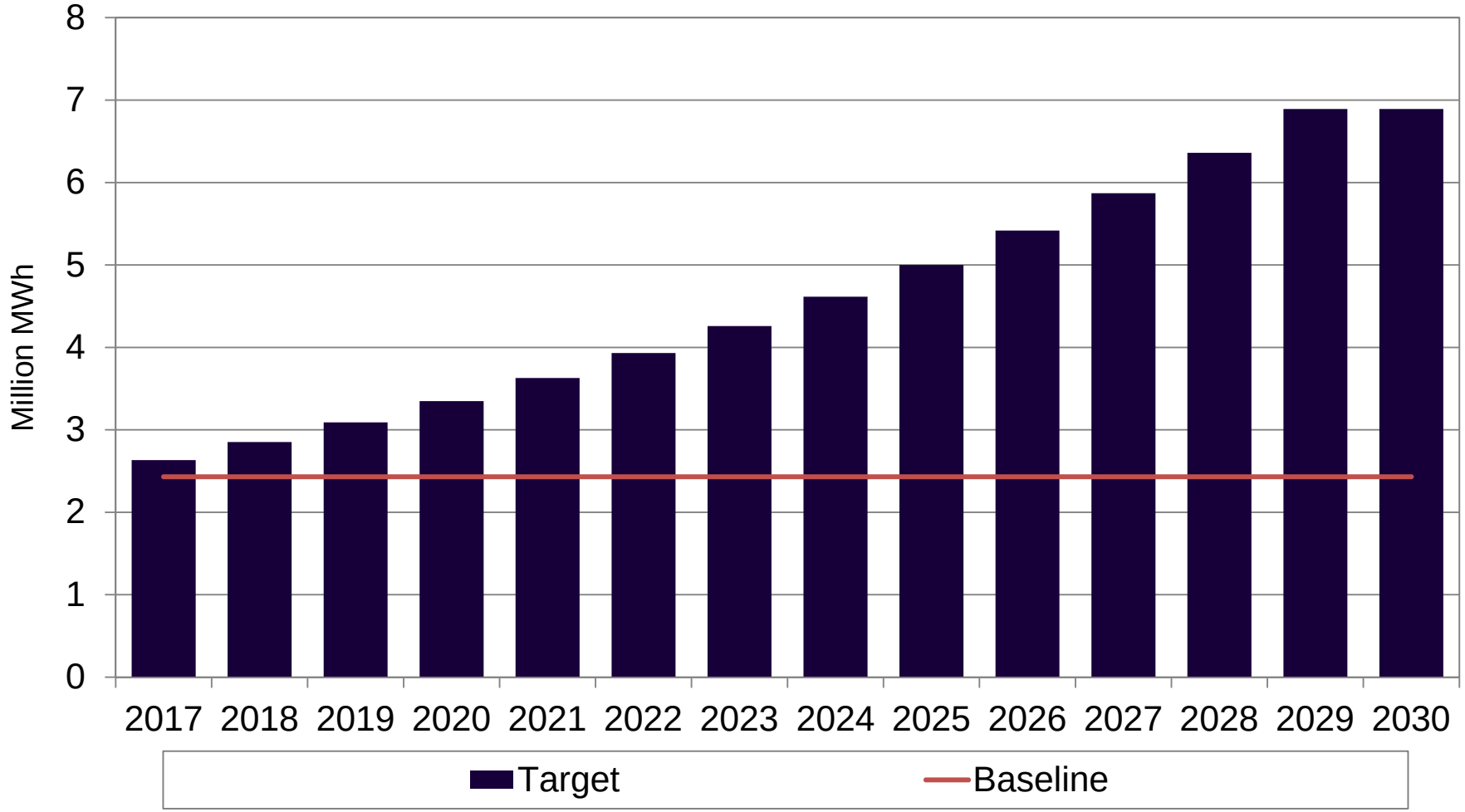
Biomass is Louisiana's most likely option for increasing renewable generation.



Source: National Renewable Energy Laboratory, U.S. Department of Energy.

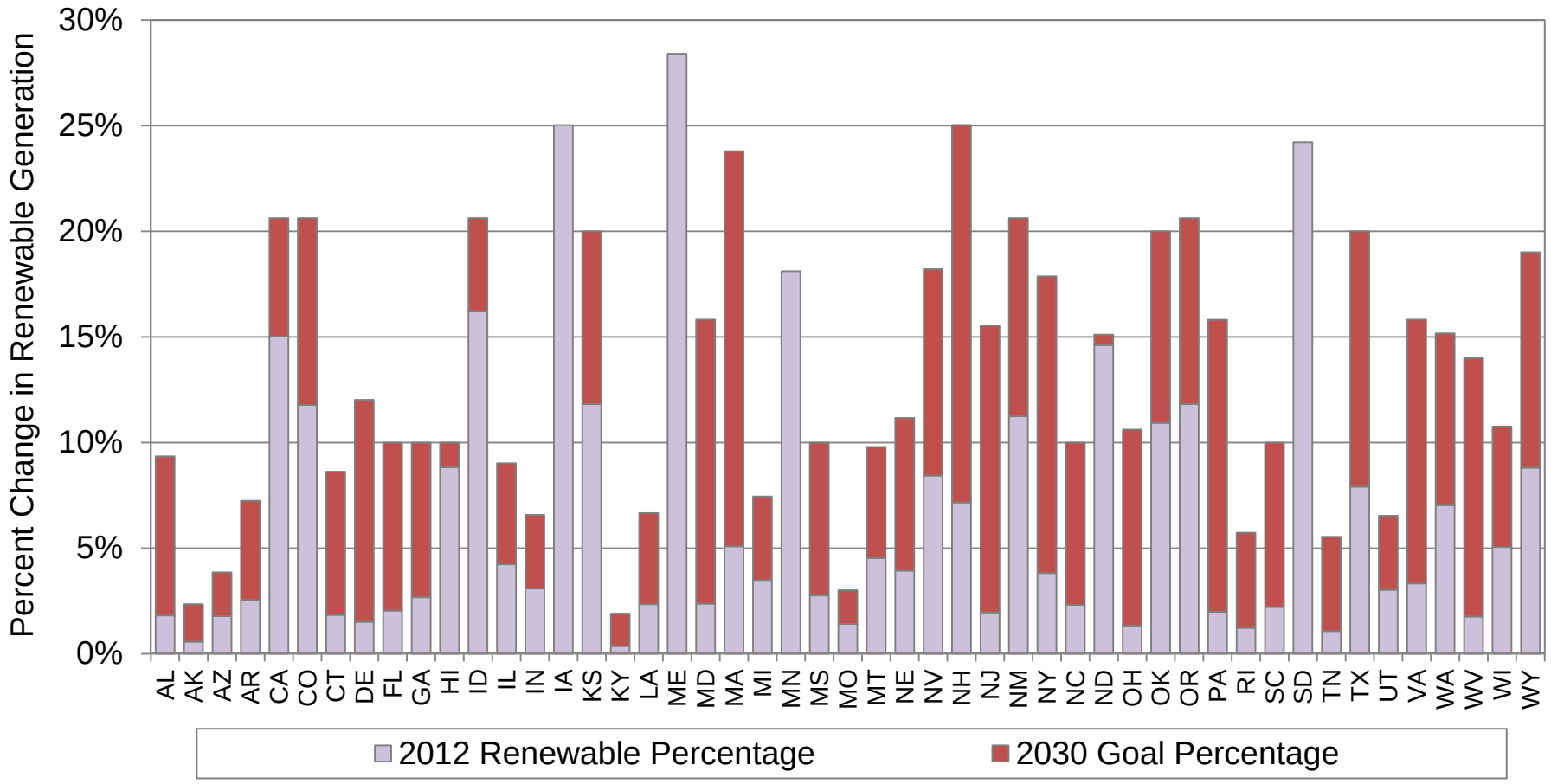
Building Block 3b, Louisiana Renewable Requirements

Under Building Block 3, the EPA expects Louisiana to be able to increase current renewable generation to 7 percent of total generation by 2030, an increase of 184 percent from current levels.



Building Block 3: Renewable Energy Growth

Under Building Block 3, the EPA expects Louisiana to be able to increase current renewable generation to 7 percent of total generation by 2030, an increase of 184 percent from current levels.



Building Block 3b Deficiencies

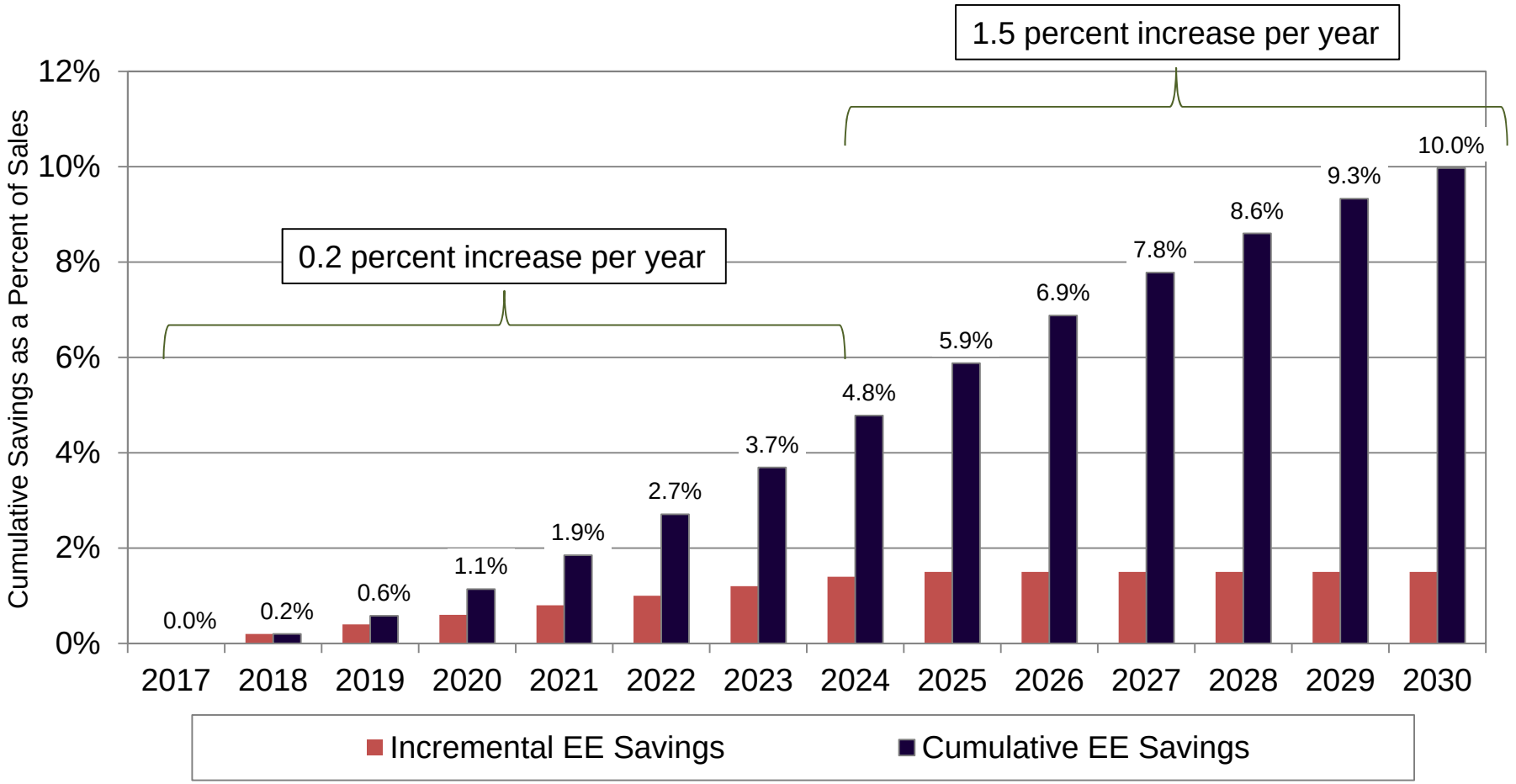
There are a number of problems with the EPA methodology:

- The EPA targets are based upon an erroneous method of averaging..
- Louisiana's RE potential differs considerably from other states in this region.
- EPA's calculations are in error (capacity vs. generation). The Kansas RPS is a capacity based goal, and correcting for this will change generation based targets significantly.
- It is well documented the Louisiana has limited technical RE capabilities.
- The EPA's proposed rule is ambiguous on the degree to which states will be allowed to use biomass to meet RE generation targets.
- EPA fails to recognize the age of existing RE facilities in Louisiana. Most of the State's non-hydro RE generation was developed in the late 1970s and 1980s.
- EPA assumptions are inconsistent with the findings of the LPSC RPS proceeding. The LPSC has already analyzed the opportunities for RE in the State.
- The EPA fails to consider lost fixed cost recovery (lost revenues or rate impacts).

Building Block 4: Increased End-Use Energy Efficiency

Building Block 4, Energy Efficiency Deployment

EPA determines the total MWh sales that could potentially be avoided through demand-side energy efficiency measures.



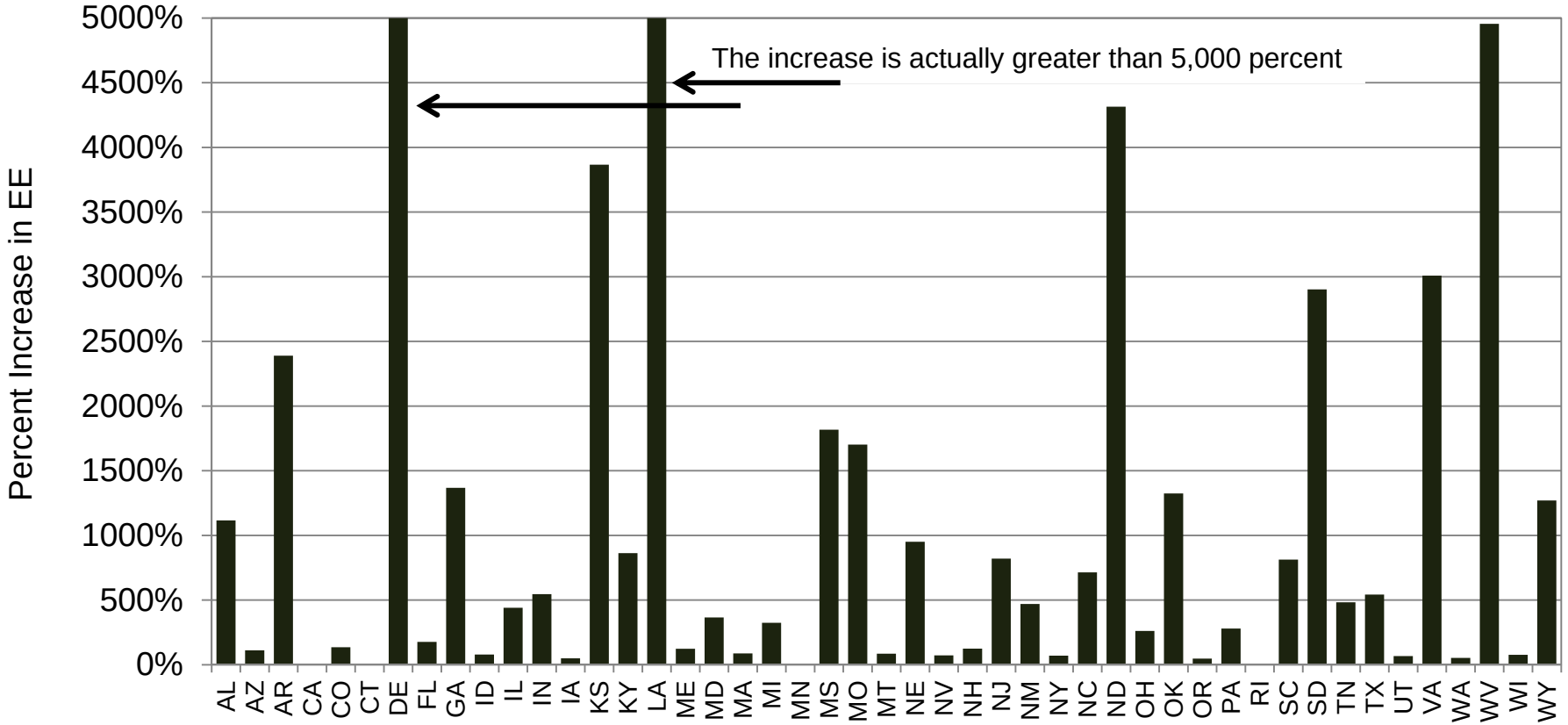
Building Block 4 Deficiencies

There are a number of problems with the EPA methodology:

- Inappropriate method of determining technical potentials.
- Fails to examine cost-effectiveness.
- Fails to recognize that prior potentials arose in high-cost energy environment.
- Fails to consider rate impacts and lost base revenues.
- Fails to consider CHP potentials at industrial facilities.
- Fails to examine total rate and ratepayer impacts adequately (cumulative impacts).

Building Block 4, Energy Efficiency

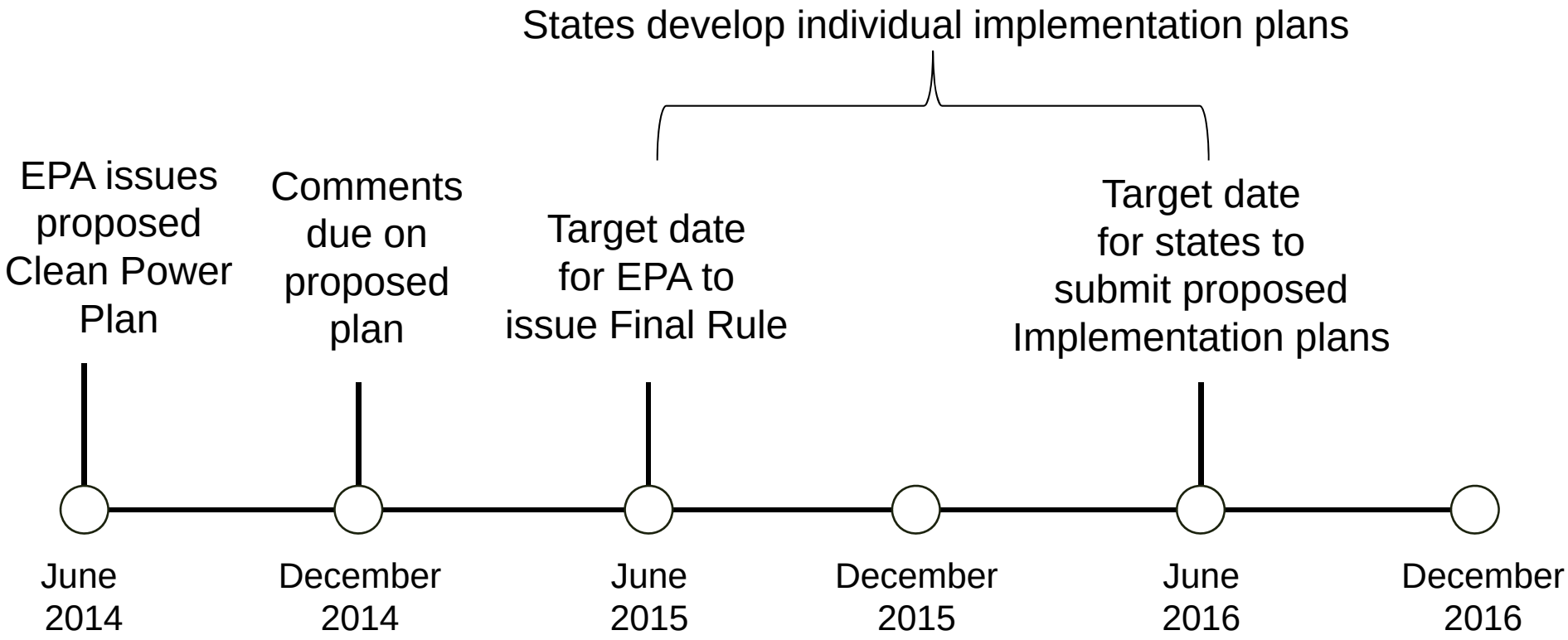
Under Building Block 4, the EPA assumes it is practical for all states to implement demand-side portfolios such that 1.5 percent of annual sales growth per year are reduced. The compounded effect results in a full 1.1 percent of total annual sales being avoided by Louisiana in 2020, and 9.3 percent of total annual sales being avoided by 2029. This is an increase



Source: 40 C.F.R. Part 60, pp. 34873-34874.

Conclusions

EPA Rulemaking Timeline



Conclusions

- Regardless of your opinion on carbon regulation, there are a number of problems and challenges with the EPA rule.
- Inefficient way to regulate carbon emissions: fails to examine cost-effectiveness, represents the worst in command and control regulation by (a) not utilizing market-based approaches and (b) forcing resource decisions on state regulators.
- This rule has very little to do with environmental regulation, and everything to do with utility regulatory resource planning.
- The costs to Louisiana ratepayers could be considerable. Some concerns this could create a significant near-term reliability challenge as well.

Questions, Comments & Input

Comments, Questions

CAVEAT: The views and opinions provided in this presentation are those of the author and do not necessarily reflect the official position of the State of Louisiana nor any Louisiana executive agency.