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President
Energy Recovery Council

WTERT 2014
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Opportunities to Deploy WTE and Reduce GHGs through EPA's Clean Power Plan

Overview

- June 2, 2014 – EPA released the "Clean Power Plan" Proposed Rule providing emission guidelines under section **111(d)** of the Clean Air Act for carbon dioxide from **fossil fuel-fired electric generating units**.

- The emission guidelines are based on a suite of technologies/strategies that EPA has designated as **Best System of Emission Reduction (BSER)** for existing fossil fuel-fired electric generating units.

- Through the application of BSER, EPA has proposed **state-specific goals** that reflect EPA's calculation of the emission limitation that each state can achieve, taking into account costs and any non-air quality health and environmental impacts.

OVERVIEW OF STATE GOAL COMPUTATION USING BUILDING BLOCKS

Building Blocks Informing State Goals - Overview

EPA created four categories of emission reduction measures (**building blocks**) used to determine state emission rate goals. States will have the flexibility to meet the standards using any combination of building blocks.

Starting Point: Unadjusted 2012 state fossil emission rate for covered sources

Building Block #1	**Building Block #2**	**Building Block #3**	**Building Block #4**
Heat Rate Improvement at Coal Plants	Redispatch to Existing Natural Gas Combined Cycle (NGCC) Plants	Existing and New Renewables and New and At-Risk Nuclear	End-use Energy Efficiency (EE)

Finishing Point: Interim and Final State Emission Rate Goals

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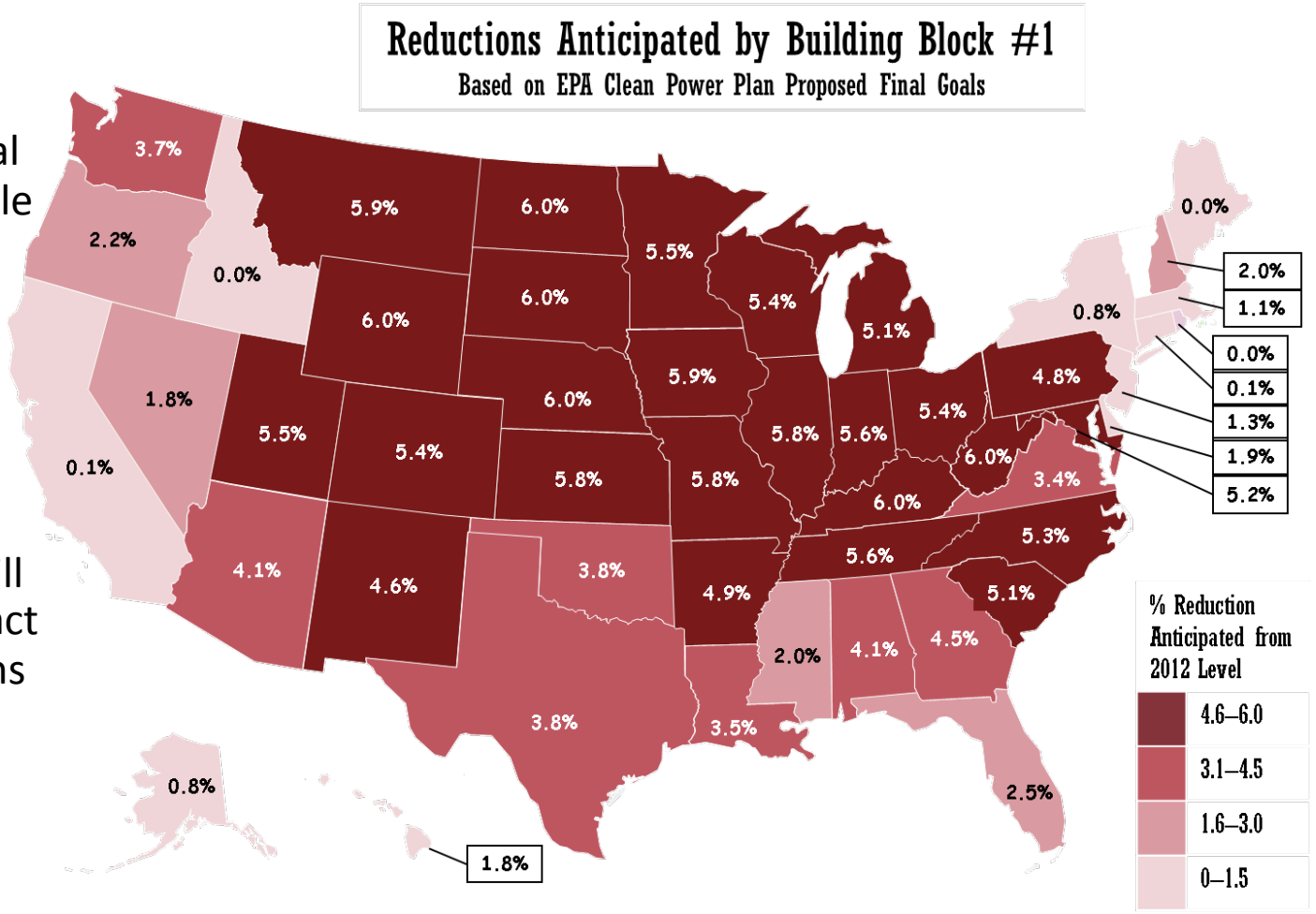
BSER Building Block #1 – Heat Rate Improvement

EPA assumes that a 6% heat rate improvement at coal facilities is achievable and will directly translate to a 6% reduction of CO2 emissions.

Building Block #1 will have a greater impact on overall reductions in states with a heavier reliance on coal plants.

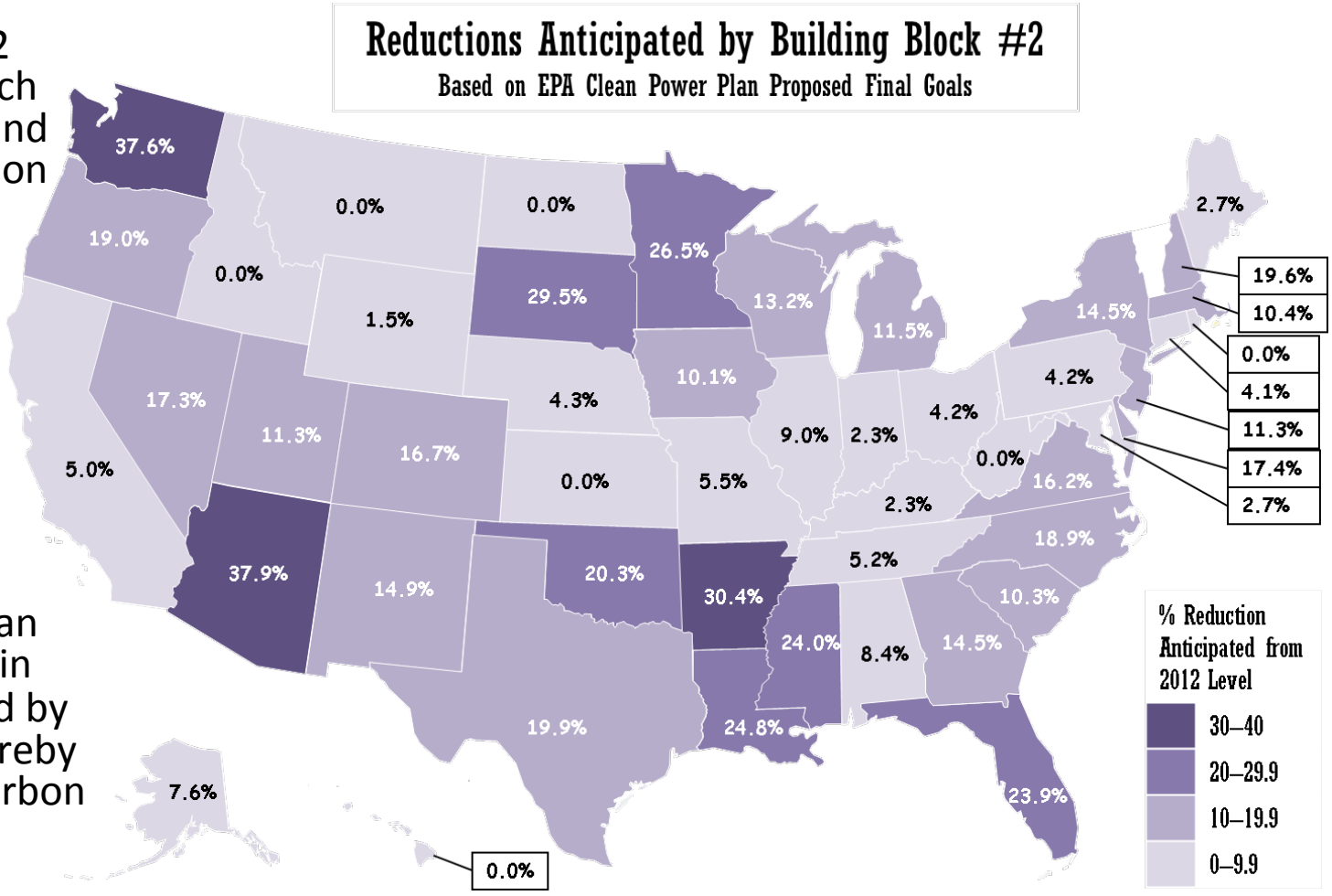


Data source: EPA Goal Computation Technical Support Document, Appendix 5 table. Levels based on reductions from 2012 rates based on fossil, and compliance eligible renewables and nuclear.
Note: Vermont is omitted since it does not have any fossil fuel-fired EGUs subject to regulation by 111(d).

BSER Building Block #2 – Redispatch to NGCC

Building block #2 assumes that each state's existing and under construction NGCC fleet will operate at a minimum 70% capacity.

All generation increased at an NGCC plant is associated with an equal reduction in power generated by coal/oil/gas, thereby achieving less carbon intensity.



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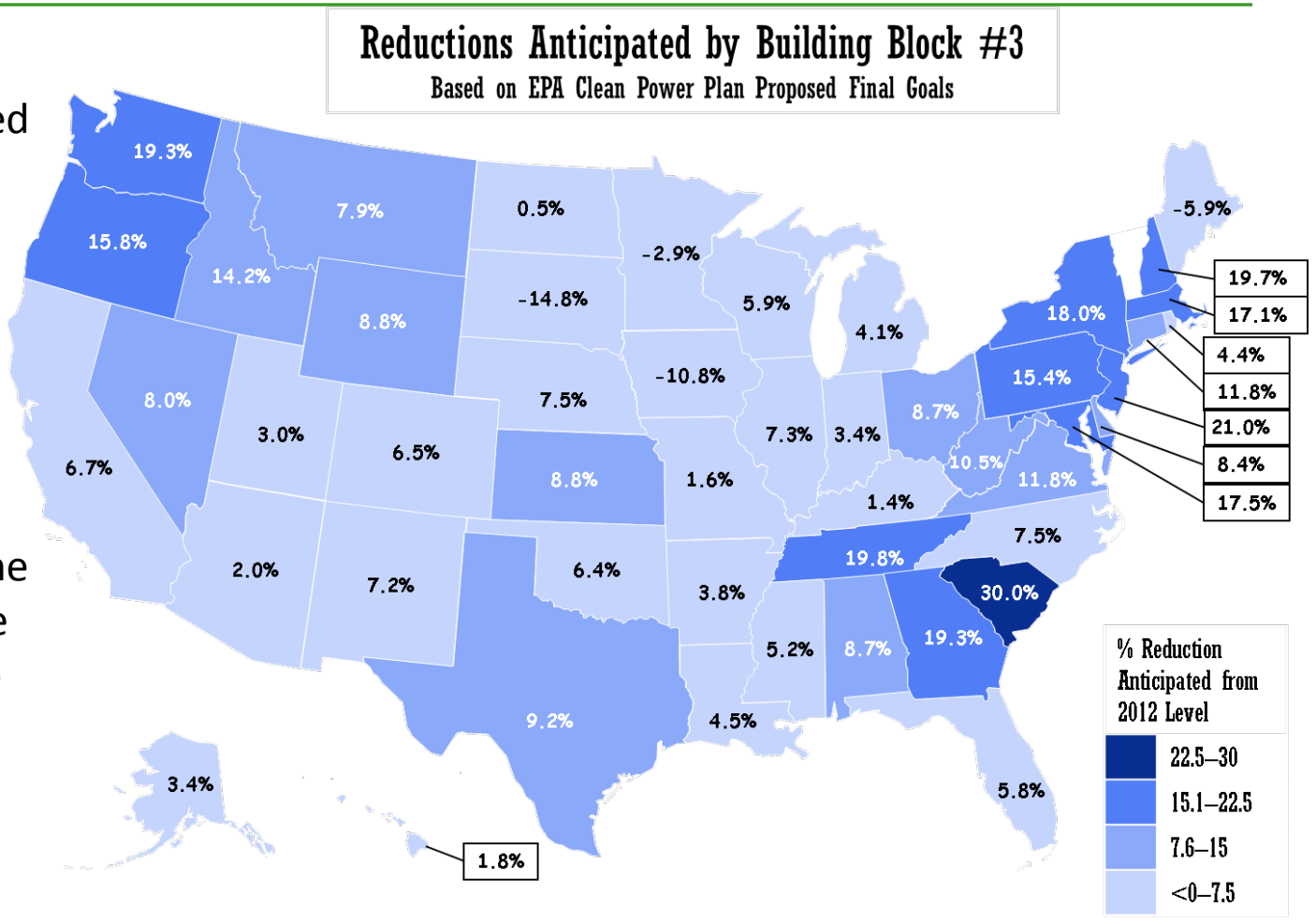
BSER Building Block #3 – Renewable Energy (RE)

Zero-emitting RE generation is added to the state's generation baseline, reducing overall carbon intensity.

States are given the flexibility to define what is renewable energy (subject to EPA approval of state compliance plans).



Data source: EPA Goal Computation Technical Support Document, Appendix 5 table. Levels based on reductions from 2012 rates based on fossil, and compliance eligible renewables and nuclear.
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BSER Building Block #3 – Under Construction and At-Risk Nuclear

EPA has identified that approx. 5.8% of domestic nuclear capacity is "at risk" of being retired and seeks to preserve this zero-CO_2 emitting capacity.

The expected generation for under construction and "at risk" nuclear is added to the state's generation baseline, reducing overall carbon intensity.

Under construction and at-risk nuclear capacity is also part of the inventory that the state can count towards compliance with its state goal.

Preserving at-risk WTE provides the same benefit as preserving at-risk nuclear. Preservation of existing facilities avoids immediate increase in GHG emissions that would occur if the facility closed.

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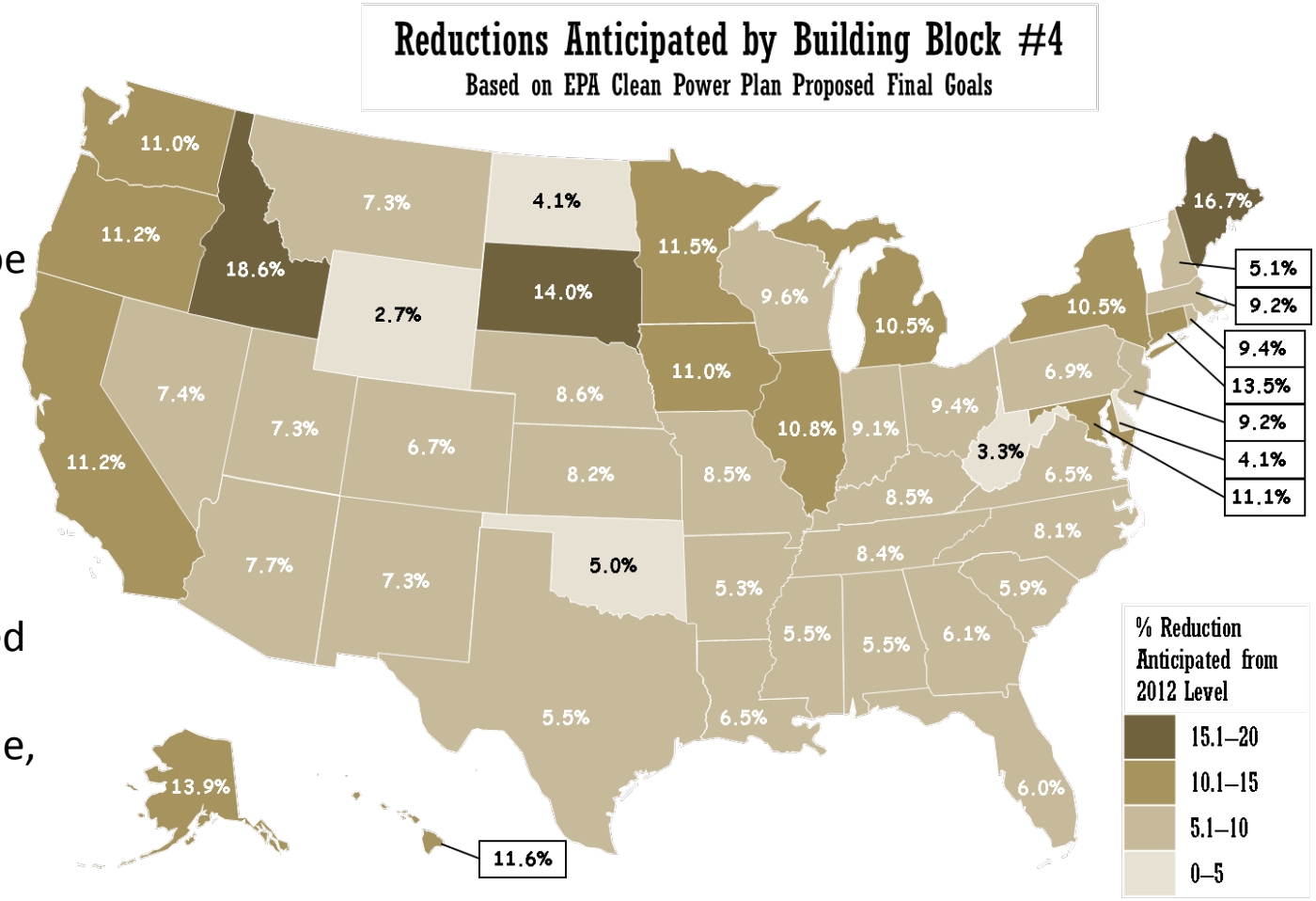
BSER Building Block #4 – End-use Energy Efficiency

EPA determines a state-specific amount of net generation that could potentially be avoided through demand-side energy efficiency measures.

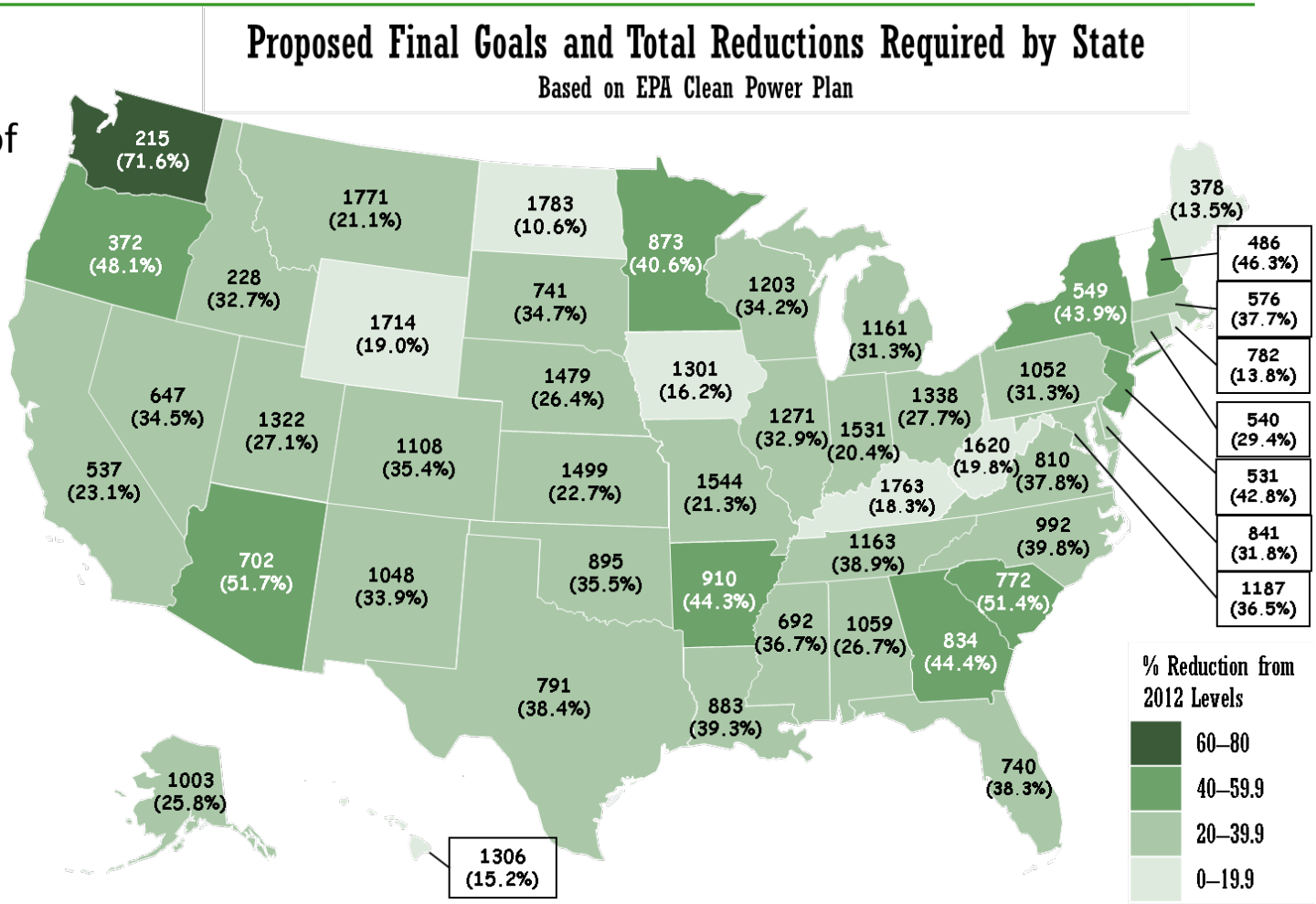
This avoided generation is added to the state's generation baseline, reducing overall carbon intensity.



Calculate Interim and Final Goals Based on Building Blocks

Interim State Goal: Average of the adjusted yearly emission rates for the period 2020-2029

Final State Goal: The 2029 emission rate becomes the state goal for 2030 and each year thereafter



Data source: EPA Goal Computation Technical Support Document, Appendix 5 table. Levels based on reductions from 2012 rates based on fossil, and compliance eligible renewables and nuclear.
Note: Vermont is omitted since it does not have any fossil fuel-fired EGUs subject to regulation by 111(d).

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A CLOSER LOOK AT BUILDING BLOCK #3

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BSER Building Block #3

EPA assumes that each state can cost-effectively increase renewable generation to levels consistent with the goals of leading states in the same region.

EPA assumes each state will grow renewable energy generation over time towards that target, starting at the state's current level of renewable energy.

The goal of Building Block #3 is to increase generation from the power sector from zero- and low-emitting sources, thereby reducing the average carbon intensity of the entire power sector.

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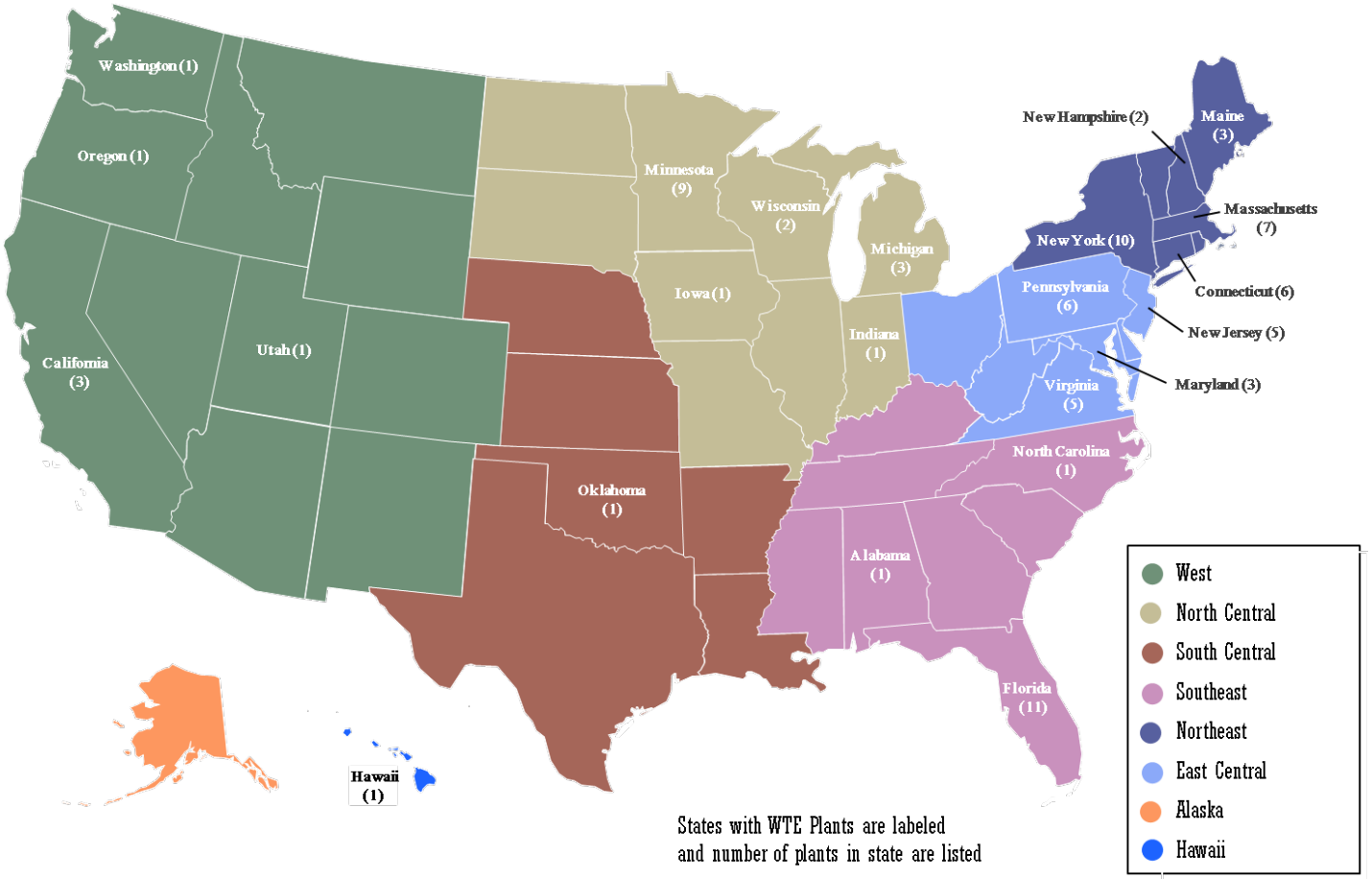
Renewable Energy Regions

The United States is divided into regions. WTE is represented in each region (excl. AK).



Source: Figure 4.3 in EPA's GHG Abatement Measures Technical Support Document, June 2014. WTE facility locations obtained from the 2014 ERC Directory of Waste-to-Energy Facilities.

Regional Renewable Energy Generation Targets

A renewable energy generation target is calculated for each region, based upon averaging all 2020 RPS requirements in that region.

The Northeast has the largest regional generation target, and is home to 28 WTE facilities.

Region	Regional RE Generation Targets
Alaska	10%
East Central (19 WTE facilities)	16%
Hawaii (1 WTE facility)	10%
North Central (16 WTE facilities)	15%
Northeast (28 WTE facilities)	25%
South Central (1 WTE facility)	20%
Southeast (13 WTE facilities)	10%
West (6 WTE facilities)	21%

Source: Table 4.4 in EPA's GHG Abatement Measures Technical Support Document, June 2014.

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Regional Renewable Energy Growth Factors

An annual growth factor is calculated that would allow the region as a whole to reach the regional RE target in 2029 assuming that 2012 RE generation levels would increase at the prescribed growth factor starting in 2017.

The East Central Region must grow the fastest to reach its targets and that region is home to 19 WTE facilities.

Region	RE Growth Factor
Alaska	11%
East Central (19 WTE facilities)	17%
Hawaii (1 WTE facility)	8%
North Central (16 WTE facilities)	6%
Northeast (28 WTE facilities)	13%
South Central (1 WTE facility)	8%
Southeast (13 WTE facilities)	13%
West (6 WTE facilities)	6%

Source: Table 4.5 in EPA's GHG Abatement Measures Technical Support Document, June 2014.

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Anticipated Renewable Energy Growth

The annual growth factor for a given region is applied to individual states' 2012 RE generation starting in 2017 and carrying forward to 2029, not to exceed a maximum RE generation level equivalent to the regional RE target.

Annual RE generation levels for each state are used to calculate interim and final RE targets for that state.

Example: Maryland, 17% Growth

Year	Existing and Incremental RE Generation (MWh)
2012	898,152
2017	1,053,165
2018	1,234,932
2019	1,448,071
2020	1,697,995
2021	1,991,053
2022	2,334,691
2023	2,737,638
2024	3,210,129
2025	3,764,169
2026	4,413,830
2027	5,175,617
2028	5,982,069
2029	5,982,069

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Source: State 2012 Generation Figures drawn from Table 4.1 in EPA's GHG Abatement Measures Technical Support Document, June 2014. Annual growth drawn from EPA Goal Computation Technical Support Document, Appendix 1 & 2 spreadsheet, June 2014.

Compliance Flexibility

- While EPA's proposed approach is derived from RPS data, **states may also consider a broad variety of other RE policies** to increase generation. There is NO requirement for states to adopt an RPS.

- Options include performance-based incentives, financial assistance programs, regulatory changes to facilitate the development of renewable sources and their interconnection to the grid and "lead by example" strategies integrating RE generation into state properties.

- States may also participate in regional **multi-state plans** and approaches.

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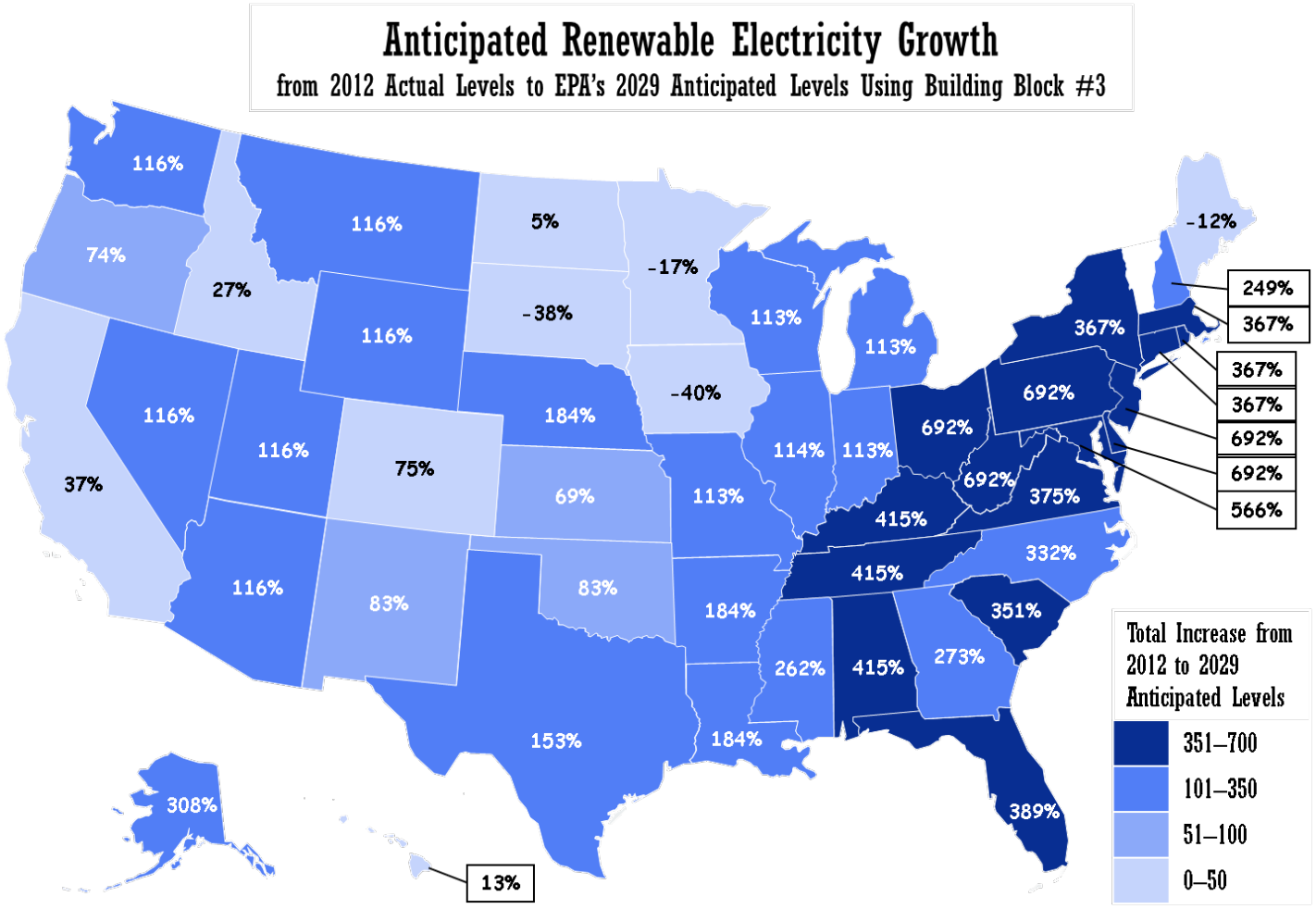
ANALYSIS

Where will the Anticipated Renewable Growth Occur?
From 2012-2029

Annual growth in the 6-17% range compounds at an amazing rate.

The opportunities for renewable growth in certain states is compelling.

States must enact robust policies to drive the renewable deployment that EPA is anticipating. Treatment of interstate trading will impact market value.



Data source: State 2012 Generation Figures drawn from Table 4.1 in EPA's GHG Abatement Measures Technical Support Document, June 2014. 2029 Anticipated Generation drawn from EPA's Goal Computation Technical Support Document, Appendix 1 & 2 spreadsheet, June 2014
Note: Vermont is omitted since it does not have any fossil fuel-fired EGUs subject to regulation by 111(d).

How Much Does Existing WTE Contribute to Renewable Energy (RE) Levels?

	2012 Non-Hydro RE Generation (MWh) (using only WTE from Biogenic MSW)	2012 Net Generation (MWh) from WTE from Biogenic MSW	% of 2012 Non-Hydro RE from WTE from Biogenic MSW	2012 Net Generation (MWh) from WTE from All MSW	% of 2012 Non-Hydro RE from WTE from All MSW if All MSW is Included in 2012 Baseline *
CT	666,525	640,684	**96.1%**	1,256,244	**98.0%**
MA	1,843,419	913,131	**49.5%**	1,790,440	**65.8%**
NJ	1,280,715	546,554	**42.7%**	1,071,688	**59.3%**
MD	898,152	308,603	**34.4%**	605,101	**50.7%**
FL	4,523,798	1,473,268	**32.6%**	2,888,746	**48.6%**
VA	2,358,444	495,840	**21.0%**	972,229	**34.3%**
PA	4,459,118	871,004	**19.5%**	1,707,863	**32.2%**
NY	5,192,427	947,167	**18.2%**	1,857,252	**30.4%**
HI	924,815	152,877	**16.5%**	299,765	**28.0%**
MI	3,785,439	192,439	**5.1%**	377,329	**9.5%**
NH	1,381,285	68,185	**4.9%**	133,697	**9.2%**

	2012 Non-Hydro RE Generation (MWh) (using only Biogenic MSW)	2012 Net Generation (MWh) from Biogenic MSW	% of 2012 Non-Hydro RE from Biogenic MSW	2012 Net Generation (MWh) from All MSW	% of 2012 Non-Hydro RE from All MSW if All MSW is Included in 2012 Baseline *
ME	4,098,795	135,826	**3.3%**	266,327	**6.3%**
MN	9,453,871	282,362	**3.0%**	553,652	**5.7%**
WA	8,214,350	71,553	**0.9%**	140,298	**1.7%**
OR	7,207,229	43,885	**0.6%**	86,048	**1.2%**
IN	3,546,367	21,172	**0.6%**	41,513	**1.2%**
WI	3,223,178	18,293	**0.6%**	35,868	**1.1%**
CA	29,966,846	152,790	**0.5%**	299,587	**1.0%**
UT	1,099,724	4,809	**0.4%**	9,429	**0.9%**
OK	8,520,724	10,469	**0.1%**	20,527	**0.2%**
IA	14,183,484	13,781	**0.1%**	27,022	**0.2%**

- EPA's technical support documents uses U.S. EIA data to determine the amount of renewable electricity was generated in the baseline year. EIA only recognizes electricity generated from **Biogenic MSW** as a RE generating technology. Electricity from Non-Biogenic MSW is "Other".
- The GHG benefits of WTE will be maximized only if EPA allows states to include generation from **All MSW / WTE** in their state compliance plans. This will allow **WTE to fully benefit** from the policies that will be put into place to deploy GHG-mitigating renewable energy technologies.

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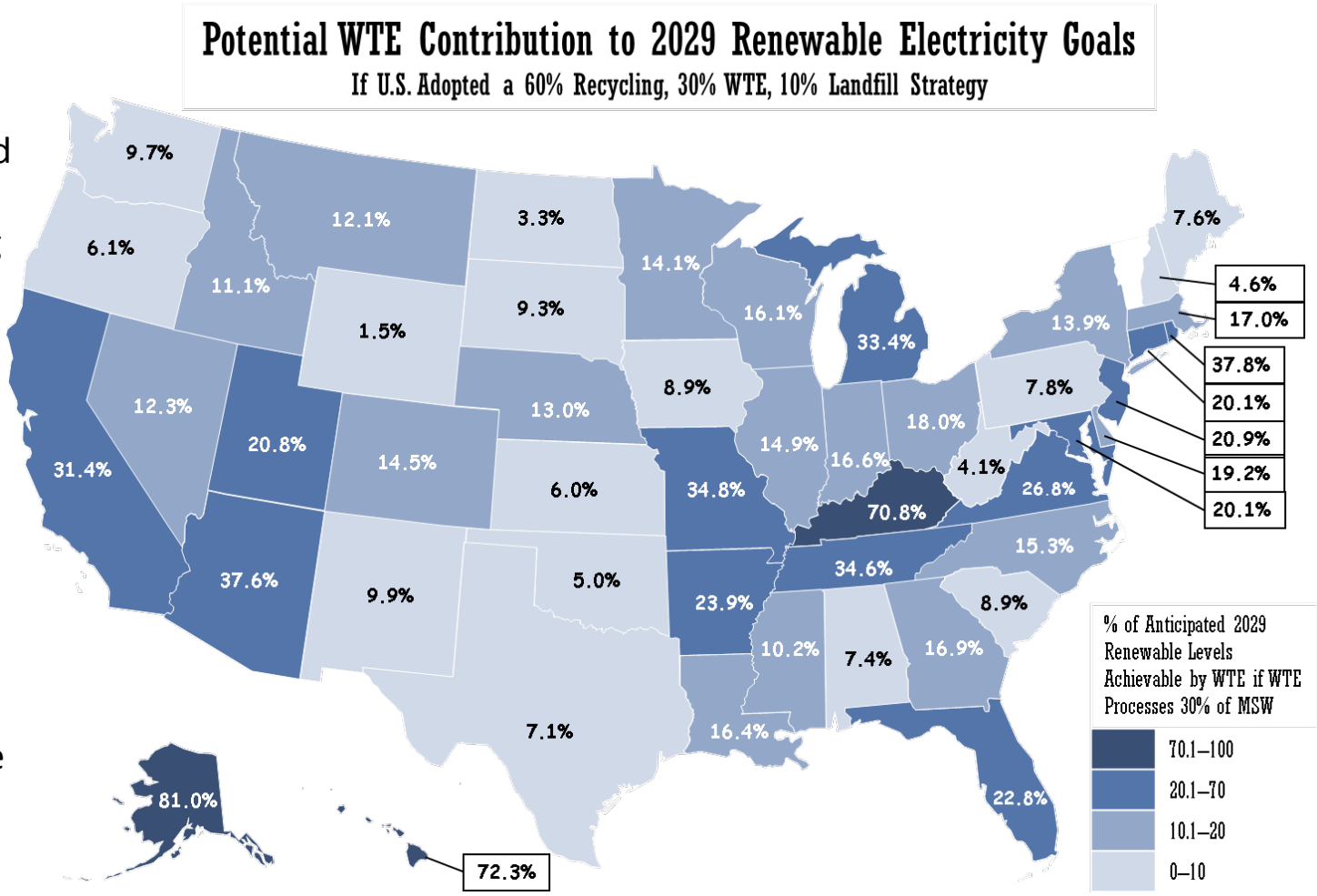
* - "Percentage of 2012 Non-Hydro Renewables from All MSW if All MSW is Included in the 2012 Baseline" was calculated by dividing the net generation from all MSW by the sum of 2012 non-hydro renewable (using only biogenic MSW) totals and 2012 net generation from non-biogenic MSW. WTE generation data obtained from Energy Information Administration.

POTENTIAL: How Much Could WTE Contribute to 2029 Renewable Goals?

If U.S. waste management practices followed a model favored in Europe (relying on increased recycling and increased WTE), the U.S. could meet significant portions of its climate goals through deployment of a progressive and sustainable waste management system.



Source: 2029 Anticipated Generation drawn from EPA Goal Computation Technical Support Document, Appendix 1 & 2 spreadsheet, June 2014. Net WTE generation based on 30% of 2011 MSW levels reported by the Columbia University 2013 MSW Report and assumes that net electric generation of 650 KWh/ton of MSW is all counted toward the 2029 goal.

Conclusions

- Electricity generated from **Biogenic MSW** was included in EPA's technical support documents as a renewable generating technology that can red, however states have flexibility to determine which renewables to include in their plans.

- EPA is **relying on existing** renewable energy facilities (except existing hydropower) and **major growth in new** renewables to reduce the carbon intensity of each state's power sector.

- States have **significant flexibility** in meeting the standards. EPA will be as deferential as possible in approving state or multi-state plans.

- This is not a national program; it is a **federal program implemented by states**. A technology must be part of each state's plan to gain traction. The benefits to any technology will be the market drivers put in place at the state level.

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