

Overview of the Clean Power Plan

**For the 2015 Clean Power Plan Summit of Southeast
Advocates**

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Synapse Energy Economics

- Research and consulting firm specializing in energy, economic, and environmental topics
- Leader for public interest and government clients in providing rigorous analysis of the electric power sector
- Services include economic and technical analyses, regulatory support, research and report writing, policy analysis and development, representation in stakeholder committees, facilitation, trainings, and expert witness services
- Develops resources such as the Synapse Clean Power Plan Toolkit to promote transparent decision-making
- All non-confidential publications and open-source tools available for free at www.synapse-energy.com

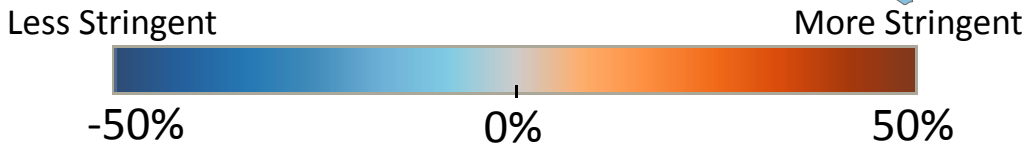
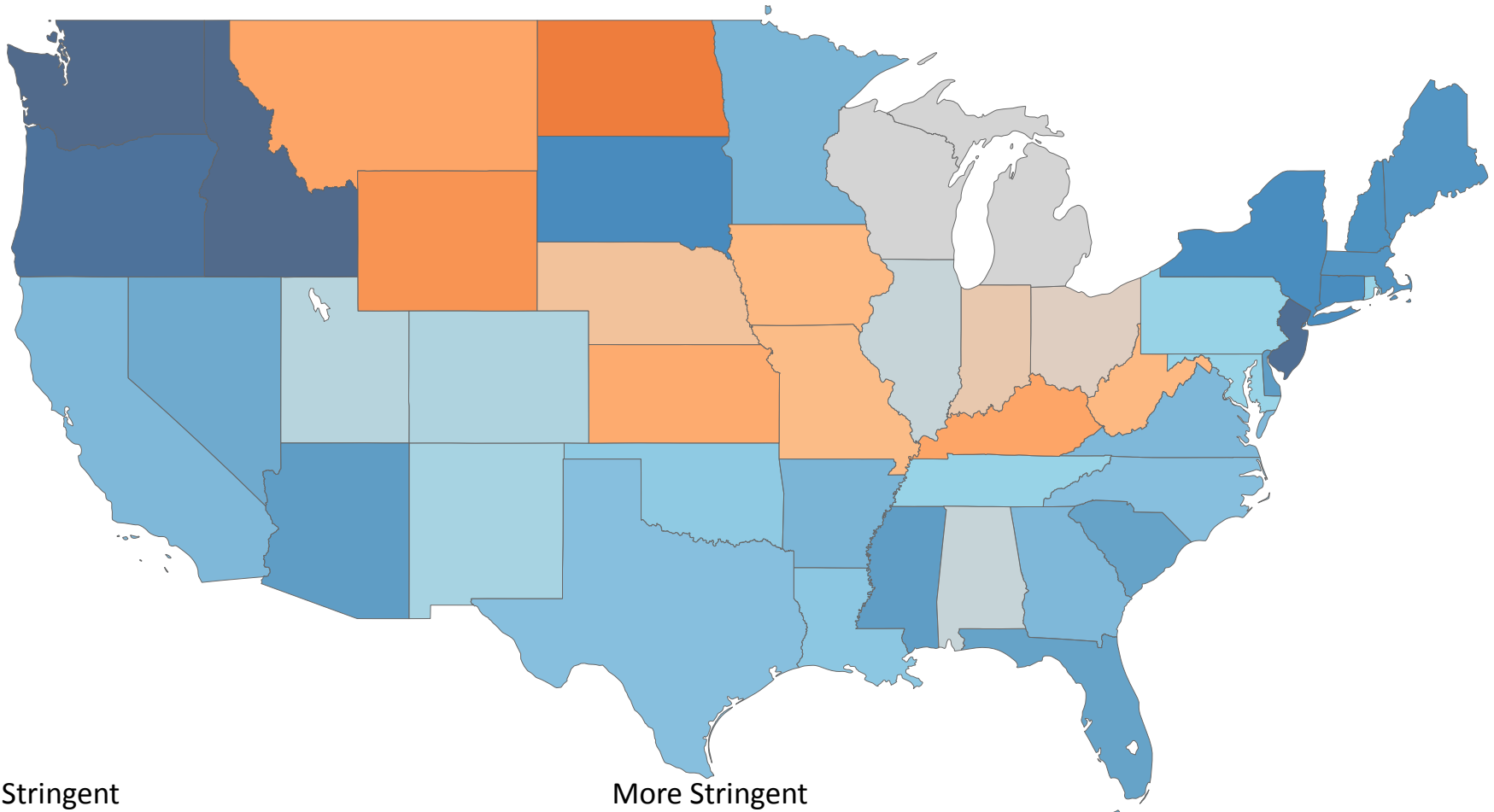
Clean Power Plan and Section 111(d)

- Who?** Applies to existing fossil fuel-fired generators that were in operation or under construction by January 8, 2014 and that meet certain size and production requirements
- What?** Covered units must reduce emissions of carbon dioxide (CO₂) by the amount determined by EPA to reflect the Best System of Emission Reductions (BSER) for the source category
- When?** Compliance targets must be met on average over an 8-year interim compliance period starting in 2022 as well as in the final compliance year: 2030
- Where?** Applies to units in 47 states and several Tribal lands (Vermont and Washington D.C. have no covered units; Hawaii, Alaska, Puerto Rico, and Guam will be brought into the program when more data is available on the units in those states/territories)
- Why?** To reduce emissions of CO₂ from the electricity sector in order to reduce its contribution to global climate change

Key Changes to the Final Rule

Change in Stringency from Proposal to Final

Change in Reduction Requirement, Relative to 2012



1. New Targets

The targets in the final rule are calculated as *uniform emission performance rates* for two sub-categories of existing electric generators:

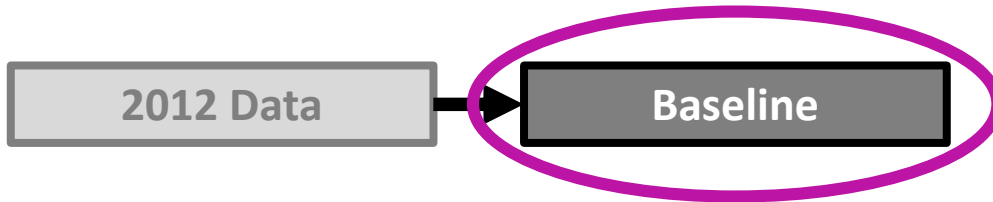
- Fossil steam generators (mostly coal and some oil and gas)
- Natural gas-fired combined-cycle generators (NGCCs)

The *uniform emission performance standards* reflect the level of performance possible based on the application of the *building blocks* EPA has determined make up the Best System of Emission Reduction (BSER)

New Targets: Still Using Building Blocks

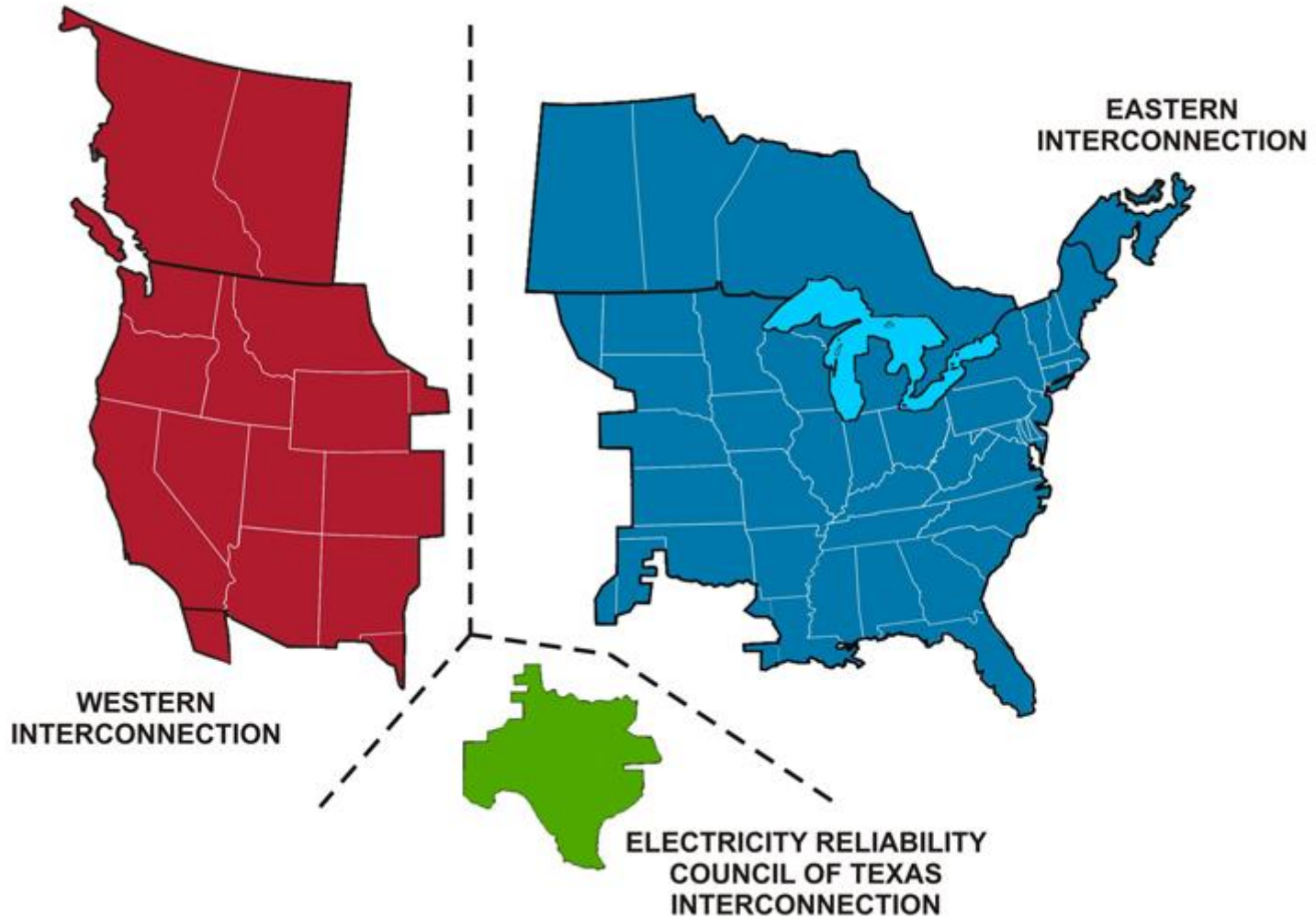
Proposal	Final
Building Block 1 – Heat Rate Improvements	Building Block 1 – Heat Rate Improvements
Building Block 2 – Redispatch to lower-emitting NGCC units	Building Block 2 – Redispatch to lower-emitting NGCC units
Building Block 3 – Addition of renewable energy and preservation of existing nuclear generation	Building Block 3 – Addition of renewable energy
Building Block 4 – Ramp up demand-side energy efficiency	

Setting New Targets for the Final Rule



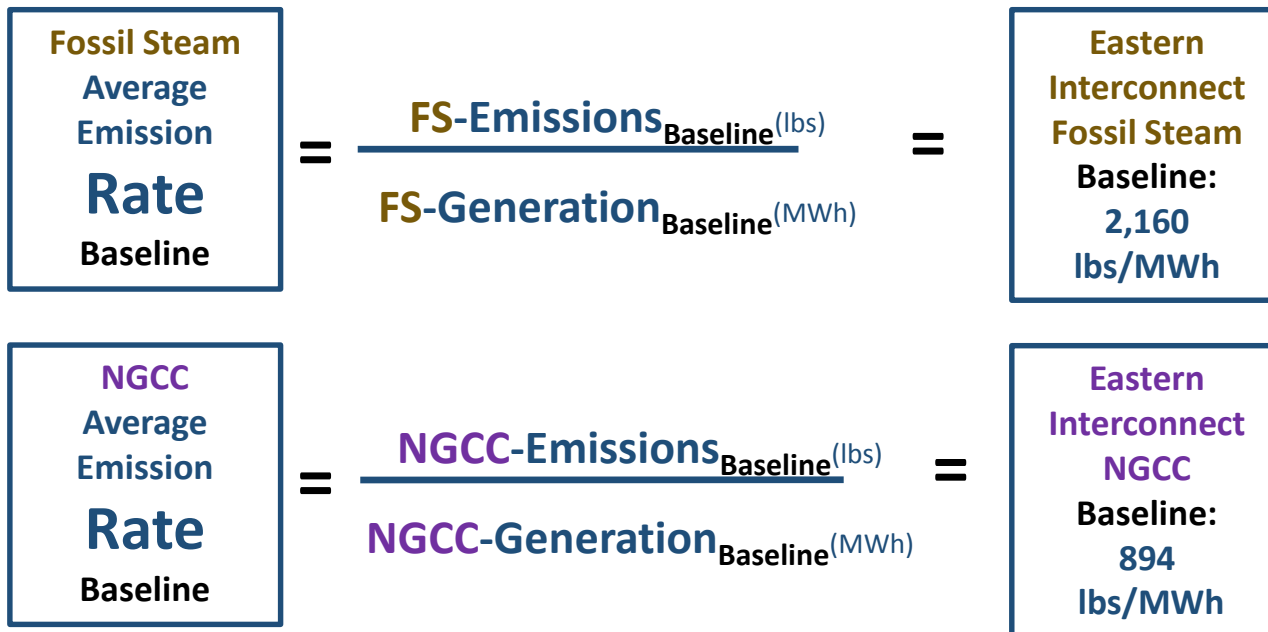
- Begin with unit-level 2012 data (generation, capacity, emissions)
- Adjust for:
 - Anomalous hydro generation in 2012
 - Significant unit outages (Sherburne County 3, Minnesota)
 - Inclusion of under-construction units with the following capacity factors:
 - New coal: 60 percent
 - New NGCC: 55 percent
 - Kemper IGCC: 70 percent
- Aggregate into three interconnects: Eastern, Western, and ERCOT

Three Interconnects

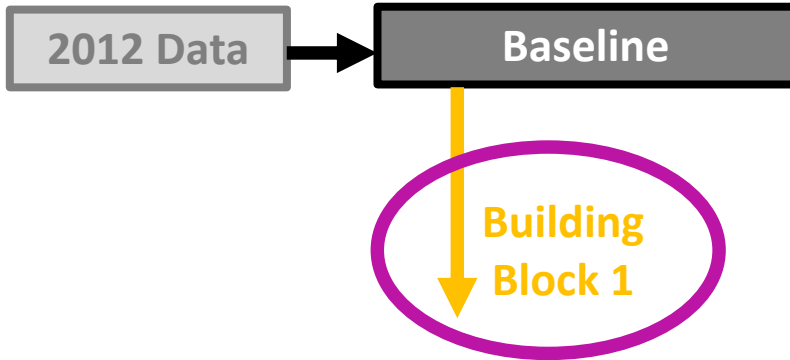


Baseline

- Calculate for each interconnect:



Building Block 1: Heat Rate Improvements



Heat rate improvements for coal plants:

- East: 4.3 percent
- West: 2.1 percent
- ERCOT: 2.3 percent

- Calculate:

Fossil Steam
Average
Emission
Rate
Post BB1

$$= \frac{\text{FS-Emissions}_{\text{PostBB1}}(\text{lbs})}{\text{FS-Generation}_{\text{Baseline}}(\text{MWh})} =$$

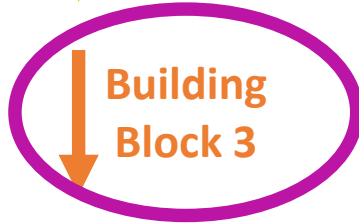
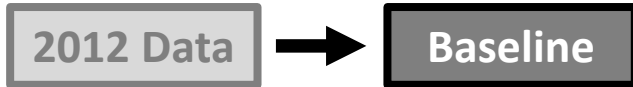
Eastern Interconnect Fossil Steam
Post BB1:
2,071
lbs/MWh

NGCC
Average
Emission
Rate
Post BB1

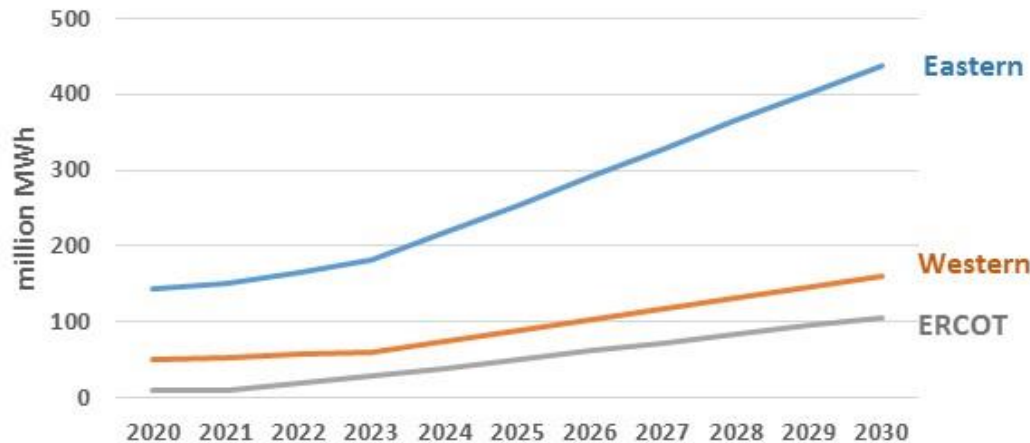
$$= \frac{\text{NGCC-Emissions}_{\text{Baseline}}(\text{lbs})}{\text{NGCC-Generation}_{\text{Baseline}}(\text{MWh})} =$$

Eastern Interconnect NGCC
Post BB1:
Doesn't
Change

Building Block 3: New Renewable Generation



- Potential for new renewable generation is estimated by year:
 - Eastern: 438 million MWh in 2030
 - Western: 161 million MWh in 2030
 - ERCOT: 107 million MWh in 2030
- Allocate renewable potential to Fossil Steam and NGCC by baseline generation share in each interconnect:
 - Eastern: 64% Fossil Steam | 36% NGCC
 - Western: 52% Fossil Steam | 48% NGCC
 - ERCOT: 47% Fossil Steam | 53% NGCC



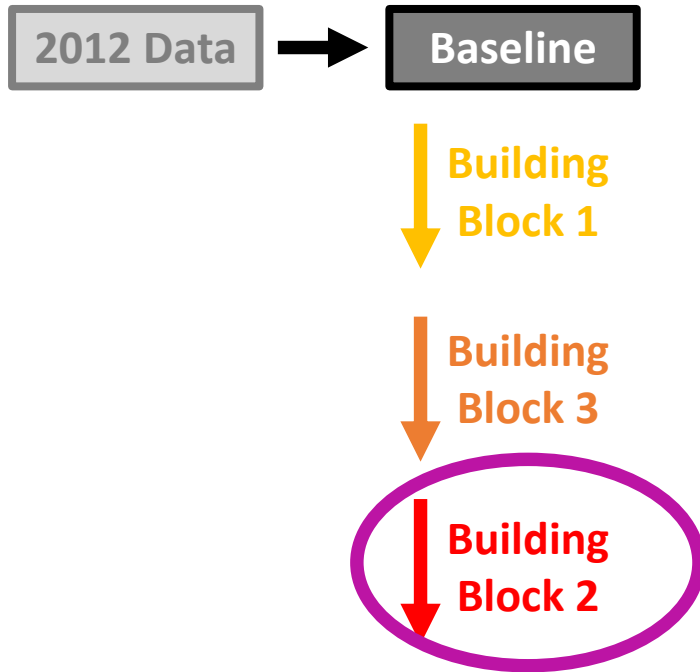
Building Block 3: New Renewable Generation

Important note on BB3: unlike in the proposal, EPA now assumes that new renewable energy generation displaces existing fossil steam and NGCC units proportionate to their share of in-state generation

$$\text{FS-Generation}_{\text{Baseline}}^{\text{(MWh)}} = \text{FS-Generation}_{\text{PostBB3}}^{\text{(MWh)}} + \text{RE-Potential}_{\text{FShare}}^{\text{(MWh)}}$$

Denominator MWhs are kept constant throughout the Building Block calculations.

Building Block 2: Re-Dispatch to NGCCs



- Increase NGCC generation to a 75 percent capacity factor (with some restrictions on the pace at which this ramp-up occurs)
- Estimate the NGCC generation that is incremental to the Post-BB3 step
- Adjust Fossil Steam emissions to represent the change in dispatch from Fossil Steam to NGCC

Final Emission Performance Rates

Fossil Steam
Average
Emission
Rate
Final

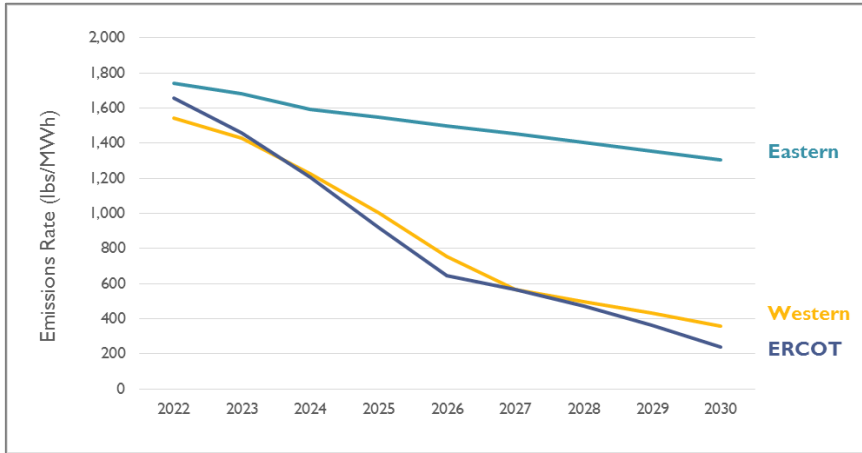
$$= \frac{\text{FS-Emissions}_{\text{PostBB2}} (\text{lbs}) + \text{Incremental NGCC-Emissions}}{\text{FS-Generation}_{\text{PostBB2}} (\text{MWh}) + \text{RE-Potential}_{\text{FSshare}} (\text{MWh}) + \text{Incremental NGCC Gen}}$$

NGCC
Average
Emission
Rate
Final

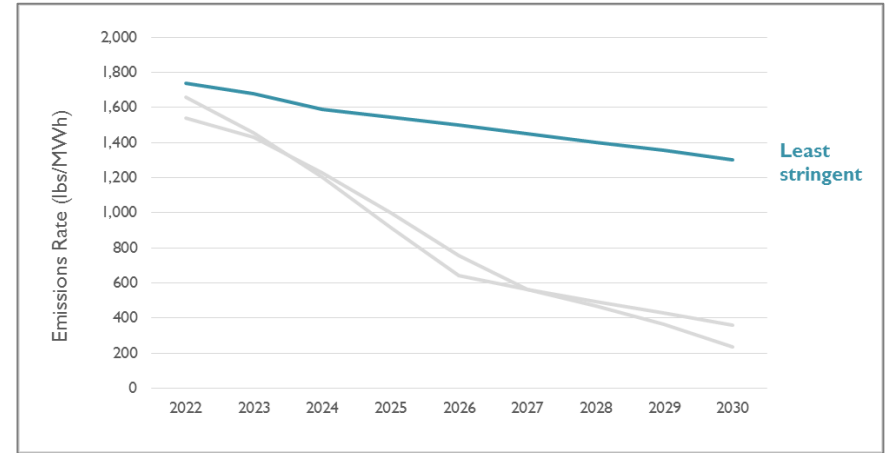
$$= \frac{\text{NGCC-Emissions}_{\text{PostBB2}} (\text{lbs})}{\text{NGCC-Generation}_{\text{PostBB2}} (\text{MWh}) + \text{RE-Potential}_{\text{NGCCshare}} (\text{MWh})}$$

Final Emission Performance Rates

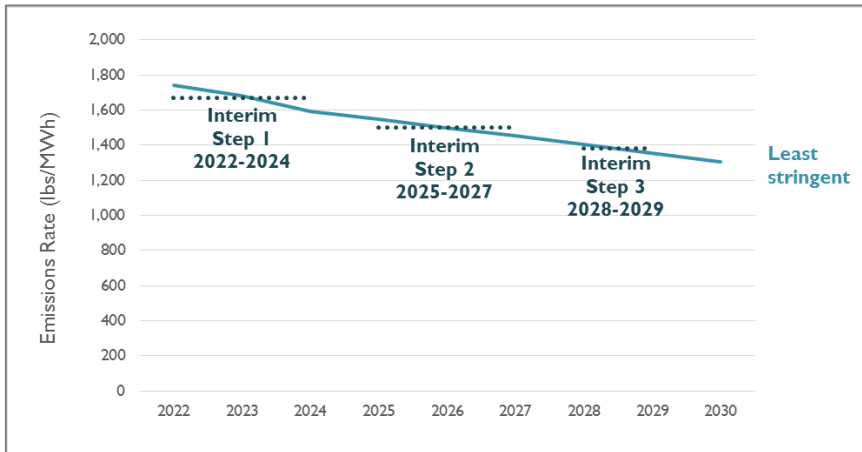
1. Fossil steam trajectories for each interconnect



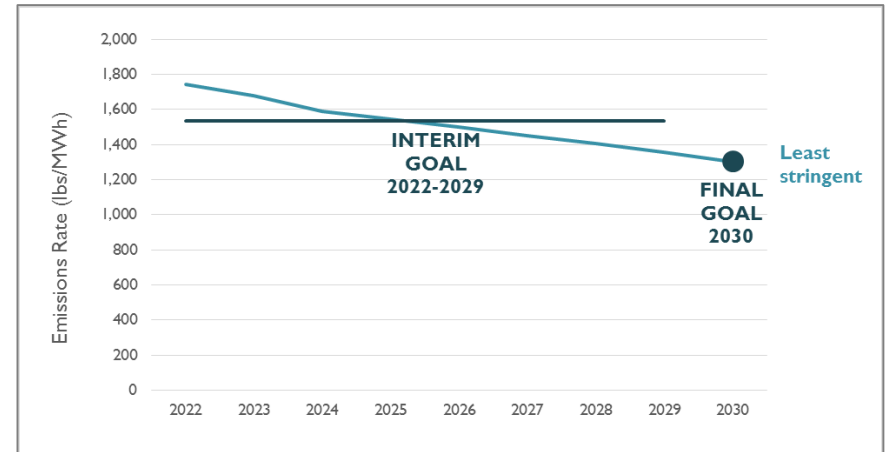
2. Choose least stringent trajectory



3. Calculate "glide path" goals



4. Calculate two compliance period goals



5. Repeat process for NGCC

Final Emission Performance Rates

	Interim Step Goals			Final Goals	
	2022-2024	2025-2027	2028-2029	2022-2029	2030 and after
Fossil Steam	1,671	1,500	1,380	1,534	1,305
NGCC	877	817	784	832	771

2. Timeline for Compliance

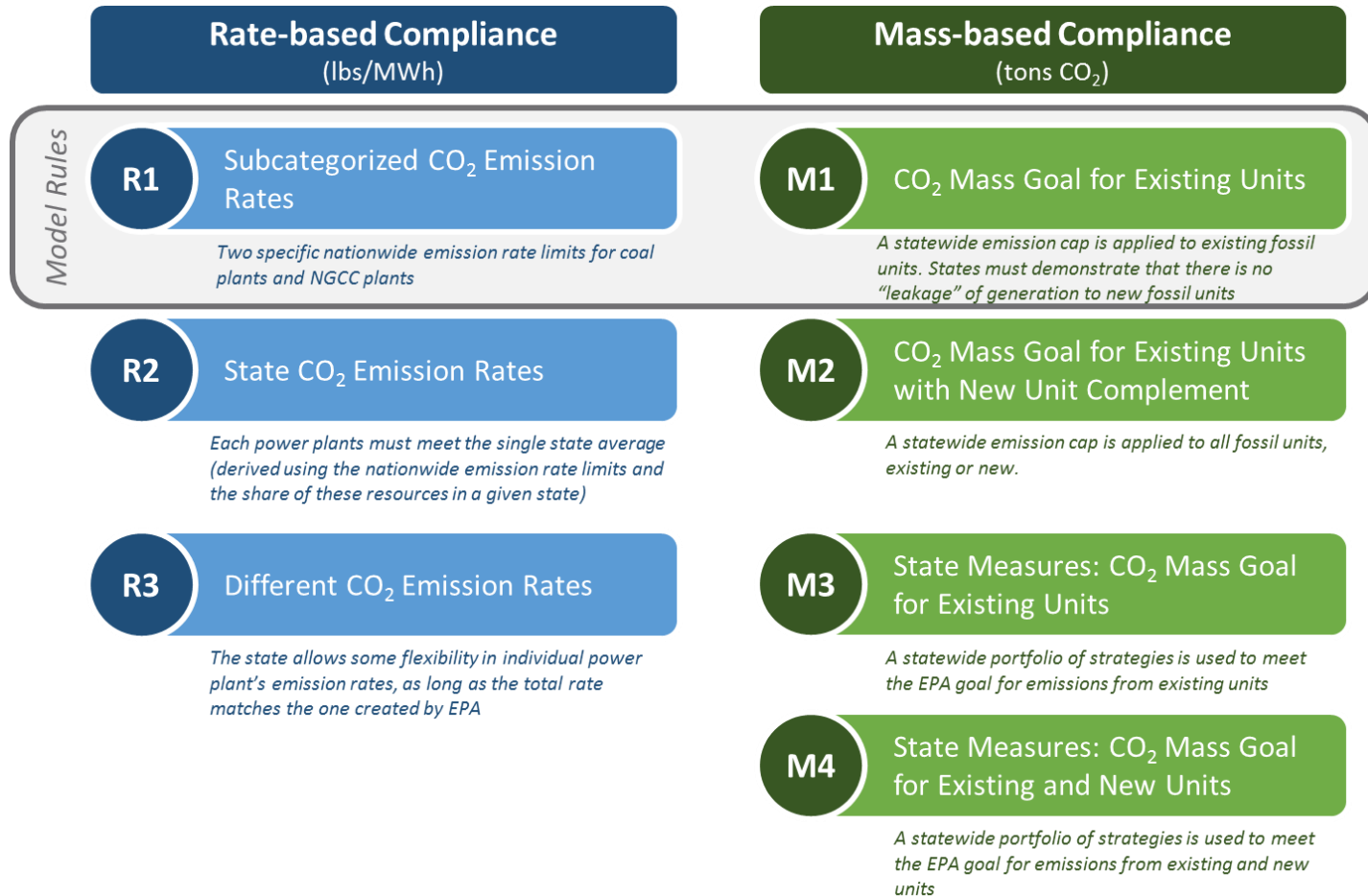
- First date for compliance pushed back from 2020 to 2022
- Two additional years to complete final State Plans
- States still expected to demonstrate progress during an interim period through 2029 and must meet the final compliance targets by 2030

Sept. 2016	<ul style="list-style-type: none">• State Plans due ...or...• Demonstration of progress
Sept. 2018	<ul style="list-style-type: none">• Final State Plans due
Jan. 2022	<ul style="list-style-type: none">• First Compliance Year begins
2022-2024	<ul style="list-style-type: none">• First Interim Compliance Period
2025-2027	<ul style="list-style-type: none">• Second Interim Compliance Period
2028-2029	<ul style="list-style-type: none">• Third Interim Compliance Period
2030	<ul style="list-style-type: none">• Final Compliance Year
...and beyond	<ul style="list-style-type: none">• States must continue to hold at 2030, biennial reports to EPA

3. Glide Path

- Final rule establishes a “glide path” that gradually steps down each state’s compliance target over the course of three interim compliance periods
- This helps smooth out the “compliance cliff” in which significant reductions would have been needed at the beginning of the compliance period

4. New Options for Compliance



5. Emission Trading Figures Prominently

- Emissions trading is a long-established mechanism for complying with environmental regulations
 - Acid Rain program, Regional Haze, NOx Budget Trading program, CSAPR, CAIR, RGGI in the Northeast, AB 32 in California
- EPA provides a “panoply” of tools to facilitate the use of emissions trading programs in the Clean Power Plan
- Both of EPA’s proposed model rules (rate and mass) include emission budget trading programs

Rate-based trading

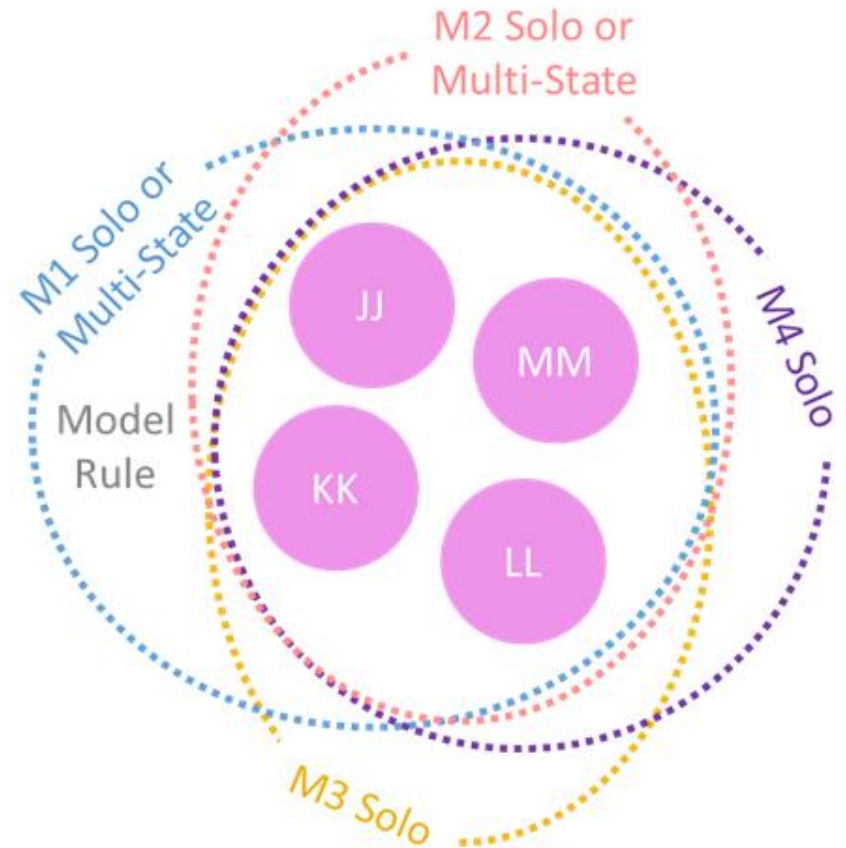
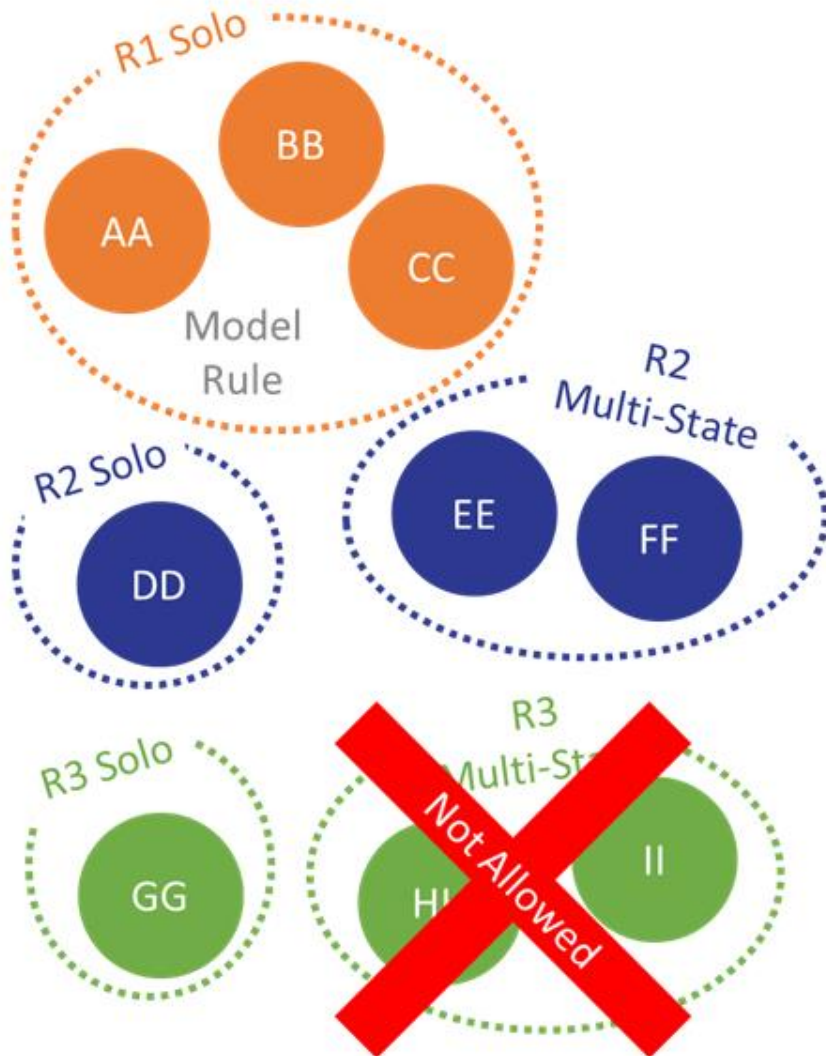
- Emission Rate Credits (ERCs) represent one MWh of zero-emission generation
 - ERCs can be produced by energy efficiency, renewables, new nuclear generation, or from incremental capacity uprates at existing nuclear, hydro, and NGCC power plants
- ERCs get added to the denominator of a generator's pounds-per-MWh performance rate calculation to dilute the rate:

$$\text{Performance Rate} = \frac{\text{EGU Emissions (lbs of CO}_2\text{)}}{\text{EGU Generation (MWh)} + \text{Emission Rate Credits or "ERCs" (MWh)}}$$

Mass-based Trading: Distribution of Allowances

- All the “M’s” can set up emission budget trading programs (and EPA encourages this)
- EPA allows states to design their own trading programs but establishes its preferred program in the Proposed Model Rule
- EPA’s Proposed Model Rule distributes allowances to EGUs from two pools: set-asides and historical generation
 - Set-asides come in three flavors: CEIP, output-based, and renewable energy
 - Historical generation is based on the share of generation each unit represented in its state in the 2010-2012 period
- States may distribute allowances through an auction process but EPA cannot due to issues with where proceeds would end up (federal treasury)

Who can trade with whom?



6. Emission Credits/Allowances Can Be Banked

- Under the final Clean Power Plan, EPA is allowing generation or emission reductions that occur over and above a given state's target to be carried forward—or banked—and applied to a future year
- These banked ERCs or allowances can be applied to any future years, without limitations, encouraging states to meet their more stringent later-year targets in early years
- EPA will allow states to count certain ERCs or allowances generated in 2020 and 2021 toward compliance in 2022 and later years (“Clean Energy Incentive Program” or CEIP)

7. Reliability

- States must demonstrate that they have considered reliability in developing their state plans
- EPA has included a “reliability safety valve” in case unforeseen emergencies arise that would impact reliability

8. Incentives for Early Action

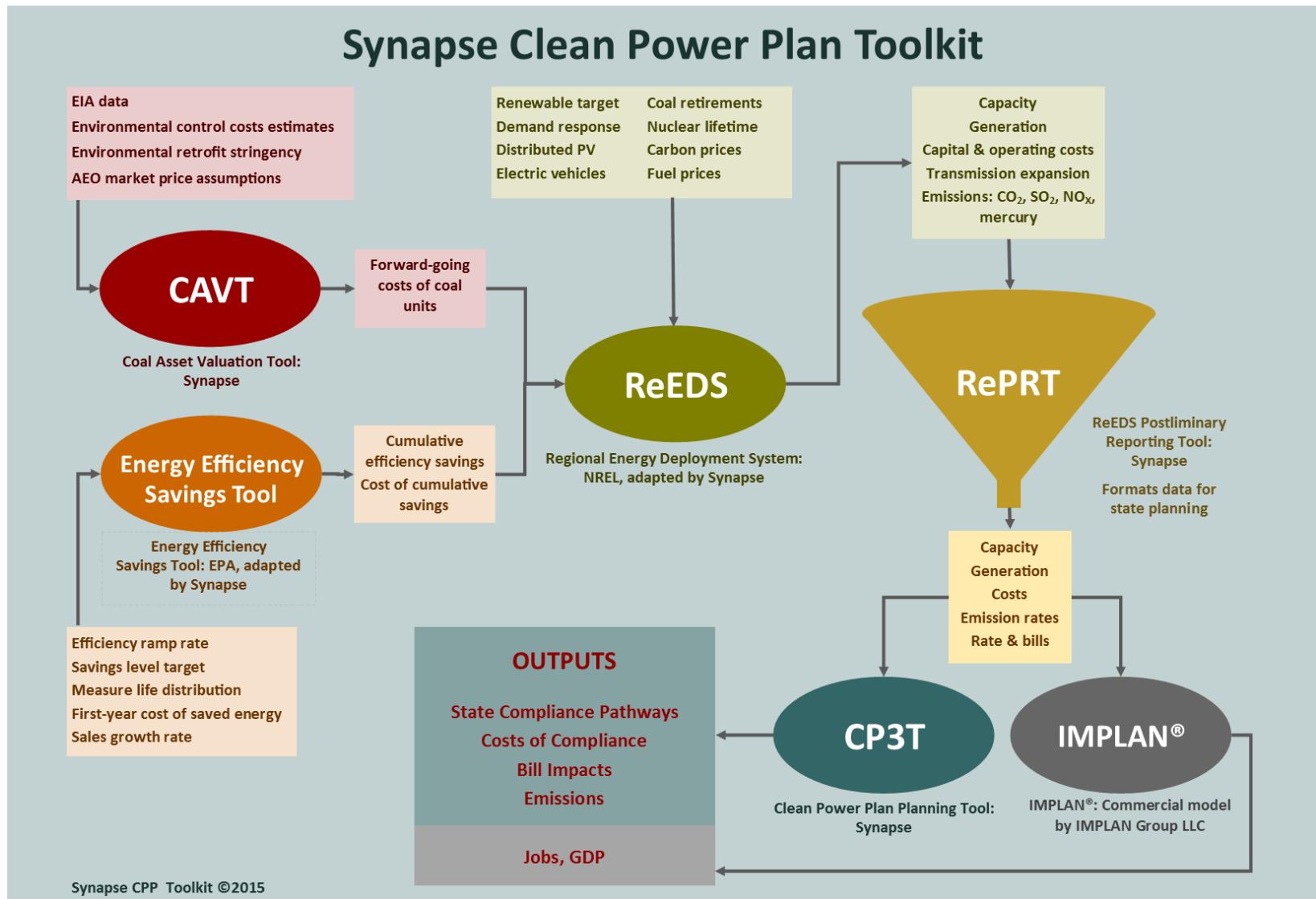
- **Clean Energy Incentive Program** encourages and rewards early installers of certain types of renewable energy and energy efficiency measures
 - Wind and solar resources and low-income energy efficiency measures installed after a state has submitted its final compliance plan can earn ERCs (or equivalent allowances) for generation or savings that occur in 2020 and 2021
 - These “early action” credits can be sold to fossil generators for use during the compliance period
- For every 2 MWh generated by wind or solar resources, the state will award one ERC (or the equivalent allowances) and EPA will award one matching ERC (or the equivalent allowances) .
- For every 1 MWh saved through energy efficiency measures in low-income developments, the state will award 1 ERC (or the equivalent allowances) and EPA will award 1 matching ERC (or the equivalent allowances)
- EPA has capped the CEIP pool of matching credits at the equivalent of 300 million short tons

9. Community and Environmental Justice Concerns

- During initial plan submittal: States are required to provide information about community engagement and their plans to include vulnerable communities in finalization of the state plan
- If requesting two-year extension: States must demonstrate meaningful engagement with vulnerable communities in a public participation process
- During submittal of the final state plan: States must include an overview of the public hearings conducted and information about how the hearings they held were accessible to vulnerable communities
- During the implementation phase of the rule: EPA plans to conduct its own assessments on emission reduction and potential negative localized impacts in the states, but encourages states to begin conducting their own community impact studies prior to implementation to uncover any immediate issues

Resources

Synapse Clean Power Plan Toolkit



Synapse Resources

Synapse Clean Power Plan Toolkit: <http://synapse-energy.com/CleanPowerPlan>

Past Clean Power Plan Webinars: <http://synapse-energy.com/synapse-projects-and-webinars-related-clean-power-plan>

Consumer Costs of Low-Emissions Futures Factsheets and Reports:
<http://synapse-energy.com/project/consumer-costs-low-emissions-futures>

Clean Power Plan Reports and Outreach for National Association of State Utility Consumer Advocates: <http://synapse-energy.com/project/clean-power-plan-reports-and-outreach-national-association-state-utility-consumer-advocates>

Synapse Blog Posts on Clean Power Plan: <http://synapse-energy.com/tags/clean-power-plan>

Contact Information

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EPA's Cost Estimates

How Much Will the Clean Power Plan Cost?

Simplified summary of EPA's cost-benefit analysis, 2030 results (2011\$)

	All Rate-based Approach	All Mass-based Approach
Costs (5% discount rate)	\$8 billion	\$5 billion
Climate Benefits (3% discount rate)	\$20 billion (range from \$6 to \$61 billion)	\$20 billion (range from \$6 to \$60 billion)
Health Co-Benefits (range represents 3% and 7% discount rates)	\$13 to \$34 billion	\$11 to \$28 billion
Net Benefit	\$25 to \$45 billion	\$25 to \$43 billion

Source: EPA (2015) Regulatory Impact Analysis for the Clean Power Plan Final Rule, Table ES-9 and ES-10, p.ES-22-23