

US EPA ARCHIVE DOCUMENT



THE CLEAN POWER PLAN

epa.gov/cleanpowerplan

#ActOnClimate #CleanPowerPlan

2015



Summary

Climate change is a threat in the U.S. -- We are already feeling the dangerous and costly effects of a changing climate – affecting people’s lives, family budgets, and businesses’ bottom lines

EPA is taking three actions that will significantly reduce carbon pollution from the power sector, the largest source of carbon pollution in the US

- Clean Power Plan (CPP) – existing sources
- Carbon Pollution Standards – new, modified and reconstructed sources
- Federal Plan proposal and model rule

EPA’s actions

- Achieve significant pollution reductions in 2030
- Deliver an approach that gives states and utilities plenty of time to preserve ample, reliable and affordable power
- Spur increased investment in clean, renewable energy



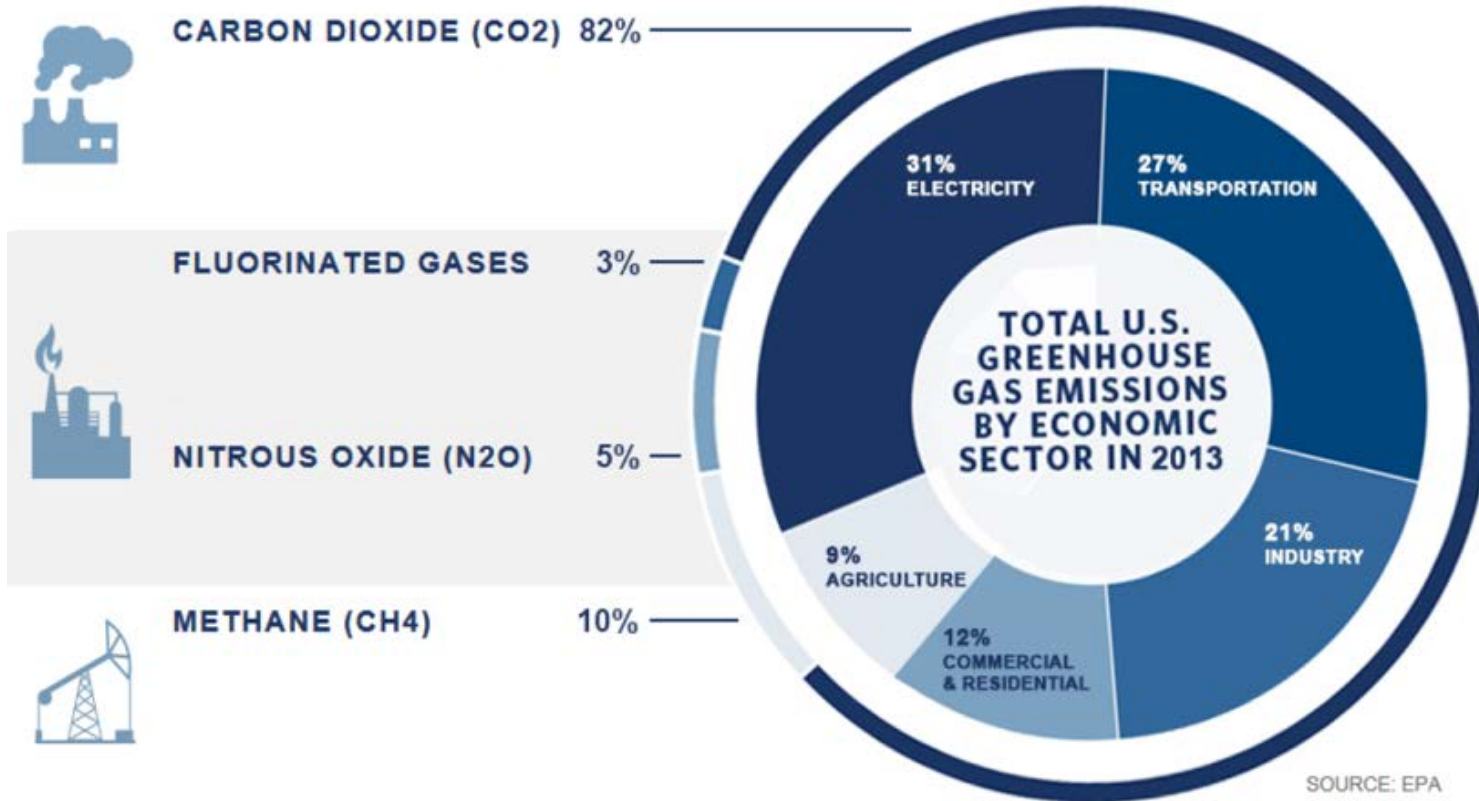
Climate Change is a Threat

- Public health risks include:
 - Increase in heat stroke and heat-related deaths
 - Extreme heat events are the leading weather-related cause of death in the U.S.
 - Worsening smog (also called ground-level ozone pollution) and, in some cases, particle pollution
 - Increasing intensity of extreme events, like hurricanes, extreme precipitation and flooding
 - Increasing the range of insects that spread diseases such as Lyme disease and West Nile virus



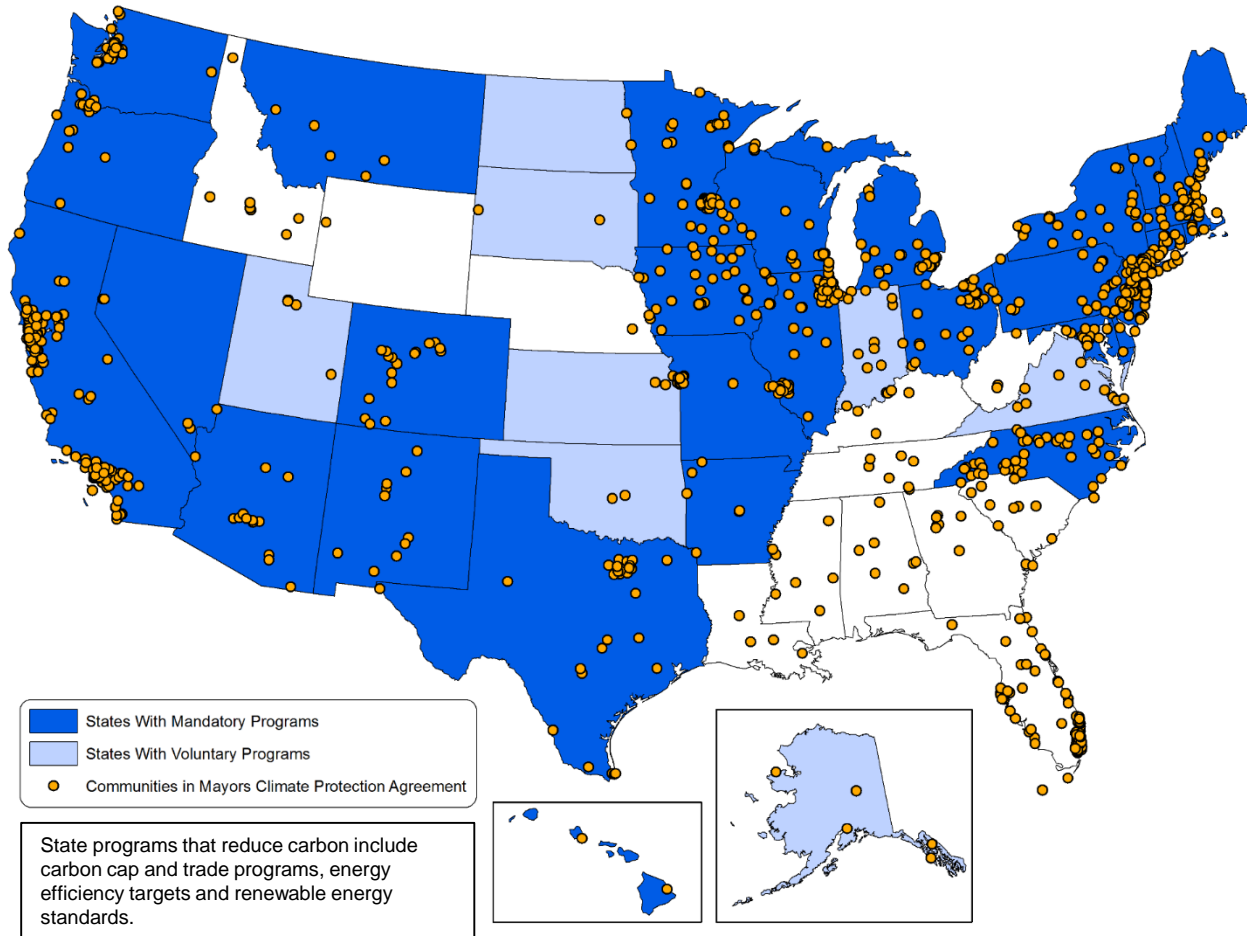


POWER PLANTS ARE THE SINGLE LARGEST SOURCE OF CARBON POLLUTION





States and Communities are Taking Action to Reduce Carbon Pollution

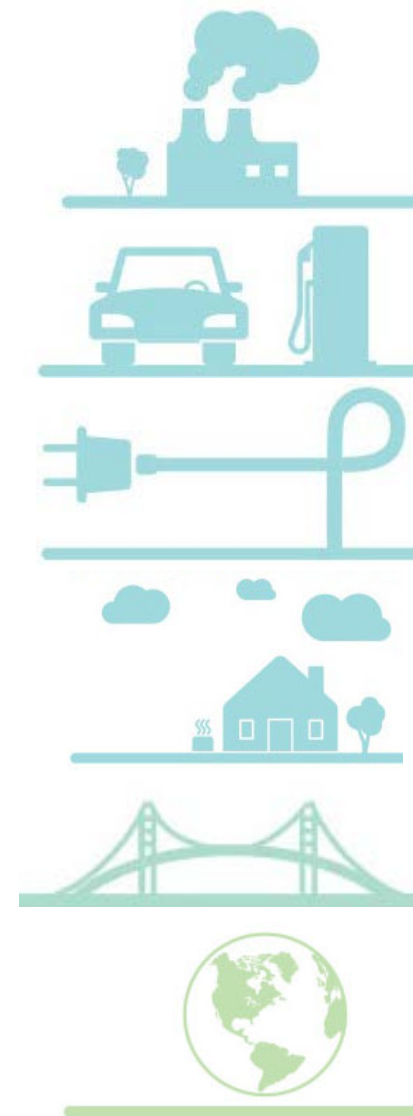


As of July 2015



Climate Action Plan

- Building a 21st century transportation sector
- Cutting energy waste in homes, businesses, and factories
- Reducing methane and HFCs
- Preparing the U.S. for the impacts of climate change
- Leading international efforts to address global climate change
- **Reducing carbon pollution from power plants**





EPA is Taking Action: Legal Foundation

- Greenhouse gases, including CO₂, are pollutants that EPA can regulate under the Clean Air Act. That issue was decided by the courts in 2007 and reaffirmed last year
- The Courts have also recognized EPA's authority to issue national rules limiting carbon pollution from stationary sources such as power plants, refineries, and other industrial facilities
- EPA's finding that greenhouse gas concentrations in the atmosphere endanger public health and the environment has been upheld by the courts, and the courts have also affirmed EPA's rules limiting greenhouse gases from cars and trucks
- EPA's regulation of power plant mercury and air toxics pollution does not preclude EPA from regulating power plant carbon pollution

Clean Power Plan



Outreach Shaped the Clean Power Plan

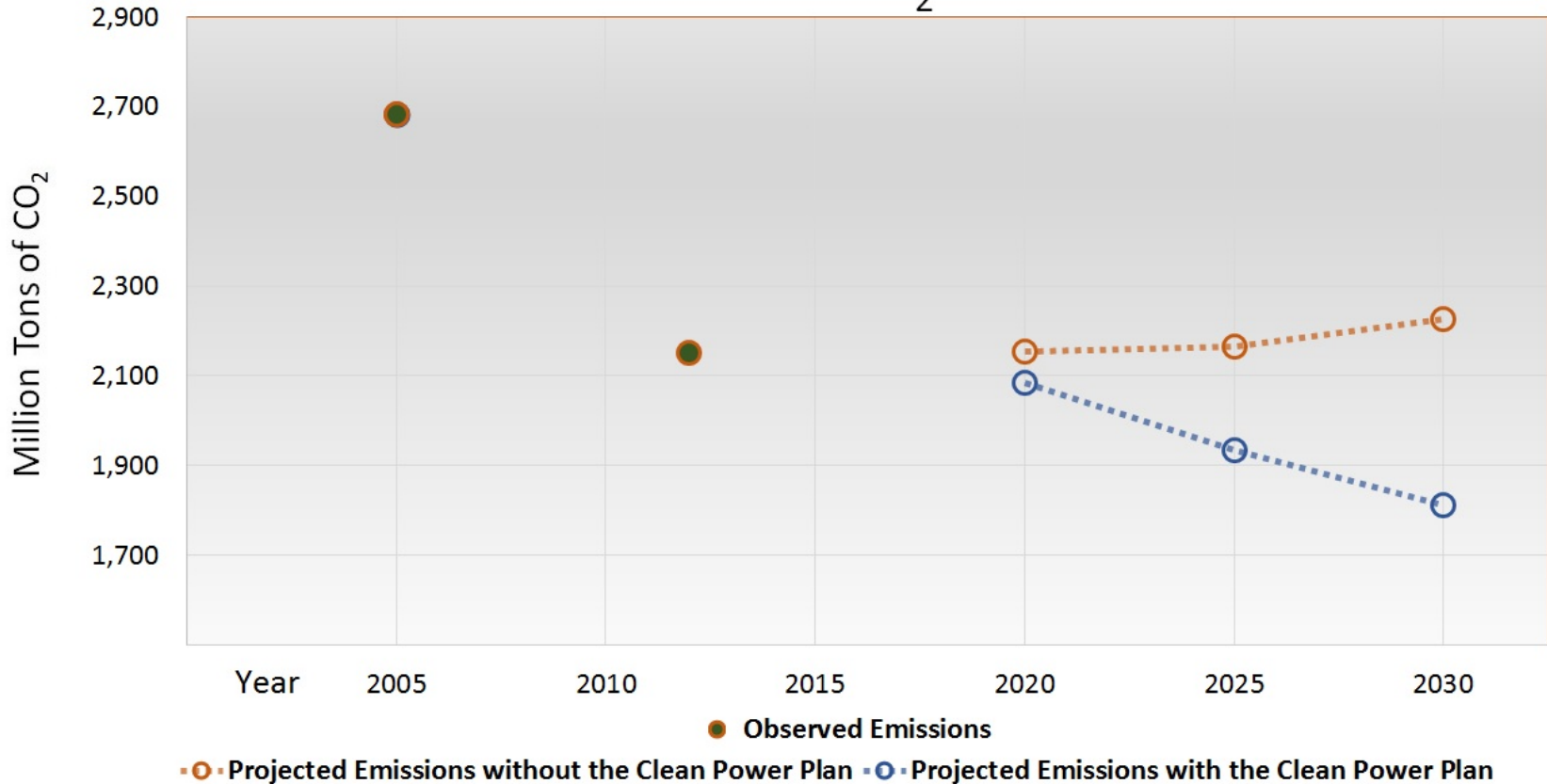
- More than two years of unprecedented outreach and public engagement
- Responds to the critical changes that stakeholders and states asked the agency to make and incorporates many of their good ideas
 - More than 4 million public comments submitted to the EPA and
 - Hundreds of meetings with stakeholders
- Public engagement was essential throughout the development of the Clean Power Plan, and that outreach will continue during the implementation





Transition to Clean Energy is Happening Faster than Anticipated

Power Sector CO₂ Emissions



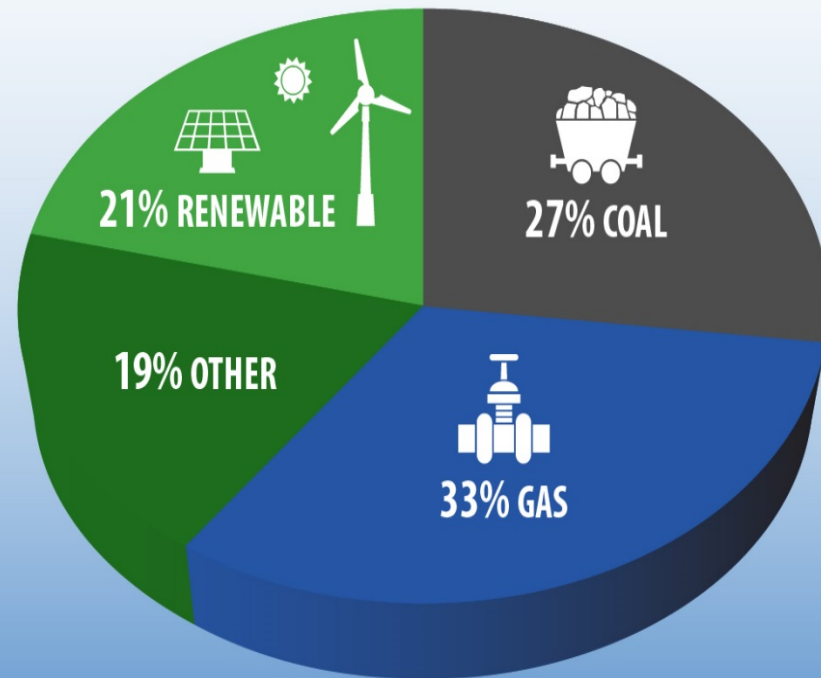
Carbon and air pollution are already decreasing, improving public health each and every year. The Clean Power Plan accelerates this momentum, putting us on pace to cut this dangerous pollution to historically low levels in the future. When the Clean Power Plan is fully in place in 2030, carbon pollution from the power sector will be 32 percent below 2005 levels, securing progress on and making sure it continues.



Coal & Natural Gas Remain Leading Sources of Electricity Generation in 2030

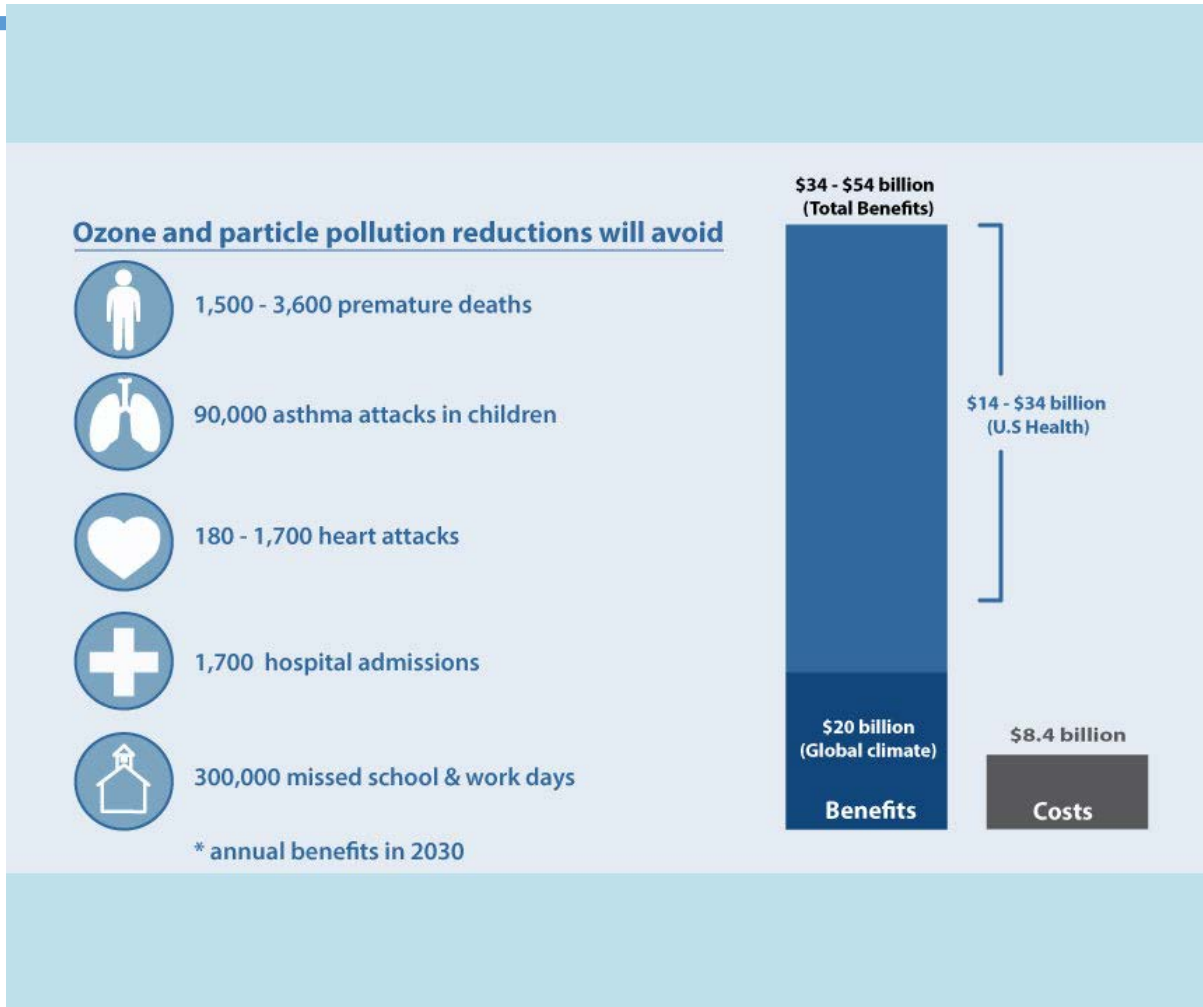
"As a country, we can continue our progress in reducing power plant pollution, thereby improving public health and protecting the environment, while supplying the reliable, affordable power needed for economic growth and advancing cleaner energy technologies, such as efficient natural gas, nuclear power, renewables such as wind and solar energy, and clean coal technology."

- President Obama 6.25.13





Benefits of the Clean Power Plan



By 2030, emissions of SO₂ from power plants will be 90 percent lower compared to 2005 levels, and emissions of NO_x will be 72 percent lower. Because these pollutants can create dangerous soot and smog, the historically low levels mean we will avoid thousands of premature deaths and have thousands fewer asthma attacks and hospitalizations in 2030 and every year beyond. Within this larger context, the CPP itself is projected to contribute significant pollution reductions, resulting in important benefits.



The Clean Power Plan

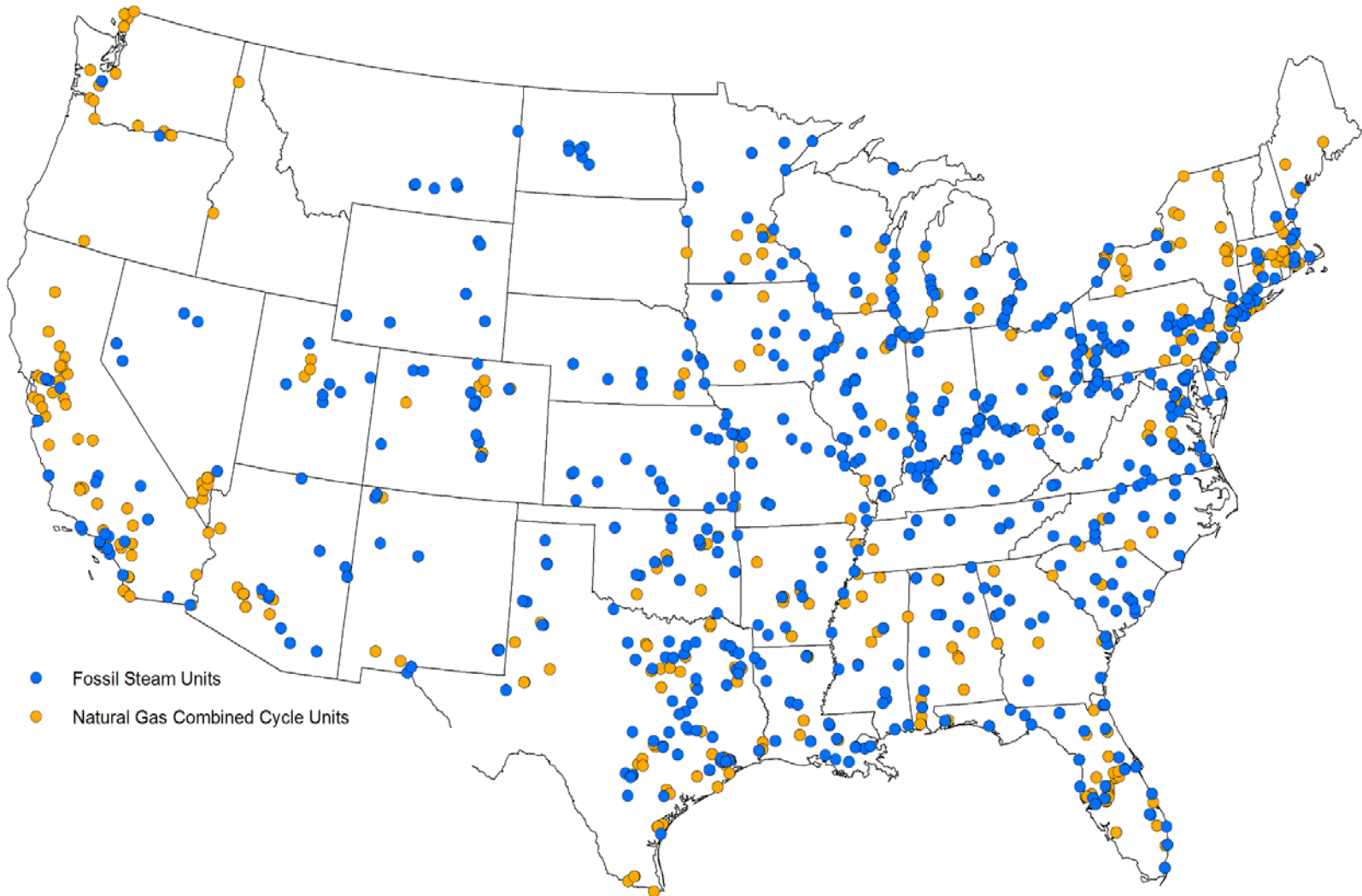
Overview

- Relies on a federal-state partnership to reduce carbon pollution from the biggest sources – power plants
- Carrying out EPA’s obligations under section 111(d) of the Clean Air Act, the CPP sets carbon dioxide emissions performance rates for affected power plants that reflect the “best system of emission reduction” (BSER)
- EPA identified 3 “Building Blocks” as BSER and calculated performance rates for fossil-fueled EGUs and another for natural gas combined cycle units
- Then, EPA translated that information into a state goal – measured in mass and rate – based on each state’s unique mix of power plants in 2012
- The states have the ability to develop their own plans for EGUs to achieve either the performance rates directly or the state goals, with guidelines for the development, submittal and implementation of those plans



The Clean Power Plan

What sources?



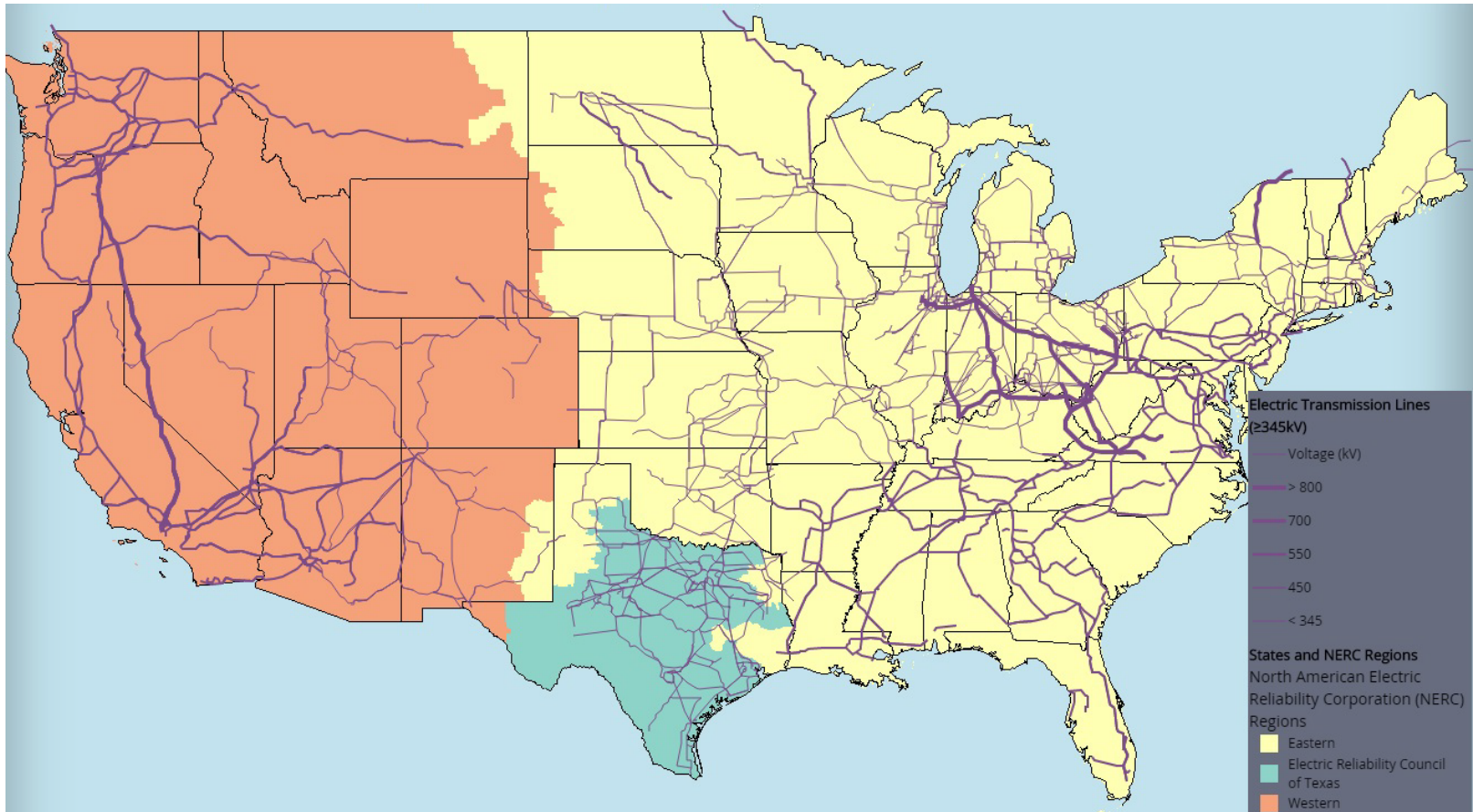


Best System of Emission Reduction: Three Building Blocks

Building Block	Strategy EPA Used to Calculate the State Goal	Maximum Flexibility: Examples of State Compliance Measures
1. Improved efficiency at power plants	Increasing the operational efficiency of existing coal-fired steam EGUs on average by a specified percentage, depending upon the region	<ul style="list-style-type: none"> -Boiler chemical cleaning -Cleaning air preheater coils -Equipment and software upgrades
2. Shifting generation from higher-emitting steam EGUS to lower-emitting natural gas power plants	Substituting increased generation from existing natural gas units for reduced generation at existing steam EGUs in specified amounts	Increase generation at existing NGCC units
3. Shifting generation to clean energy renewables	Substituting increased generation from new zero-emitting generating technologies for reduced generation at existing fossil fuel-fired EGUs in specified amounts	Increased generation from new renewable generating capacity, e.g., solar, wind, nuclear, and combined heat & power



Grid Connects Sources to Deliver Energy

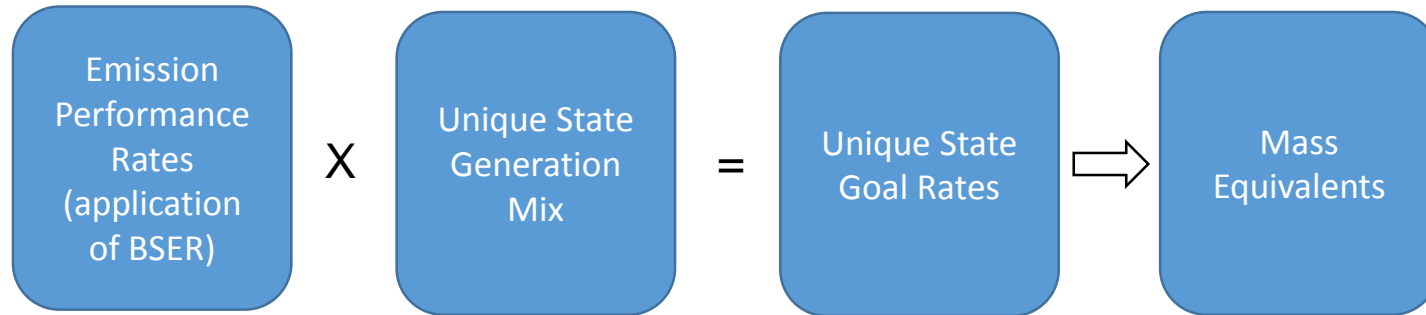


- This interconnection and diversity of generation offer cost-effective advantages and approaches that many states have already shown can provide power while emitting less CO₂
- In assessing the BSER, EPA recognized that power plants operate through broad interconnected grids that determine the generation and distribution of power. EPA's analysis is based on the three established regional electricity interconnects: Western, Eastern and the Electricity Reliability Council of Texas



Category-Specific Performance Rates

Power plants are subject to the same standards no matter where they are located.



EPA is establishing carbon dioxide **emission performance rates** for two subcategories of existing fossil fuel-fired electric generating units (EGUs):

1. Fossil fuel-fired electric generating units (generally, coal-fired power plants)
2. Natural gas combined cycle units

Emission performance rates have been translated into equivalent state goals. In order to maximize the range of choices available to states, EPA is providing state goals in three forms:

- rate-based goal measured in pounds per megawatt hour (lb/MWh);
- mass-based goal measured in short tons of CO₂
- mass-based goal with a new source complement (for states that choose to include new sources) measured in short tons of CO₂



Performance Rates -- Reasonable and Achievable

- **Legally solid**
 - Aligned with the approaches Congress and EPA have always take to regulate emissions from this and other industries
- **No plant has to meet the rate alone or all at once**
 - Part of the grid and over time, or as part of their statewide goal
- **Calculation mirrors the way electricity is generated and moves around the country**
 - In determining the BSER, EPA looked to the actions, technologies and strategies already in widespread use by states and utilities that result in reductions of carbon pollution and puts all utilities on a path to cleaner energy as a whole
- **EPA is providing tools**
 - Model rule that relies on trading, and incentives for early investment make standards more affordable and achievable than the ones the agency proposed last year
 - States and utilities asked for these tools, and the source category-specific rate makes it possible for them to be available
 - “Trading ready” options for states and utilities – straightforward pathways that mean a state doesn’t have to partner with any other state to take full advantage of the opportunities for renewable energy, energy efficiency, etc. on the interconnected grid
 - EPA will support trading implementation (e.g., through EPA-approved or administered tracking systems)
 - An emissions trading market, like the standards themselves, allows states and utilities to maintain fuel diversity, in which coal can continue to play a substantial role



Choosing the Glide Path to 2030

- **Phased-in glide path**

- The interim period runs from 2022-2029 and includes three interim performance periods creating a reasonable trajectory (smooth glide path)
- Interim steps:
 - Step 1 – 2022-2024
 - Step 2 – 2025-2027
 - Step 3 – 2028-2029
- Provided that the interim and final CO₂ emission performance rates or goals are met, for each interim period a state can choose to follow EPA's interim steps or customize their own

- **Renewables and energy efficiency can help states meet their goals**

- Investments in renewables can help states under all plan approaches to achieve the Clean Power Plan emission goals while creating economic growth and jobs for renewable manufacturers and installers, lowering other pollutants and diversifying the energy supply
- Energy efficiency improvements are expected to be an important part of state compliance across the country and under all state plan types, providing energy savings that reduce emissions, lower electric bills, and lead to positive investments and job creation

State Plans

Clean Power Plan Timeline

Summer
2015

- August 3, 2015 - Final Clean Power Plan

1 Year

- September 6, 2016 – States make initial submittal with extension request or submit Final Plan

3 Years

- September 6, 2018 - States with extensions submit Final Plan

7 Years

- January 1, 2022 - Compliance period begins

15 Years

- January 1, 2030 - CO₂ Emission Goals met



Two State Plans Designs:

- States are able to choose one of two state plan types:

Emission Standards Plan – state places federally enforceable emission standards on affected electric generating units (EGUs) that fully meet the emission guidelines

- can be designed to meet the CO₂ emission performance rates or state goal (rate-based or mass-based goal)

State Measures Plan - state includes, at least in part, measures implemented by the state that are not included as federally enforceable emission standards

- designed to achieve the state CO₂ mass-based goal
- includes federally enforceable measures as a backstop



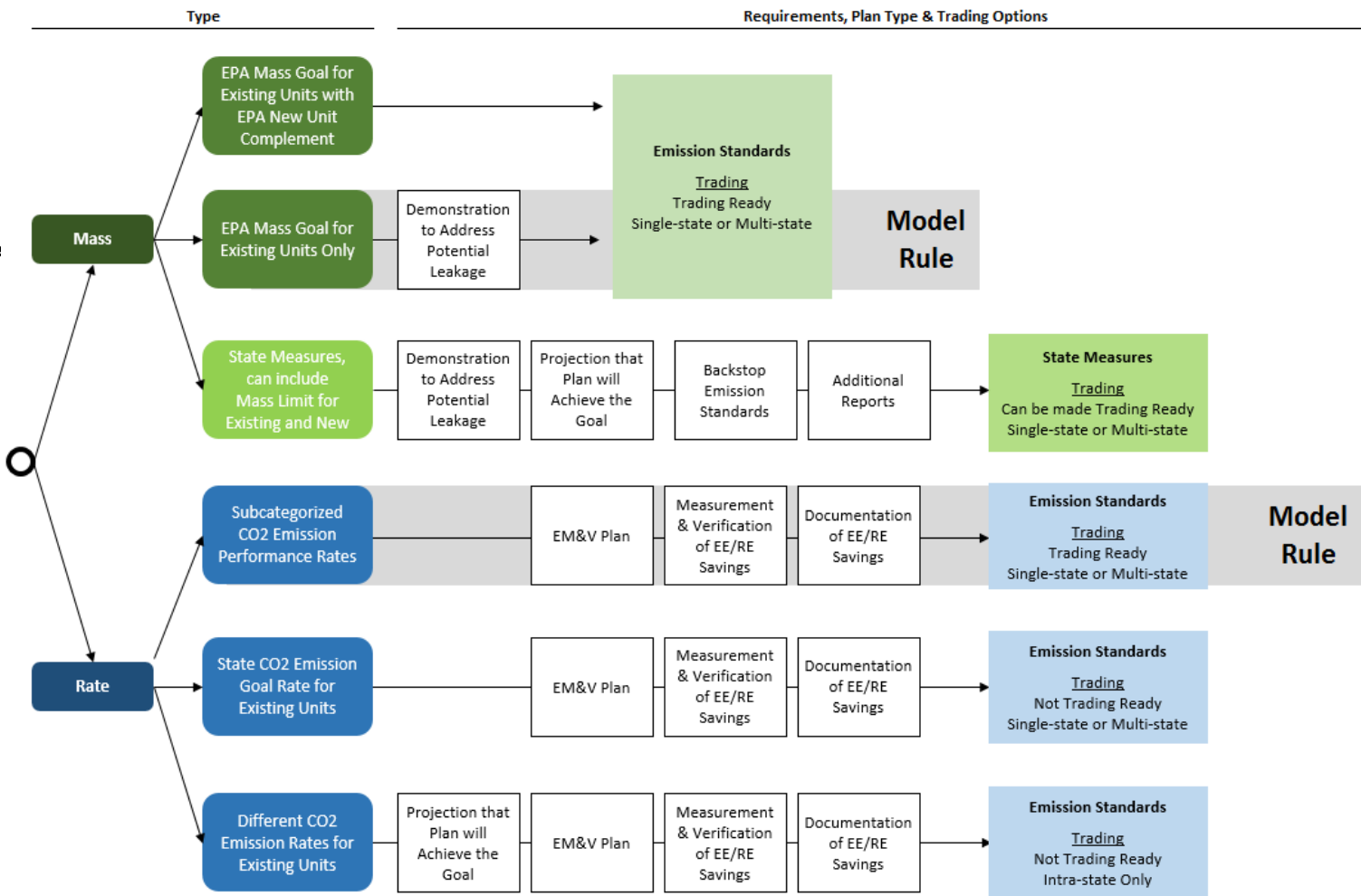
State Plan Development

- Many states are discussing plans that would enable them to collaborate with other states, including multi-state plans or linking plans through common administrative provisions (i.e. “trading ready”)
 - Trading-ready mechanisms allow states or power plants to use creditable, out-of-state reductions to meet their goal without the need for up-front interstate agreements
 - If states elect to collaborate, EPA can support the option for trading as a suitable choice for both EPA and states to implement the CPP
 - Examples of trading in NOx SIP and CSAPR, Acid Rain program
 - Appropriate for carbon emissions
 - Eases administrative burdens
 - Reduces costs to electricity consumers and utilities
- In the CPP, EPA is finalizing state plan designs that suit state needs
 - Pathways for existing programs to reduce carbon emissions, individual state plans and multi-state trading approaches
- Federal plan proposes option for model trading program a state may then implement
 - Invites comment on mass and rate based model trading programs for EGUs
 - Invites comment on idea that all types of state plans can participate in trading



More State Options, Lower Costs

- This chart shows some of the compliance pathways available to states under the final Clean Power Plan. Ultimately, it is up to the states to choose how they will meet the requirements of the rule
- EPA's illustrative analysis shows that nationwide, in 2030, a **mass-based approach is less-expensive** than a rate-based approach (\$5.1 billion versus \$8.4 billion)
- Under a mass-based plan, states that anticipate continuing or expanding investments in energy efficiency have unlimited flexibility to leverage those investments to meet their CPP targets. EE programs and projects do not need to be approved as part of a mass-based state plan, and EM&V will not be required
- For states currently implementing mass-based trading programs, the "state measures" approach offers a ready path forward
- Demand-side energy efficiency is an important, proven strategy that states are already widely using and that can substantially and cost-effectively lower CO₂ emissions from the power sector





Many CO₂ Reduction Opportunities

- Heat rate improvements
- Fuel switching to a lower carbon content fuel
- Integration of renewable energy into EGU operations
- Combined heat and power
- Qualified biomass co-firing and repowering
- Renewable energy (new & capacity uprates)
 - Wind, solar, hydro
- Nuclear generation (new & capacity uprates)
- Demand-side energy efficiency programs and policies
- Demand-side management measures
- Electricity transmission and distribution improvements
- Carbon capture and utilization for existing sources
- Carbon capture and sequestration for existing sources



Incentives for Early Investments

- EPA is providing the Clean Energy Incentive Program (CEIP) to incentivize early investments that generate wind and solar power or reduce end-use energy demand during 2020 and 2021
- The CEIP is an optional, “matching fund” program states may choose to use to incentivize early investments in wind or solar power, as well as demand-side energy efficiency measures that are implemented in low-income communities
- EPA will provide matching allowances or Emission Rate Credits (ERCs) to states that participate in the CEIP, up to an amount equal to the equivalent of 300 million short tons of CO₂ emissions. The match is larger for low-income EE projects, targeted at removing historic barriers to deployment of these measures. Also, states with more challenging emissions reduction targets will have access to a proportionately larger share of the match
- The CEIP will help ensure that momentum to no-carbon energy continues and give states a jumpstart on their compliance programs
- EPA will engage with stakeholders in the coming months to discuss the CEIP and gather feedback on specific elements of the program

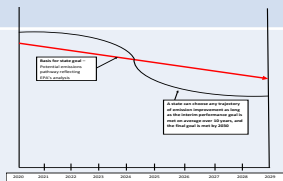


Design Preserves Reliability

- The Clean Power Plan includes features that reflect EPA's commitment to ensuring that compliance with the final rule does not interfere with the industry's ability to maintain the reliability of the nation's electricity supply:
 - long compliance period starting in 2022 with sufficient time to maintain system reliability
 - design that allows states and affected EGUs flexibility to include a large variety of approaches and measures to achieve the environmental goals in a way that is tailored to each state's and utility's energy resources and policies, including trading within and between states, and other multi-state approaches
 - requirement that each state demonstrate in its final plan that it has considered reliability issues in developing its plan, including consultation with an appropriate reliability or planning agency
 - mechanism for a state to seek a revision to its plan in case unanticipated and significant reliability challenges arise
 - reliability safety valve to address situations where, due to an unanticipated event or other extraordinary circumstances, there is a conflict between the requirements imposed on an affected power plant and maintaining reliability
- EPA, Department of Energy (DOE) and the Federal Energy Regulatory Commission (FERC) are coordinating efforts to monitor the implementation of the final rule to help preserve continued reliable electricity generation and transmission

Changes from Proposal to Final Respond Directly to Comments

ITEM	PROPOSAL	FINAL
Compliance timeframe	2020	2022
Building Blocks	Four Building Blocks	Three Building Blocks (see next row) and refinements to Building Blocks
Demand-Side Energy Efficiency	Included as a Building Block	No longer a Building Block – though EPA anticipates that, due to its low costs and large potential in every state, demand-side energy efficiency will be a significant component of state compliance plans under the CPP
Timing of reductions	S-curve. Commenters disliked the “cliff”	Steps down glide path more gradually: 2022-2024 2025-2027 2028-2029
Goal Setting	Formula included energy efficiency (EE), new nuclear, and existing renewable energy (RE) sources in the Best System of Emission Reduction (BSER)	BSER: Apply three building blocks to set two uniform CO ₂ emissions rates: generally, 1. Fossil and 2. natural gas. EE, nuclear and existing RE not included in goal setting
Geographic focus	State/tribe/territory	Contiguous U.S.
Deadline for final state plan	September 2016 with opportunity for one or two year extension	September 2018: after initial submittal by September 2016
State plans options	Two Types: Direct emission limits and portfolio approach	Two types: emissions standards and state measures
Interstate trading mechanisms	Up-front agreements	Up-front agreements not required Trading-ready option





Tribes and the Clean Power Plan

- EPA has finalized carbon goals for each of the three affected areas of Indian country:
 - Navajo Nation
 - Ute Tribe of the Uintah and Ouray Reservation
 - Fort Mojave Tribe
- The four power plants in these areas are part of the regional system of electricity generation, so their rates are derived the same way as for power plants located within states
- These tribes have the opportunity, but not the obligation to develop and implement a 111d plan for these sources. If a tribe chooses not to develop a plan, or EPA cannot approve a tribe's plan, EPA will put a federal plan in place if it determines that it is appropriate or necessary to do so
- Tribes that do not have any affected EGUs in their areas, but where RE or EE projects will be developed, may participate in the trading provisions of the final rule and can provide emission rate credits (ERCs) to states to help them meet their goals, as long as they are connected to the continental U.S. grid and meet other requirements for eligibility



Alaska, Hawaii, Puerto Rico and Guam

- EPA is not promulgating final guidelines for Alaska, Hawaii, Puerto Rico or Guam at this time
- Power plants in these four isolated jurisdictions do not operate within geographically broad grids, and the Best System of Emission Reduction established for the contiguous states is not appropriate for them
- EPA will work with these jurisdictions and other stakeholders to gather additional data and information about the emissions reduction measures, particularly with respect to renewable generation, available in those jurisdictions



CPP: Plan Implementation Timeline

Submittals	Dates
State Plan OR initial submittal with extension request	September 6, 2016
Progress Update, for states with extensions	September 6, 2017
State Plan, for states with extensions	September 6, 2018
Milestone (Status) Report	July 1, 2021

Interim and Final Goal Periods ¹	Reporting
Interim goal performance period (2022-2029) ²	
- Interim Step 1 Period (2022-2024) ³	July 1, 2025
- Interim Step 2 Period (2025-2027) ⁴	July 1, 2028
- Interim Step 3 Period (2028-2029) ⁵	July 1, 2030
Interim Goal (2022-2029) ⁶	July 1, 2030
Final Goal (2030)	July 1, 2032 and every 2 years beyond

¹ State may choose to award early action credits (ERCs) or allowances in 2020-2021, and the EPA may provide matching ERCS or allowances, through the Clean Energy Incentive Program. See section VIII.B of the final rule preamble for more information.

² The performance rates are phased in over the 2022-2029 interim period, which leads to a glide path of reductions that “steps down” over time. States may elect to set their own milestones for Interim Step periods 1, 2, and 3 as long as they meet the interim and final goals articulated in the emission guidelines.

^{3,4,5} State required to compare EGU emission levels with the interim steps set forth in the state’s plan. For 2022-2024, state must demonstrate it has met its interim step 1 period milestone, on average, over the three years of the period. For 2025-2027, state must demonstrate it has met its interim step 2 period milestone, on average, over the three years of the period. For 2028-2029, state must demonstrate it has met its interim step 3 period milestone, on average, over the two years of the period. See section VIII.B of the final rule preamble for more information.

⁶ State required to compare EGU emission levels with the interim goal set forth in the state’s plan. For 2022-2029, state must demonstrate it has met its interim goal, on average, over the eight years of the period.

Carbon Pollution Standards



Carbon Pollution Standards

A **new source** is any newly constructed fossil fuel-fired power plant that commenced construction on or after January 8, 2014

A **modification** is any physical or operational change to an existing source that increases the source's maximum achievable hourly rate of air pollutant emissions. This standard would apply to units that modify on or after June 18, 2014

A **reconstructed source** is a unit that replaces components to such an extent that the capital cost of the new components exceeds 50 percent of the capital cost of an entirely new comparable facility. This standard would apply to units that reconstruct on or after June 18, 2014

- EPA set standards to limit carbon dioxide emissions from new, modified, and reconstructed power plants.
- In the Clean Air Act (CAA), Congress recognized that the opportunity to include the most advanced emissions controls into a source's design is greater for new sources than for existing sources; so it laid out distinct approaches for each under CAA section 111
- EPA is establishing separate standards for two types of fossil-fuel fired sources:
 - stationary combustion turbines, generally firing natural gas; and
 - electric utility steam generating units, generally firing coal
- EPA is deferring standards for some types of modifications at this time



Carbon Pollution Standards

Overview

- These final standards reflect specific concerns and technical input from the comments received on both the proposed Carbon Pollution Standards for New Sources and the proposed Carbon Pollution Standards for Modified and Reconstructed Sources
- The standards reflect the degree of emission limitation achievable through the application of the best system of emission reduction (BSER) that EPA has determined has been adequately demonstrated for each type of unit
- These limits provide the starting point for new fossil-fueled fired power plants, which must obtain permits under the Clean Air Act's New Source Review program. That program requires the use of Best Available Control Technology. EPA will revise its BACT Guidance to reflect these requirements and explain further requirements for applicants to evaluate advancing technology
- Because these standards are in line with current industry investment patterns, these standards are not expected to have notable costs and are not projected to impact electricity prices or reliability



Carbon Pollution Standards

Coal

New Coal-Fired Power Plants

- Best System for Emission Reduction (BSER) for new steam units is highly efficient supercritical pulverized coal (SCPC) with partial carbon capture and storage (CCS)
- Emission limit of 1,400 lb CO₂/MWh-gross
- A new coal-fired power plant could meet by
 - Capturing about 20 percent of its carbon pollution
 - IGCC co-firing natural gas

Modified Coal-Fired Power Plants

- BSER for modified units is based on each affected unit's own best potential performance
- Setting standards for units that make larger modifications, those resulting in an increase of hourly CO₂ emission of more than 10 percent
- Withdrawing standards for units that make smaller modifications, those resulting in an increase less than or equal to 10 percent. Delayed until EPA gathers more information

Reconstructed Coal-Fired Plants

- BSER is the performance of the most efficient generating technology for these types of units (i.e., reconstructing the boiler if necessary to use steam with higher temperature and pressure, even if the boiler was not originally designed to do so)
 - Sources with heat input greater than 2,000 MMBtu/h would be required to meet an emission limit of 1,800 lb CO₂/MWh-gross and
 - Sources with a heat input of less than or equal to 2,000 MMBtu/h would be required to meet an emission limit of 2,000 lb CO₂/MWh-gross.



Carbon Pollution Standards

Natural Gas

New and Reconstructed Stationary Combustion Turbines, Generally Natural Gas

- BSER is natural gas combined cycle (NGCC) technology
- Issuing final emission limit of 1,000 lb CO₂/MWh-gross for all sizes of base load units
- Non-base load units must meet a clean fuels input-based standard
- Sales applicability threshold determines whether a unit is “base load” or “non-base load”

Modified Stationary Combustion Turbines, Generally Natural Gas

- Withdrawing standards for stationary combustion turbines that make modifications. Delayed until EPA gathers more information

Proposed Federal Plan and Model Rules

Pathways for Implementation



Proposed Federal Plan

Overview

- The federal plan and model trading rules provide a readily available path forward for Clean Power Plan implementation and present flexible, affordable implementation options for states
- The model rules provide a cost-effective pathway to adopt a trading system supported by EPA and make it easy for states and power plants to use emissions trading
- Both the proposed federal plan and model rules:
 - Contain the same elements that state plans are required to contain, including:
 - Performance standards
 - Monitoring and reporting requirements
 - Compliance schedules that include milestones for progress
 - Ensure the CO₂ reductions required in the final CPP are achieved
 - Preserve reliability
- Co-proposing two different approaches to a federal plan— a rate-based trading plan type and a mass-based trading plan type
 - Both proposed plan types would require affected EGUs to meet emission standards set in the Clean Power Plan



Proposed Federal Plan

How does it work?

- Will be finalized only for those affected states with affected EGUs that EPA determines have failed to submit an approvable Clean Air Act 111(d) state plan by the relevant deadlines set in the emission guidelines
 - Even where a federal plan is put in place, a state will still be able to submit a plan, which if approved, will allow the state and its sources to exit the federal plan
- EPA currently intends to finalize a single approach (i.e., either the mass-based or rate-based approach) for every state in which it finalizes a federal plan
- Affected states may administer administrative aspects of the federal plan and become the primary implementers
 - May also submit partial state plans and implement a portion of a federal plan
- Affected states operating under a federal plan may also adopt complementary measures outside of that plan to facilitate compliance and lower costs to the benefit of power generators and consumers
- Proposes a finding that it is necessary or appropriate to implement a section 111(d) federal plan for the affected EGUs located in Indian country. CO₂ emission performance rates for these facilities were finalized in the Clean Power Plan



Information and Resources

How can I learn more?

After two years of unprecedented outreach, the EPA remains committed to engaging with all stakeholders as states implement the final Clean Power Plan.

- For more information and to access a copy of the rule, visit the **Clean Power Plan website**: <http://www2.epa.gov/carbon-pollution-standards>
- Through graphics and interactive maps, the **Story Map** presents key information about the final Clean Power Plan. See: <http://www2.epa.gov/cleanpowerplan>
- For community-specific information and engagement opportunities, see the **Community Portal**:
- For additional resources to help states develop plans, visit the **CPP Toolbox for States**: <http://www2.epa.gov/cleanpowerplantoolbox>
- For a graphical and detailed walk through of the EGU category-specific CO₂ emission performance rate and state goals, see **State Goal Visualizer**: <http://www2.epa.gov/cleanpowerplantoolbox>
- EPA provides **webinars** and **training** on CPP related topics at the air pollution control learning website. See: <http://www.apti-learn.net/lms/cpp/plan/>