



CLEAN POWER PLAN **PROPOSAL**

Reducing Carbon Pollution From Existing Power Plants

Josh Tapp, Chief
Air Planning Branch
EPA Region 7
July 14, 2014

The President's Climate Action Plan

- **Cut carbon pollution in America**
 - **Reduce power sector greenhouse gas emissions**
 - Accelerate clean energy leadership
 - Build a 21st century transportation sector
 - Cut energy waste in homes, businesses, factories
 - Reduce other greenhouse gas emissions (e.g., HFCs, methane)
- **Prepare the United States for climate change**
 - Support sustainability and climate resilience efforts
 - Maintain agricultural productivity
- **Lead international efforts to combat global climate change**



Reducing Carbon Pollution From Power Plants

President's Directive to EPA:

Develop carbon pollution standards, regulations or guidelines, as appropriate, for:

1. New power plants

- Proposed: January 8, 2014

2. Modified and reconstructed power plants

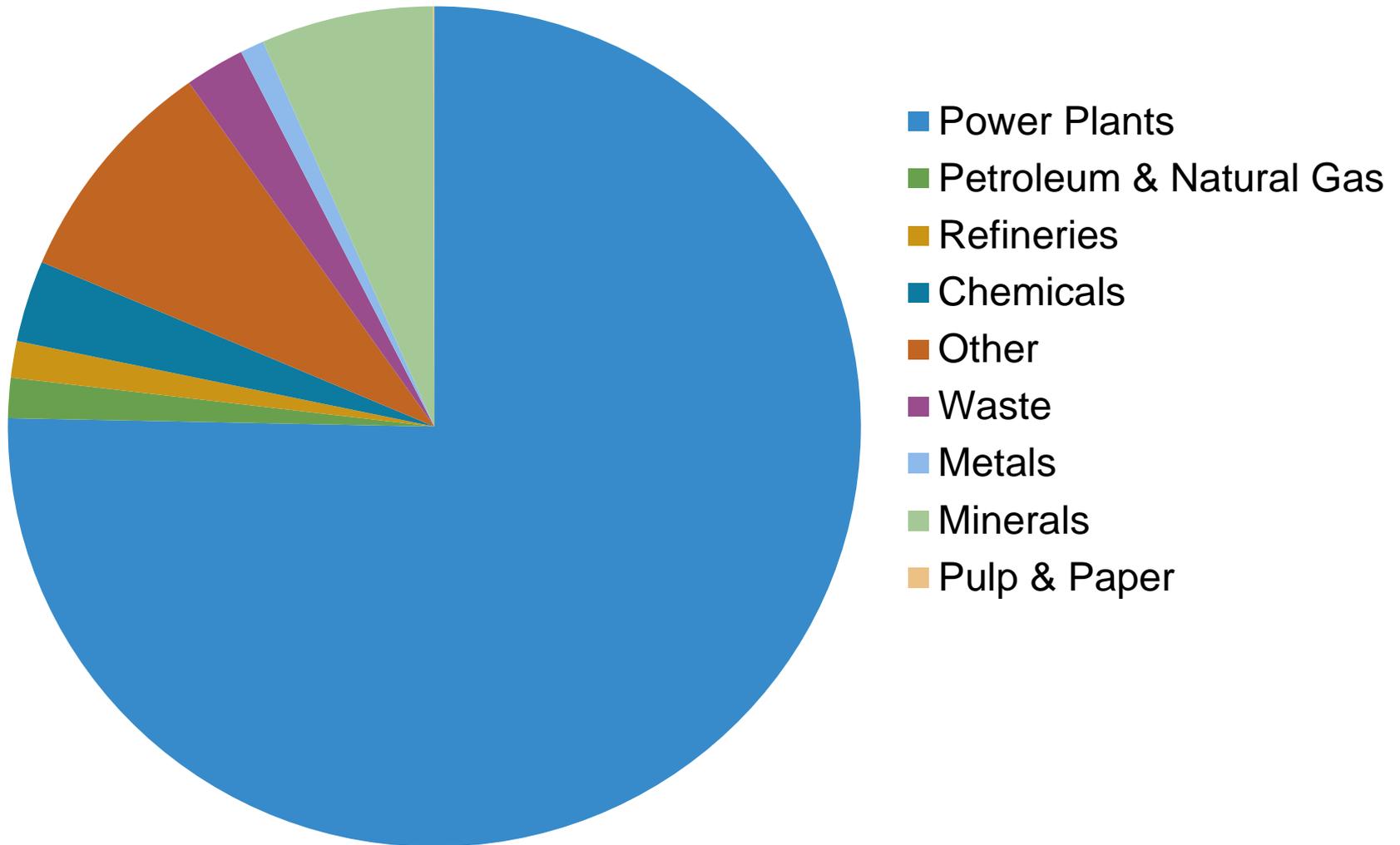
- Proposal: June 2014
- Final: June 2015

3. Existing power plants

- Proposed Guidelines: June 2014
- Final Guidelines: June 2015
- State Plans due: June 2016



Region 7 2012 Direct Emissions as of 9/1/2013 in CO₂e





Proposal Process

<http://www2.epa.gov/carbon-pollution-standards>

- Signed June 2, 2014
- Published June 18, 2014
- Comment Period Closes Oct. 16, 2014
- EPA will hold four public hearings on the proposed Clean Power Plan the week of July 28, 2014 in:
 - Atlanta, GA
 - Denver, CO
 - Pittsburgh, PA
 - Washington, DC



Early Outreach Informed This Proposal

- EPA conducted a robust pre-proposal stakeholder engagement process.
 - Participated in meetings with over 300 utility, consumer, labor and environmental groups since June 2013.
 - Held 11 public listening sessions around the country.
 - 3,300 people attended.
 - More than 1,600 people offered oral statements.
- Reached out to all 50 states.
 - Some states noted their programs to address carbon evolved because of:
 - The need to address carbon pollution;
 - Electric system that is dynamic, and in the midst of market changes; and
 - Modernizing the power sector is good for the economy.
- Common themes included reliability, flexibility, affordability, time for plans and implementation.





Proposal Benefits Summary

This proposal will:

- Reduce carbon pollution from existing power plants, for which there are currently no national limits.
- Maintain an affordable, reliable energy system.
- By 2030, reduce nationwide carbon dioxide (CO₂) emissions, from the power sector by approximately 30% from 2005 levels.
 - Significant reductions begin by 2020.
- Cut hundreds of thousands of tons of harmful particle pollution, sulfur dioxide and nitrogen oxides as a co-benefit.
- Provide important health protections to the most vulnerable, such as children and older Americans.
- Lead to health and climate benefits worth an estimated \$55 billion to \$93 billion in 2030.
- From soot and smog reductions alone, for every dollar invested through the Clean Power Plan – American families will see up to \$7 in health benefits.

EPA Sets the Goals

General Overview of Proposal

- ▶ Proposal sets an interim (2020-2029) and final goal (2030) for affected EGUs in each state to reduce carbon pollution
 - ▶ Rate-based performance level (lb CO₂/MWh)
- ▶ EPA is not prescribing measures states need to implement to meet the goal
- ▶ States have flexibility to choose what goes into their plan – how and when to get the necessary reductions, provided the goals are met in established timeframe
 - ▶ Choose form of goal (rate or translate to mass)
 - ▶ Choose what works best in a state, tailored to state needs and policy objectives
 - ▶ Opportunity to build on existing energy efficiency and renewable energy programs
 - ▶ Flexible over time and place – states can look across the electricity system to achieve reductions from affected EGUs, and have 10 years to meet the interim goal on average basis
 - ▶ Option to work with other states through multi-state plan, which can lower costs
 - ▶ Fits into existing state and utility electricity sector planning processes



CO2 Emission Intensity Rate 2012 to 2030

State	2012 CO2 Emissions Intensity (lbs/MWh)	2020 Interim CO2 Emissions Goal (lbs/MWh)	2030 Final CO2 Emissions Goal (lbs/MWh)
MO	1,963	1,621	1,544
IA	1,552	1,341	1,301
KS	1,940	1,578	1,499
NE	2,009	1,596	1,479



Background: Clean Air Act Section 111(d) Best System of Emission Reduction

- Previous EPA rules under this section of the Clean Air Act have considered “add-on” control technologies – like scrubbers -- that are technically feasible to deploy at virtually any facility.
- In contrast, there are a wide variety of ways to reduce carbon pollution that are commercially available, technically feasible, and cost effective.
- The opportunities vary from state to state, depending on how electricity is generated, energy infrastructure, and other factors.
- In this proposal, EPA took an approach that viewed the Clean Air Act factors in determining Best System of Emission Reduction in light of the interconnected nature of power generation.
 - BSER factors
 - Costs
 - Size of reductions
 - Technology
 - Feasibility



State Goals – What is BSER?

- State goals do not lay out a set of required mechanisms a state must use to reduce carbon pollution. They are a numeric target that a state must plan to meet through the measures they choose.
- EPA is setting state goals after determining the Best System of Emission Reduction (BSER).
- Because the power sector is interconnected, EPA determined that a set of 4 measures together are the best system to reduce carbon pollution from fossil fuel fired power plants.
- The best system is made up of 4 building blocks that are being implemented now and can be implemented more broadly across the power system :
 - (1) measures to make coal plants more efficient,
 - (2) increased use of high efficiency, natural gas combined cycle plants,
 - (3) generating electricity from low/zero emitting facilities, and
 - (4) demand-side energy efficiency.



EPA Establishes a Goal for Every State

- EPA analyzed the practical and affordable strategies that states and utilities are already using to lower carbon pollution from the power sector.
- Proposed goals are based on a consistent national formula, calculated with state and regional specific information.
- The result of the equation is the state goal.
- Each state goal is a rate – a statewide number for the future carbon intensity of covered existing fossil-fuel-fired power plants in a state.
 - Encompasses the dynamic variables that ultimately determine how much carbon pollution is emitted by fossil fuel power plants.
 - Accommodates the fact that CO₂ emissions from fossil fuel-fired power plants are influenced by how efficiently they operate and by how much they operate.
- The state goal rate is calculated to account for the mix of power sources in each state and the application of the “building blocks” that make up the best system of emission reduction.
- States will need to meet an interim goal and a final goal.

Building Block	Strategy EPA Used to Calculate the State Goal	State Goal
1. Make fossil fuel-fired power plants more efficient	Efficiency Improvements for coal-fired general	6% HRI
2. Use lower-emitting power sources more	Dispatch changes to existing natural gas combined cycle (CC)	70% Utilization NGCC
3. Build more zero/low-emitting energy sources	Renewable Energy Certain Nuclear	MO 3% 
4. Use electricity more efficiently	Demand-side energy efficiency programs	1.5%  per year in MW reduction



State Goals - Calculation

$$\frac{\text{State } \mathbf{CO_2 \text{ emissions}} \text{ from covered fossil fuel fired power plants (lbs)}}{\text{State } \mathbf{electricity \text{ generation}} \text{ from covered fossil plants + RE + nuclear}_{ar\&UC} + \text{EE (MWh)}} = \text{state goal}$$

- The numerator is the sum of CO₂ emissions at covered fossil fuel fired power plants in that state .
- The denominator is electricity generation in the state, factoring in megawatt hours from fossil fuel power plants plus other types of power generation like renewables and nuclear, as well as megawatt hour savings from energy efficiency in the state.
 - More specifically -- this includes covered fossil sources, existing and new renewable energy (but excluding existing hydro), 6% of the nuclear fleet's generation, and EE accounted for as zero emitting MWh.
- No single fossil fired unit has to meet any of these goals.



State Flexibility – States Get to Decide

- Goals are unique to every state because they reflect the diversity of how states produce and consume electricity.
 - For example, some states have more coal-fired generators and therefore more potential for heat rate improvements.
- State goals do not define or limit states compliance choices
 - States can choose to meet their goal using more or less of any of the compliance options in the four building blocks.
 - They can also use compliance options not included in the building blocks such as new NGCC, transmission improvements and retrofit CCS.
- State goals were not derived using any 2005 data
 - EPA described the overall, nationwide reduction target in reference to 2005, because that is a common year to consider when evaluating GHG emission reductions



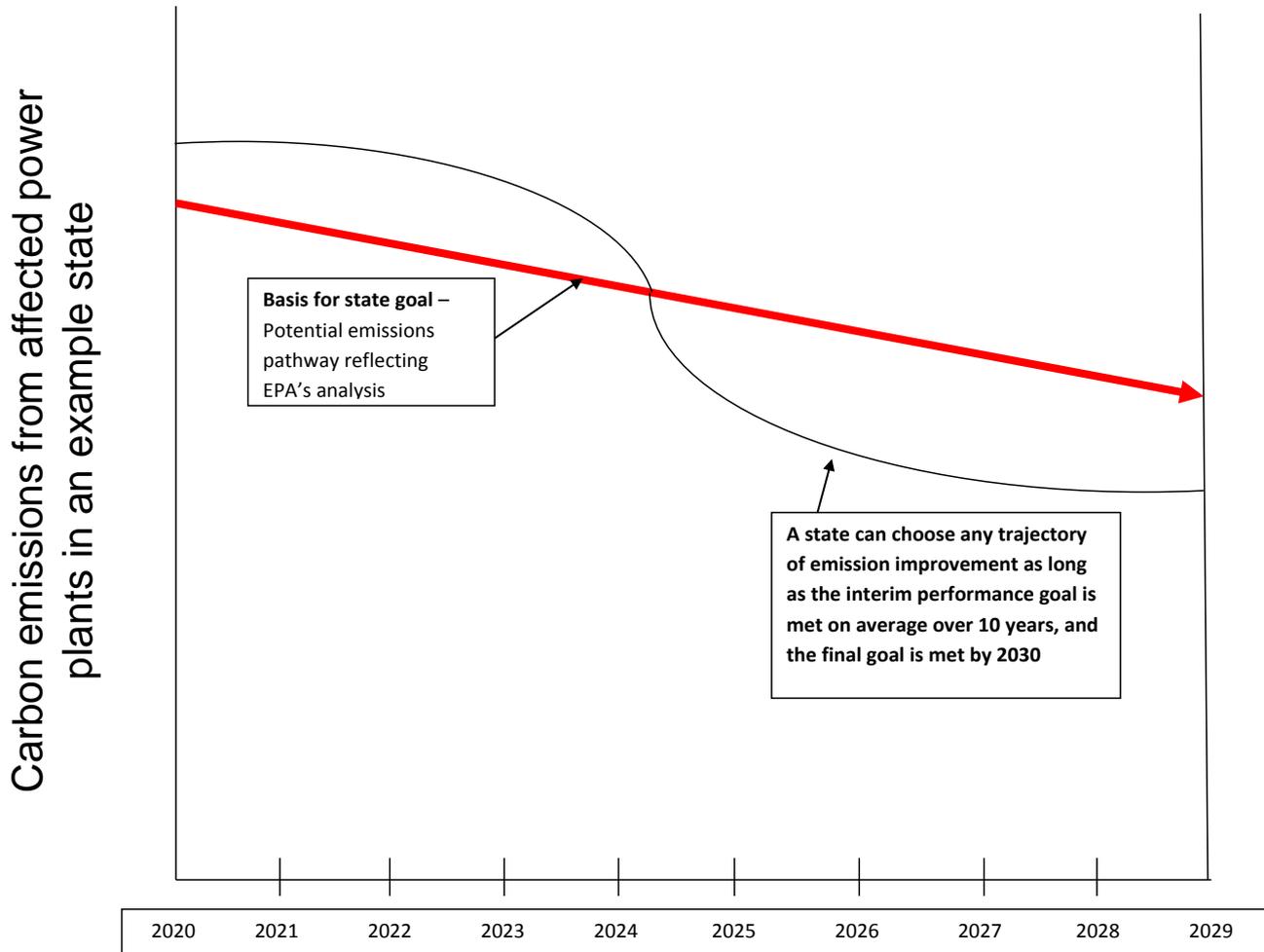
State Goals – Learning More

- EPA calculated the goal based on the specific actions EPA has defined as BSER under the Clean Air Act– not on a particular compliance approach.
- **The proposal provides significant flexibility for states to achieve reduction in any number of ways, therefore state goals are not prescriptions for any specific actions in any state.**
- Each state has substantial flexibility to determine how to meet its goal.
 - A state can employ all, some, or none of the strategies EPA used to calculate the goal in its state plan as long as the state can demonstrate how the plan's actions will get them to its goal and achieve real reductions in carbon pollution from power plants.



States Have Flexibility

As an example, states could do less in the early years, and more in the later years, as long as on average it meets the goal



Timing of Power Plant Emission Reductions



Strategies to Meet the Goals



States Choose How to Meet the Goals

- Demand-side energy efficiency programs.*
- Generating electricity from low/zero-emitting facilities.*
- Expanding use of existing NGCC units.*
- Transmission efficiency improvements.
- Energy storage technology.
- Working with utilities to consider retiring units that are high emitting.
- Energy conservation programs.
- Retrofitting units with partial CCS.
- Use of certain biomass.
- Efficiency improvements at higher-emitting plants.*
- Market-based trading programs.
- Building new renewables.
- Dispatch changes.
- Co-firing or switching to natural gas.
- Building new natural gas combined cycle units.

* Measures EPA used in calculating the state goals



Details About State Plans

- EPA lists about a dozen components that will need to be included in the state plan.
- Measures to meet the state's interim goal and final goal.
 - Interim goal -- meet on average over a 10-year period from 2020-2029;
 - Final goal -- meet in 2030 and thereafter.
- Individual and multi-state plans due June 30, 2016.
- Proposed timing of extensions to submit a complete plan, if justified and supported:
 - Submit initial plan by June 30, 2016;
 - Individual state plans: a one-year extension (June 30, 2017); and
 - Multi-state plans: a two-year extension (June 30, 2018).

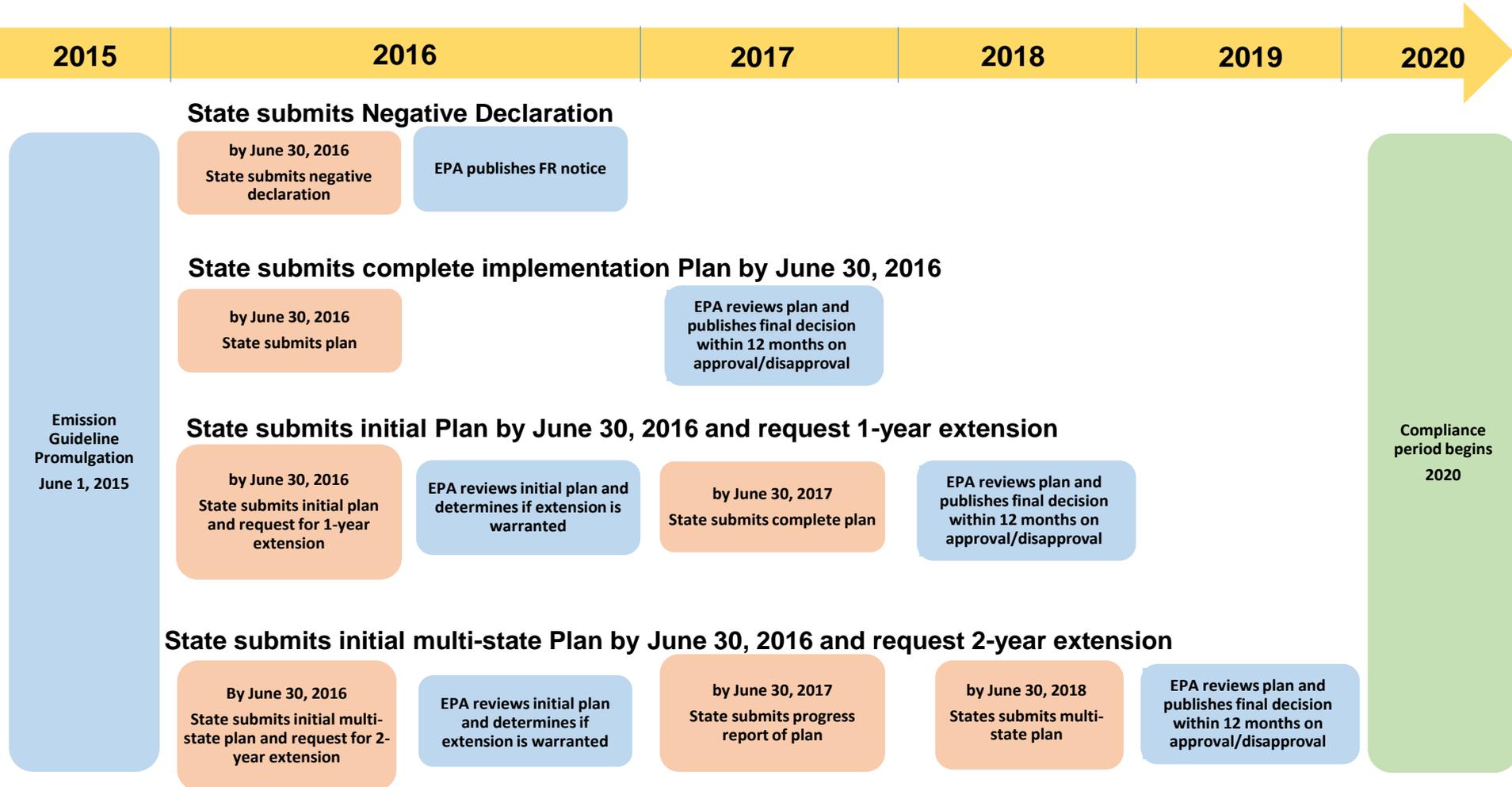


State Plan Components

- ▶ Emission guidelines include a list of 12 components that must be included in a state plan:
 - ▶ Identification of affected entities (affected EGUs and other responsible parties)
 - ▶ Description of plan approach and geographic scope
 - ▶ Identification of state emission performance level
 - ▶ Demonstration that plan is projected to achieve emission performance level
 - ▶ Identification of milestones
 - ▶ Identification of corrective measures
 - ▶ Identification of emission standards and any other measures
 - ▶ Demonstration that each emission standard is quantifiable, non-duplicative, permanent, verifiable, and enforceable (recognizing non-traditional nature of some potentially affected entities)
 - ▶ Identification of monitoring, reporting, and recordkeeping requirements
 - ▶ Description of state reporting
 - ▶ Certification of hearing on state plan
 - ▶ Supporting material



Proposed Implementation Timeline



EPA United States Environmental Protection Agency

Español | 中文: 繁體版 | 中文: 简体版 | Tiếng Việt | 한국어

Learn the Issues | Science & Technology | Laws & Regulations | About EPA

Search EPA.gov

Contact Us | Share

Clean Power Plan Toolbox for States

Resources to help develop state plans

As co-regulators, states will develop plans to meet the guidelines in the [Clean Power Plan \(CPP\)](#). The resources below provide information on state plan development and can help states determine the most cost-effective approaches to reducing greenhouse gas emissions from the power sector.

Regulatory Action

- [Proposed CPP for existing power plants](#)
- [Technical support documents](#)

Technical Resources for Reducing CO₂ from Power Plants

- [Combined heat and power technology options](#)
- [Combined heat and power project development resources](#)

Policies and Programs for Reducing CO₂ from the Power Sector

- [Existing state programs](#)
- [Energy efficiency portfolio planning with ENERGY STAR](#)
- [Utility incentives for energy efficiency \(PDF\)](#) (116 pp, 1.2 MB)
- [Market-based mechanisms: design and operation \(PDF\)](#) (78 pp, 1.1 MB)
- [Market-based mechanisms: key insights \(PDF\)](#) (47 pp, 1.1 MB)

Estimating Potential Energy Efficiency and Renewable Energy (EE/RE) Impacts

- [AVoided Emissions & geneRation Tool \(AVERT\)](#)
- [Assessing the multiple benefits of EE/RE](#)
- [Projected energy impacts from existing state EE/RE policies](#)
- [Combined Heat and Power Partnership](#)
- [U.S. DOE Building Technologies Office](#)
- [U.S. DOE Advanced Manufacturing Office – Technical Assistance Activities](#)
- [State & Local Energy Efficiency Action Network](#)

Clean Power Plan

EPA is taking its first steps under President Obama's Climate Action Plan to reduce carbon pollution from power plants - the largest stationary source of carbon pollution in the United States.

[Learn more about EPA's proposed Clean Power Plan](#)

Get Involved

- [Comment on the Clean Power Plan proposal](#)
- [Attend a public hearing on the proposed rule](#)

You will need Adobe Reader to view some of the files on this page. See [EPA's About PDF page](#) to learn more.

[Contact Us](#) to ask a question, provide feedback, or report a problem.

EPA Home | Privacy and Security Notice | Accessibility

News by E-mail | Widgets | News Feeds | Podcasts | EPA Blog

Social sites: [Facebook](#) [Twitter](#) [LinkedIn](#) [YouTube](#) [Instagram](#)

More social media at EPA →





Questions?

Josh Tapp

Air Planning Branch Chief

EPA Region 7

913.551.7606

Tapp.Joshua@epa.gov

This presentation is provided solely for informational purposes. It does not provide legal advice, have legally binding effect, or expressly or implicitly create, expand, or limit any legal rights, obligations, responsibilities, expectations, or benefits in regard to any person.

Appendix



This Proposal Deals With the Largest Source of GHG Emissions in the U.S.

U.S. GREENHOUSE GAS POLLUTION INCLUDES:



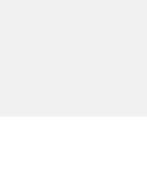
CARBON DIOXIDE (CO₂) 82%

Enters the atmosphere through burning fossil fuels (coal, natural gas, and oil), solid waste, trees and wood products, and also as a result of certain chemical reactions (e.g., manufacture of cement).



FLUORINATED GASES 3%

Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic, powerful greenhouse gases that are emitted from a variety of industrial processes.



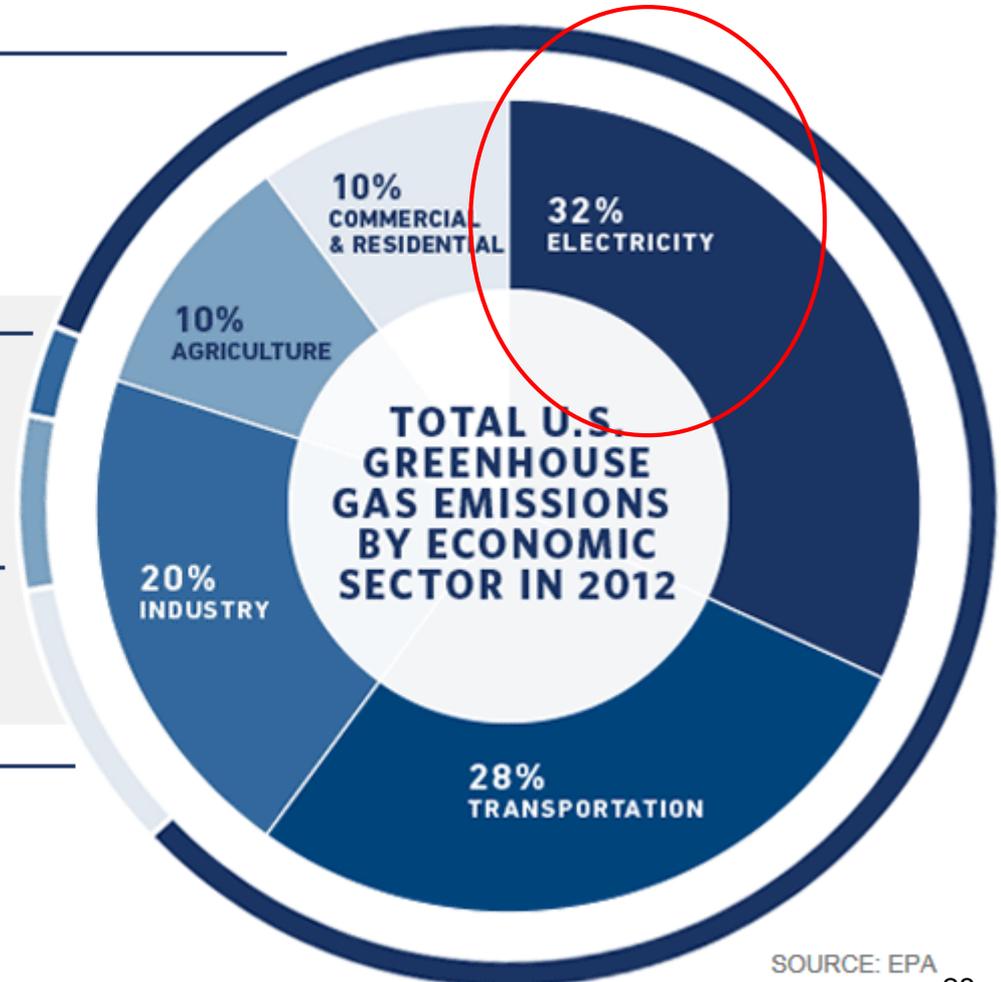
NITROUS OXIDE (N₂O) 6%

Emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.



METHANE (CH₄) 9%

Emitted during the production and transport of coal, natural gas, and oil as well as from landfills.



SOURCE: EPA



Carbon Pollution and Health

- 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.



\$30 BILLION
U.S. DROUGHT/HEATWAVE
ESTIMATED ACROSS THE U.S.



\$11.1 BILLION
COMBINED SEVERE WEATHER
ESTIMATED FOR INCIDENTS ACROSS THE U.S.



\$65 BILLION
SUPERSTORM SANDY
ESTIMATED

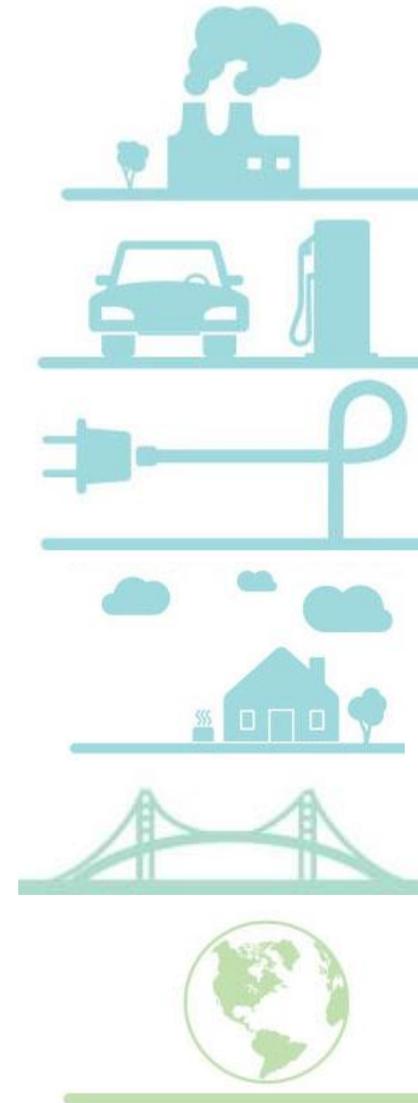


\$1 BILLION
WESTERN WILDFIRES
ESTIMATED



Actions to Reduce Carbon Pollution

- 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**





State Goals – Why They Are Different?

- State goals are unique to each state factoring in the amount of reductions that can be achieved through the 4 building blocks:
- Key factors that influence an individual state goal include:
 - The ratio of coal to existing natural gas combined cycle units
 - Magnitude of state RPS's within region
 - Energy demand (which impacts the potential for reductions from energy efficiency)
- Because the key factors that influence individual state goals are different for every state, each state's goal (and reduction percentage) is different.
- The percentage reduction in emission rate implied by the 2012 actual rate (adjusted for RE) and the targets in other years is not the same as a required percentage reduction in mass emissions.
 - This can be easily seen because increases in EE and RE can be accompanied by varying decreases in emissions.
 - Overall, the 2012 rate to 2030 State goal comparison suggest a 33% reduction between the adjusted emission rate and the state goals, but this is achieved via a 17% reduction in emissions over that same time period.



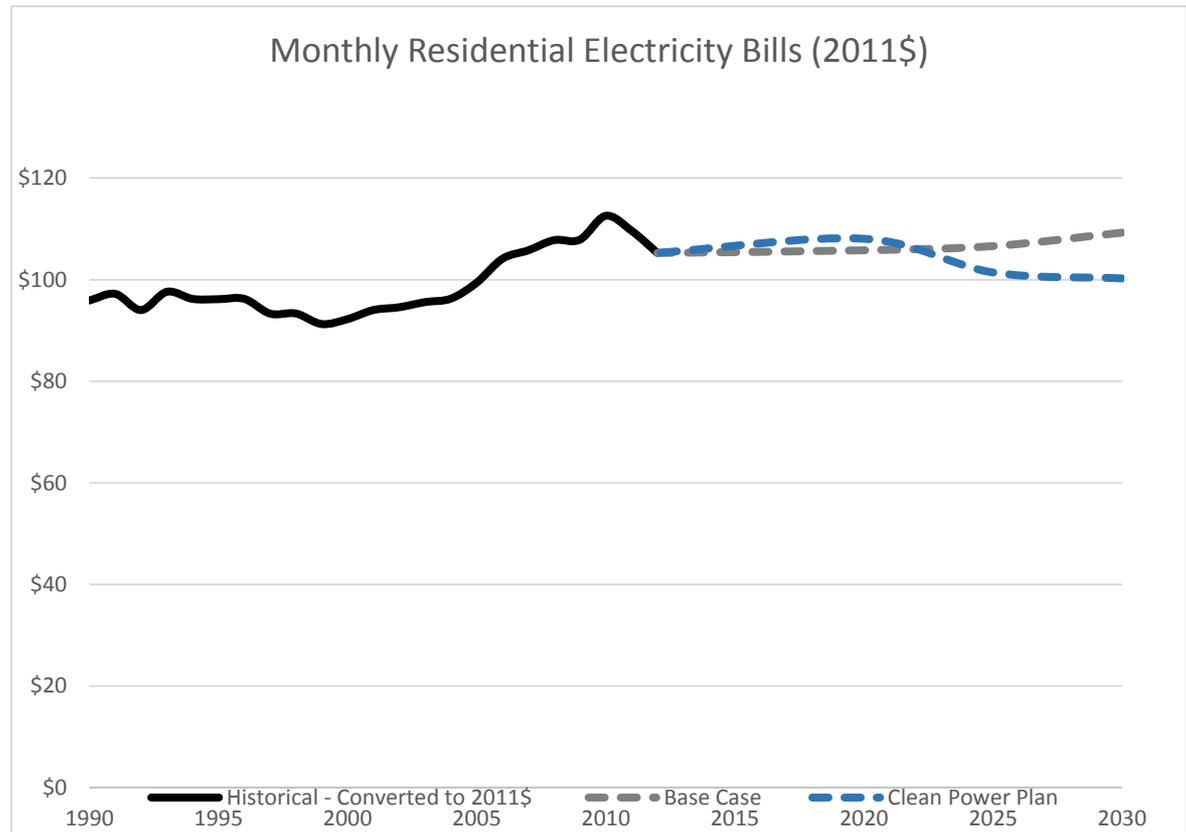
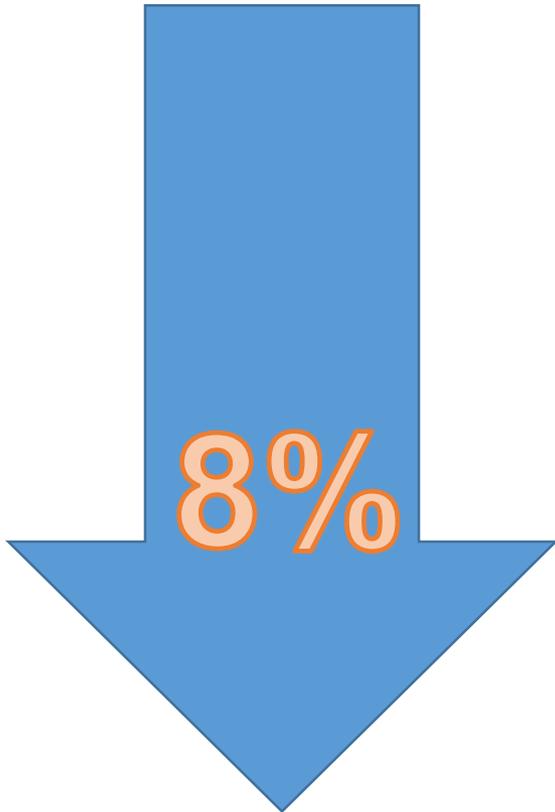
Benefits and Costs

- Nationwide, by 2030, this rule would help reduce CO₂ emissions from the power sector by approximately 30% from 2005 levels.
 - Also by 2030, reduce by over 25% pollutants that contribute to the soot and smog that make people sick.
- These reductions will lead to public health and climate benefits worth an estimated \$55 billion to \$93 billion in 2030.
- Proposal will avoid an estimated 2,700 to 6,600 premature deaths and 140,000 to 150,000 asthma attacks in 2030.
- Health and climate benefits far outweigh the estimated annual costs of meeting the standards.
 - Estimated at \$7.3 billion to \$8.8 billion in 2030.
- Proposal protects children and other vulnerable Americans from the health threats posed by a range of pollutants.
- Move us toward a cleaner, more stable environment for future generations.
- Ensures an ongoing supply of the reliable, affordable power needed for economic growth.



Other Impacts

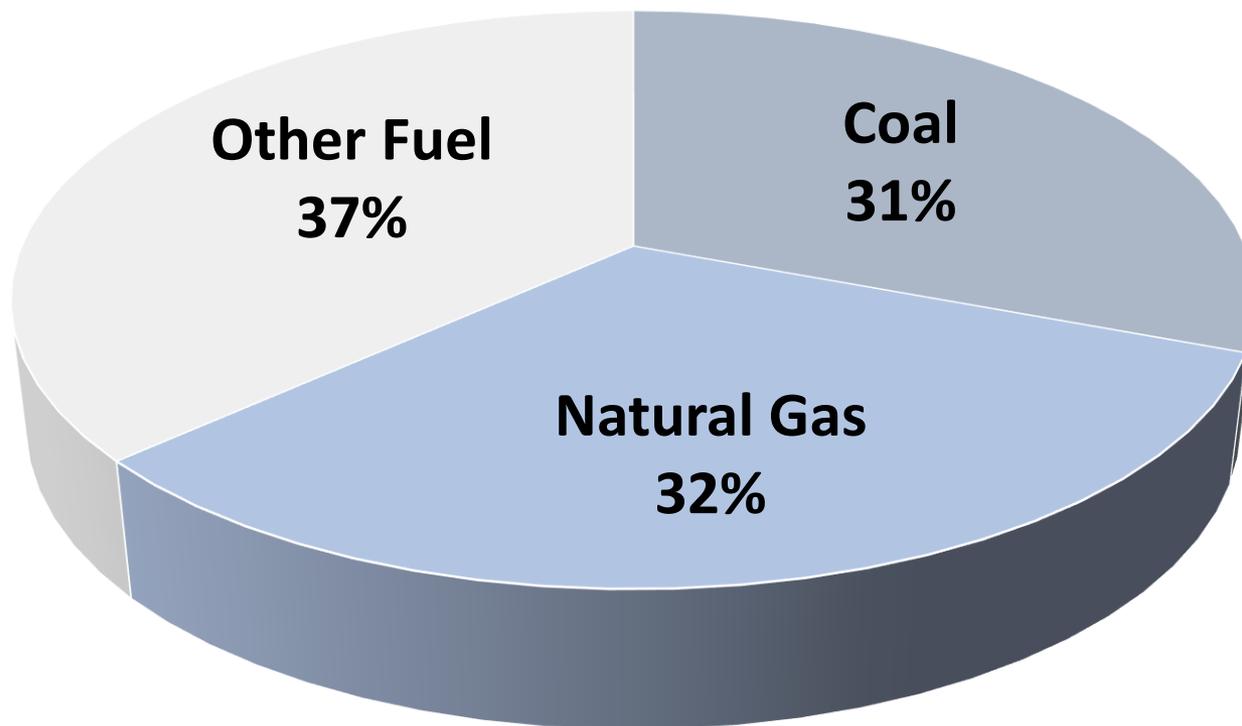
Electricity bills down 8% in 2030





After Proposal, Coal & Natural Gas Remain Leading Sources of Electricity Generation

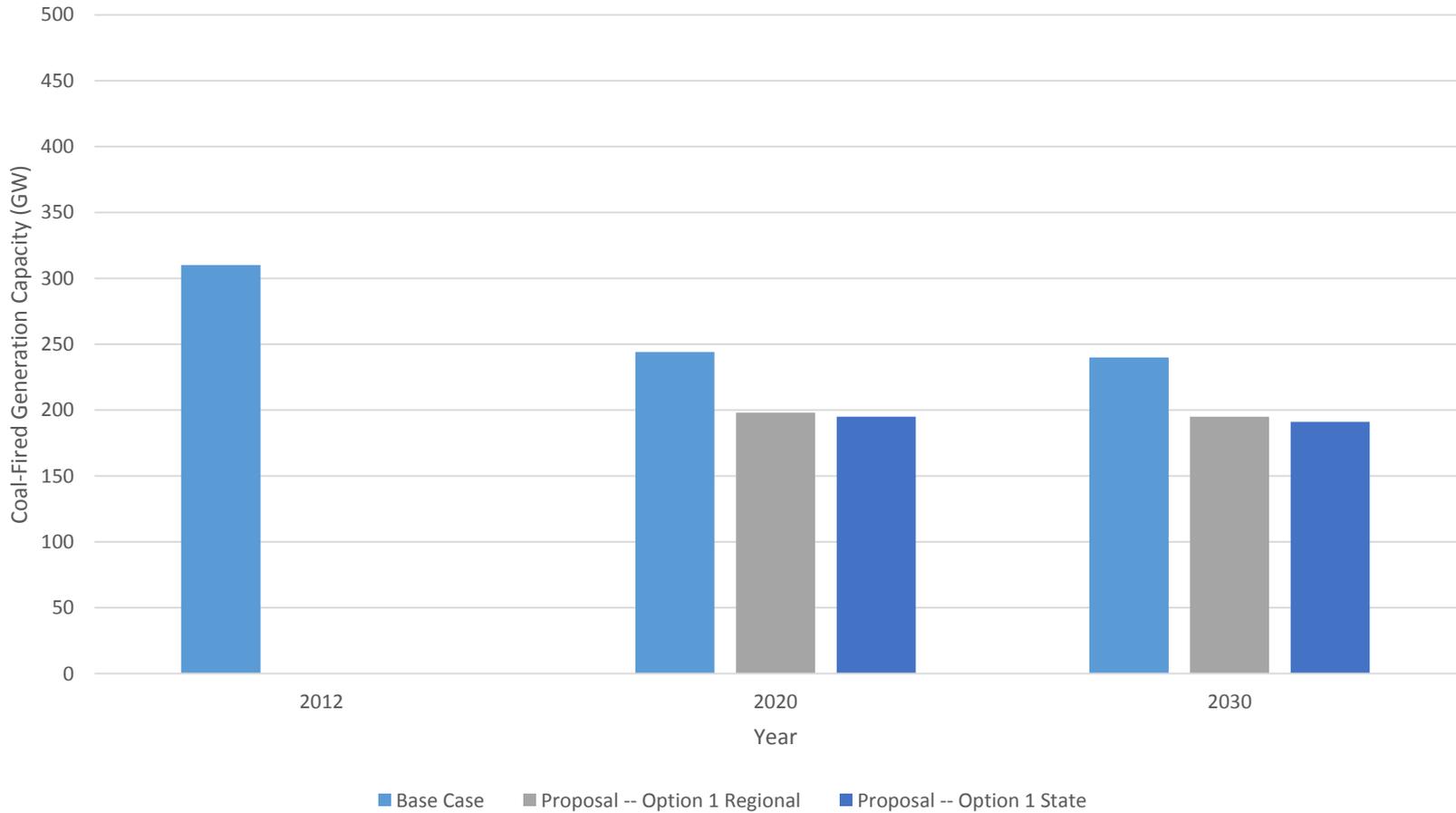
Each more than 30% of projected generation in 2030





Other Impacts

Past and Projected Coal Generation in US





For More State-By-State Information



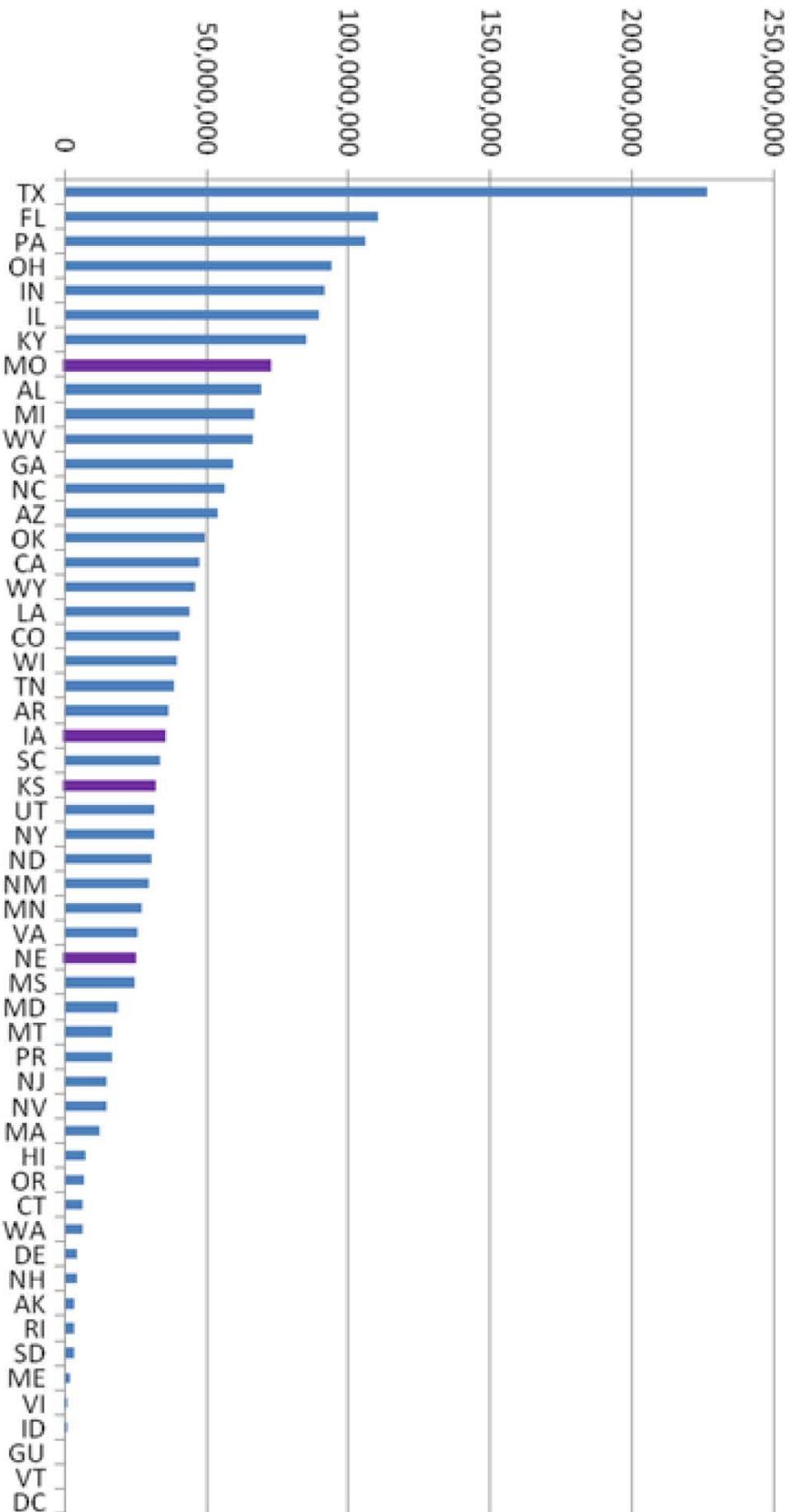
<http://www.epa.gov/cleanpowerplan>



Next Steps

- The proposed rule, as well as information about how to comment and supporting technical information, are available online at:
<http://www.epa.gov/cleanpowerplan>
- EPA will hold 4 public hearings the week of July 28th in Denver, Atlanta, Pittsburgh and Washington, D.C.
- There will be a 120-day public comment period on the proposal.
- Comments on the proposal should be identified by Docket ID No.
EPA-HQ-OAR-2013-0602.

2012 Direct GHG Emissions From Power Plants by State





State Goals – Why They Are Different?

- State goals are unique to each state factoring in the amount of reductions that can be achieved through the 4 building blocks:
- Key factors that influence an individual state goal include:
 - The ratio of coal to existing natural gas combined cycle units
 - Magnitude of state RPS's within region
 - Energy demand (which impacts the potential for reductions from energy efficiency)
- Because the key factors that influence individual state goals are different for every state, each state's goal (and reduction percentage) is different.
- The percentage reduction in emission rate implied by the 2012 actual rate (adjusted for RE) and the targets in other years is not the same as a required percentage reduction in mass emissions.
 - This can be easily seen because increases in EE and RE can be accompanied by varying decreases in emissions.
 - Overall, the 2012 rate to 2030 State goal comparison suggest a 33% reduction between the adjusted emission rate and the state goals, but this is achieved via a 17% reduction in emissions over that same time period.



Flexibilities Available To States

- Timing:
 - Up to 15-year window in which to plan for and achieve reductions in carbon pollution.
 - Up to two or three years to submit final plans.
- Form of goal: States can use either a rate-based or mass-based goal.
- Single or multi-state plans: States can collaborate and develop plans on a multi-state basis.
- Selection of measures:
 - States will choose how to meet the goal through whatever collection of measures reflects its particular circumstances and policy objectives.
 - State measures may impact and, in fact may be explicitly designed to reduce, CO₂ emissions from utilities on a regional basis.
 - EPA would support building off existing reduction programs.



Summary (Cont'd)

- Build on actions states, cities and businesses across the country are already taking to address the risks of climate change.
- Spur investment in cleaner and more efficient technologies, creating jobs and driving innovation.
- Require a reasonable emission reduction glidepath starting in 2020.
- Provide a flexible timeline—up to 15 years from guideline issuance—for all emission reduction measures to be fully implemented in 2030.
 - Recognizing that investments in infrastructure can take time to put in place and
 - Avoiding stranded assets.
- Provide an array of tools states can use to formulate approvable plans.

Treatment of Interstate Emission Effects

- ▶ For Energy Efficiency (EE) programs and measures:
 - ▶ A state may take into account in its plan only those CO₂ emission reductions from affected EGUs occurring in the state that result from demand-side energy efficiency programs and measures implemented in the state
 - ▶ States participating in multi-state plans would have the flexibility to attribute the CO₂ emission reductions from EE programs among states in the multi-state area
 - ▶ States could jointly demonstrate CO₂ emission performance by affected EGUs through a multi-state plan in a contiguous electric grid region
- ▶ For Renewable Energy (RE) programs and measures:
 - ▶ Consistent with existing state RPS policies, a state could take into account all of the CO₂ emission reductions from affected EGUs due to renewable energy programs and measures implemented by the state, whether they occur in the state and/or in other states
 - ▶ States participating in multi-state plans would have the flexibility to attribute the CO₂ emission reductions among states in the multi-state area.
 - ▶ States could jointly demonstrate CO₂ emission performance by affected EGUs through a multi-state plan in a contiguous electric grid region, in which case attribution among states of emission reductions from renewable energy measures would not be necessary
- ▶ See discussion in State Plan Considerations TSD for more information



“Covered” EGU

- ▶ A stationary combustion turbine, steam generating unit or IGCC that is (1) capable of combusting more than 250 MMBtu/h heat input of fossil fuel and (2) constructed for the purpose of supplying one-third or more of its potential net-electric output capacity and more than 219,000 MWh to any utility power distribution system for sale (to the grid). In addition, for a stationary combustion turbine to be considered an EGU the heat input must consist of over 90% natural gas.