

Clean Air Act Section 111 GHGs from the Power Sector

Standards of Performance for
New, Reconstructed, and
Modified Sources and Emission
Guidelines for Existing Sources

AAPCA FALL BUSINESS MEETING
RALEIGH, NORTH CAROLINA

SEPTEMBER 29, 2022

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Upcoming OAR
Section 111
Power Sector
Rules

GHG NSPS
CAA 111(b)

Proposed **New Source Performance Standards** for Greenhouse Gas Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Generating Units

GHG EGs
CAA 111(d)

Proposed **Emission Guidelines** for Greenhouse Gas Emissions from Existing Electric Generating Units

Power Sector Overview

Power Sector Overview

The U.S. power sector has been in transition since approximately 2005

Coal-fired electric generation has **decreased** from ~51% to ~20% of total

Natural gas-fired electric generation has **increased** 22%

- Includes stationary combustion turbines operating as base load electric generating units (EGUs) and as on-demand non-base load EGUs, supporting the grid during peak demand

Electric generation from renewables has **increased** ~11%

Electric Power Generation by Fuel Type

Fuel Type	1990	2005	2016	2017	2018	2019	2020
Coal	54.1%	51.1%	31.4%	30.9%	28.4%	24.2%	19.9%
Natural Gas	10.7%	17.5%	32.7%	30.9%	34.0%	37.3%	39.5%
Nuclear	19.9%	20.0%	20.6%	20.8%	20.1%	20.4%	20.5%
Renewables	11.3%	8.3%	14.7%	16.8%	16.8%	17.6%	19.5%
Petroleum	4.1%	3.0%	0.6%	0.5%	0.6%	0.4%	0.4%
Other Gases ^a	+	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
<i>Net Electricity Generation (Billion kWh)^b</i>	<i>2,905</i>	<i>3,902</i>	<i>3,917</i>	<i>3,877</i>	<i>4,017</i>	<i>3,963</i>	<i>3,849</i>

+ Does not exceed 0.05 percent.

(a) Other gases include blast furnace gas, propane, and other manufactured and waste gases derived from fossil fuels.

(b) Represents net electricity generation from the power sector. Excludes commercial and industrial CHP generation.

Funding Considerations

- **Bipartisan Infrastructure Law (BIL)** provides for significant investments in infrastructure and programs
- **Inflation Reduction Act (IRA)** provides for significant investments in clean energy technologies and supporting infrastructure
- Specific funds to potentially support addressing GHG emission reductions from EGUs include:

Significant tax credits benefitting technologies such as clean hydrogen and carbon capture, utilization, and storage

Department of Energy loan guarantee programs to provide a backstop for financing of pollution control equipment

U.S. Department of Agriculture programs to finance clean energy technologies with rural coops

EPA programs to capitalize private green banks and fund state-led greenhouse gas reduction plans

Questions for Consideration

- EPA's regulations will be proposed and finalized **in the context of transition** within the power sector
- The regulatory approach should capture the most current information about **investment decisions** in the sector
 - Are there any significant recent announcements or commitments to transitioning generation of which the Agency should be aware?
 - How does passage of the IRA impact investments in the transitioning power sector?

GHG NSPS under CAA 111(b)

NEW, MODIFIED, AND RECONSTRUCTED SOURCES

CAA Section 111(b)

- For source categories that **cause or contribute significantly** to air pollution which may reasonably be anticipated to **endanger public health or welfare**, CAA section 111 requires EPA to establish standards of performance for new sources
- Standards must be set based on what is achievable through the application of the **best system of emission reduction (BSER)**
 - Cost (must not be “exorbitant,” “greater than the industry can bear,” or “unreasonable”)
 - Non-air quality health and environmental impacts
 - Energy requirements
 - Technology that has been adequately demonstrated

Regulatory History – GHG NSPS

2015: GHG NSPS established standards to limit carbon dioxide (CO₂) emissions from fossil fuel-fired electric generating units (EGUs)

- 40 CFR part 60, subpart TTTT
- Established standards for newly constructed and reconstructed stationary combustion turbines generally firing natural gas based on the use of efficient generation and clean fuels
- Established standards for newly constructed fossil fuel-fired steam generating EGUs (*i.e.*, utility boilers and gasification units) based on the use of a supercritical pulverized coal (SCPC) boiler and partial carbon capture, utilization, and storage (CCUS). Also established standards for modified and reconstructed steam generating EGUs.
- Standards reflect the degree of emission limitation achievable through the application of BSER that EPA determined has been adequately demonstrated for each type of unit

Stationary Combustion Turbines

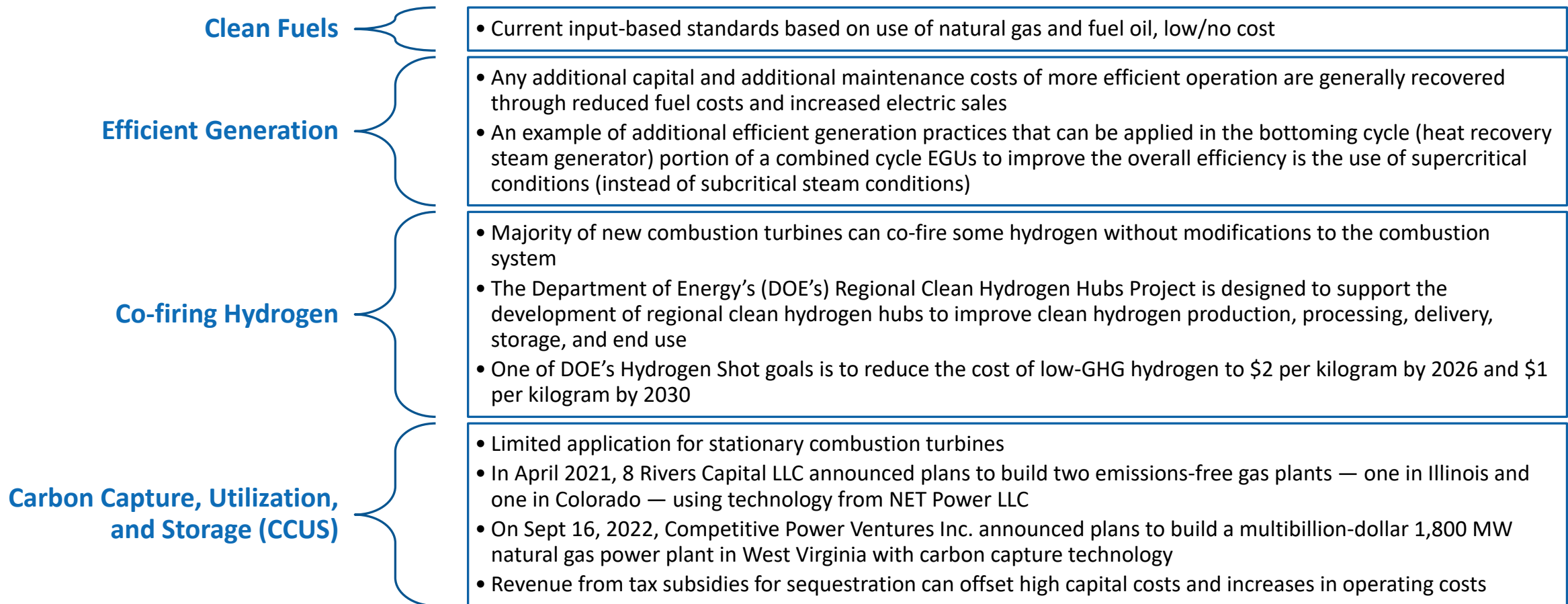
Applicability

- Natural gas-fired base load combustion turbine
 - Combusts more than 90% natural gas, and
 - Supplies more than the site-specific electric sales threshold to the electric grid
 - Electric sales threshold is determined based on the design efficiency of the EGU
- Non-base load and non-natural gas-fired combustion turbines
 - Combustion turbines not meeting the natural gas-fired base load applicability criteria

Current Requirements

- New and Reconstructed
 - Natural gas-fired base load emissions standard (applies to all sizes): 1,000 pounds carbon dioxide per megawatt-hour on a gross-output basis
 - Non-base load: clean fuels input-based standard
- Modified
 - Did not set a standard

Combustion Turbines Potential GHG Mitigation Strategies



Questions for Consideration: GHG NSPS

- Spring 2022: EPA released a draft white paper on GHG control technologies for combustion turbines, including efficient combustion; carbon capture, utilization, and storage; and hydrogen
 - What are your thoughts regarding how EPA should consider those technologies as we consider developing the proposed NSPS under CAA section 111(b)?
 - What other factors should be considered as we develop the CAA section 111(b) proposal?

GHG EGs under CAA 111(d)

EXISTING SOURCES

CAA Section 111(d)

- For source categories that **cause or contribute significantly** to air pollution, which may reasonably be anticipated to **endanger public health or welfare**, CAA section 111 requires EPA to:
 - Establish standards of performance for new sources and
 - For certain pollutants, issue regulations under which states establish standards of performance for existing sources
- In response to EPA's emission guidelines, states are required to craft plans that establish **standards of performance for existing sources** and submit those plans to EPA
- When issuing regulations for existing sources, the Clean Air Act allows states to consider the **remaining useful life of those sources, and other factors**, in applying standards of performance in their state plans

Regulatory History – GHG EGs

2015 – Finalized emission guidelines for existing power plants (Clean Power Plan or CPP)

- 40 CFR part 60, subpart UUUU
- Provided framework for states to use in developing plans to limit CO₂ emissions from fossil fuel-fired power plants
- Never took effect due to a U.S. Supreme Court stay

2019 – Repealed CPP and finalized Affordable Clean Energy (ACE) rule

- 40 CFR part 60, subpart UUUUa
- Set emission guidelines based on efficiency improvements at existing EGUs
- January 2021 – U.S. Court of Appeals for the D.C. Circuit vacated the ACE rule and repeal of CPP
- June 2022 – U.S. Supreme Court overturned D.C. Circuit's decision in *West Virginia v. EPA*

Questions for Consideration: GHG EGs

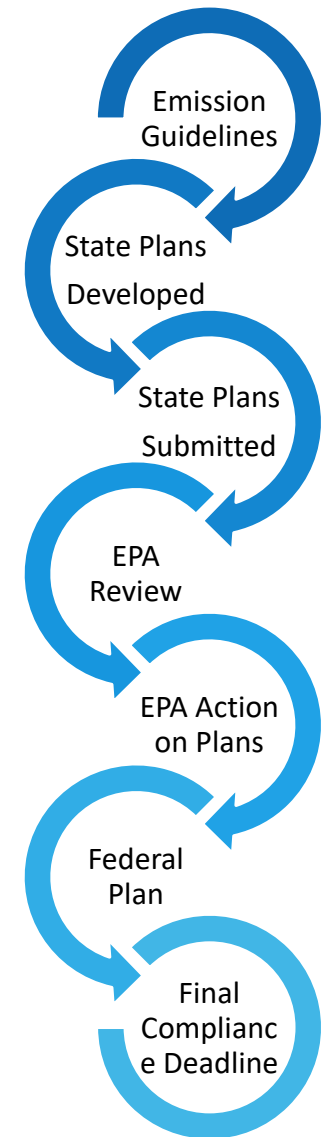
- ACE rule and CPP proposals identified options for systems of emission reduction that included:
 - Fuel-switching or co-firing
 - Carbon capture, utilization, and storage (CCUS)
 - Improvements in operating efficiency
- We welcome input on whether EPA should consider these systems in developing proposed emission guidelines under CAA section 111(d)
 - What are your views on the feasibility, cost, air pollution impacts, energy impacts, or other advantages and disadvantages of these systems?
 - Are there particular types or subcategories of EGUs for which one or more of these systems would be particularly appropriate or inappropriate?
 - Are there particular conditions, criteria, or limitations that EPA should consider with respect to any of these systems to address climate, public health, or environmental justice considerations?
 - Are there other systems EPA should be considering as alternatives to or in conjunction with these systems?

Questions for Consideration: GHG EGs

- CAA section 111 standards are typically “rate-based” limits expressed in terms of a quantity of pollution per unit of product produced or per unit of energy consumed
- Examples of rate-based limits: Pound per kilowatt hour (lb/kWh) or pound per million British thermal units (lb/mmBtu)
 - What options should EPA be considering in expressing proposed limits on carbon dioxide (CO₂) from existing power plants?

Cooperative Federalism

- Establishing standards of performance for sources under 111(d) involves actions by both EPA and the states
 - EPA promulgates emission guidelines which include the BSER, the degree of emission limitation achievable through application of BSER and, often, presumptive standards of performance
 - States use this information to set standards of performance for each designated facility (*i.e.*, existing fossil fuel-fired EGUs in this context) and may consider source-specific factors in establishing standards; states submit this and other required information to EPA as a part of a state plan
 - EPA approves state plans that are satisfactory, at which point the standards of performance become federally enforceable
 - If EPA determines a state plan is not satisfactory, the Agency is required to promulgate a federal plan for the state
 - What are tools and components of an emission guideline that EPA can provide to best support a state's role? Are there any specifics for an emission guideline for the power sector?



Questions for Consideration: GHG EGs

- CAA section 111(d) gives states responsibility for designing state plans that establish, implement, and enforce standards of performance for CO₂ from existing power plants
 - What flexibilities should EPA offer to states and utilities regarding designing such plans?
 - How much time should an emission guideline provide for states to develop and submit plans to EPA?
 - Can EPA allow states to design alternative forms of emission limitations (*e.g.*, state-wide emissions budgets) and what limitations, conditions, or criteria should EPA establish to ensure such plans are satisfactory?
 - CAA section 111(d) provides that states must be allowed to consider “remaining useful life and other factors” in developing state plans. What requirements or guidance should EPA provide with respect to how such factors can be considered in the context of CO₂ from existing power plants?

Cost Information

- Regulations under 111(d) take considerable time, effort, and resources from all parties involved
 - What are the expected level of resources and cost incurred by states in the development of state plans for 111(d)?
 - What are the expected level of resources and cost incurred by states in the implementation of state plans for 111(d)?

Questions for Consideration: GHG EGs

- Because states and the federal government have a shared responsibility in the regulations under 111(d), there is also a shared responsibility to understand the local and broader environmental justice (EJ) impacts of these regulations
 - How much engagement and consideration do states initiate on EJ impacts for 111(d) state plans? What is the level of resources and costs for this?
 - What requirements, guidance, or tools and resources can EPA provide to ensure state plans improve air quality and reduce emissions in communities with environmental justice concerns?

Next Steps

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- EPA has opened a **non-regulatory docket** to gather perspectives from a broad group of stakeholders in advance of our proposed rulemaking(s) to reduce GHG emissions from new and existing fossil fuel-fired EGUs
- Submit comments to Docket ID No. **EPA-HQ-OAR-2022-0723** at www.regulations.gov
- EPA Office of Air and Radiation
Email: PowerSectorGHG@epa.gov
- EPA anticipates issuing proposed GHG rules for public comment in Spring 2023
- EPA is seeking input from other key stakeholders and entities
 - Potential Small Business Advocacy Review Panel
 - Tribal government officials
 - Environmental justice-related organizations
 - Public health organizations
 - Nongovernmental organizations
 - Power generators
 - Labor
 - Federal partners
 - Others