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EPA's Affordable Clean Energy Rule: In Brief

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SUMMARY

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EPA's Affordable Clean Energy Rule: In Brief

In 2019, the U.S. Environmental Protection Agency (EPA) completed its reconsideration of a Clean Air Act (CAA) rulemaking for greenhouse gas (GHG) emissions from existing fossil-fuel-fired power plants. Specifically, the agency repealed the Clean Power Plan (CPP) and promulgated new guidelines for coal-fired power plants in the Affordable Clean Energy (ACE) rule. EPA based these actions on its conclusion that the CPP exceeded CAA authority by using measures that applied to the power sector as a whole rather than measures implemented at an individual facility.

EPA promulgated the CPP in 2015 to limit GHG emissions—specifically, carbon dioxide (CO_2)—from existing fossil-fuel-fired power plants. The CPP was the subject of ongoing litigation and never went into effect. In 2017, EPA reviewed the CPP in response to Executive Order (E.O.) 13783, which directed federal agencies to "review existing regulations and policies that potentially burden the development or use of domestically produced energy resources." EPA's review concluded that the CPP exceeded EPA's statutory authority. The agency therefore proposed repeal of the CPP in 2017 and a rule to replace it in 2018.

EPA finalized new emissions guidelines for existing coal-fired electric generating units (EGUs), more commonly referred to as power plants, in the 2019 ACE rule. Specifically, the final ACE rule establishes emission guidelines for states to use when they develop and submit plans to EPA that establish standards to reduce CO_2 emissions from existing coal-fired units. States are to also provide for the implementation and enforcement of the performance standards in the state plans. The ACE rule defines the best system of emission reduction (BSER) for existing, coal-fired power plant CO_2 emissions as "heat rate improvement" measures, also known as efficiency improvements. EPA stated that it lacked adequate information to establish a BSER for other types of existing fossil-fuel-fired units, particularly natural-gas-fired units.

The ACE rule does not establish a binding, numeric performance standard for CO_2 emissions from existing coal-fired units. Rather, EPA identified six candidate technologies, along with operating and maintenance practices that states must evaluate in establishing a standard of performance for each source in their state plans under CAA Section 111(d). EPA reported the level of emissions reductions achievable using the candidate technologies. States, however, have the option to establish performance standards reflecting a heat rate improvement that falls outside these ranges.

EPA's power sector modeling projected "modest" CO_2 reductions (less than 1%) under the final ACE rule compared to a baseline, which excludes the CPP. EPA also projected modest changes in SO_2, NO_x, and hazardous air pollutants, including mercury, under the ACE rule. While these non-CO_2 pollutants have implications for air quality and public health, they are not directly targeted by the ACE rule.

Some have raised concerns that the ACE rule would contribute to a rebound effect. That is, coal-fired power plant efficiency gains achieved from heat rate improvements (HRI) may lead to increased electricity generation from these units, thereby increasing absolute emissions and, to some extent, offsetting the emission reductions from the HRI. According to EPA, its modeling analysis does not support the view of some stakeholders that nationwide CO_2 emissions would increase under ACE due to increased operation of some power plants. Although EPA projected that CO_2 emissions would increase in 15 states (and the District of Columbia) in 2030 compared to a reference case, EPA concluded that the projected nationwide decrease in CO_2 emissions would outweigh "any potential CO_2 increases related to increased generation by certain units."

The CPP and the ACE rule present different legal interpretations of EPA's authority under the CAA. EPA's 2017 review concluded that the CPP exceeded EPA's statutory authority by using measures that applied to the power sector as a whole rather than measures carried out within an individual facility. The final ACE rule applies a narrower interpretation than the CPP of the BSER, defining it as on-site HRIs for existing coal-fired units. These interpretations arguably could raise broader questions about Clean Air Act regulation of GHG emissions. The ACE rulemaking may also raise questions about state and federal roles under the Clean Air Act. Various stakeholders are challenging the repeal of the CPP and the ACE rule in court.

A detailed examination of these issues is beyond the scope of this report. For more information about these topics and associated litigation, see CRS Report R46482, *EPA's Affordable Clean Energy Rule and Related Issues: Frequently Asked Questions*.

Contents

Introduction 1
Electricity Sector GHG Emissions 2
Clean Air Act 3
The Clean Power Plan 3
Repeal of the Clean Power Plan 4
Affordable Clean Energy Rule 5
No BSER Determined for Other Fossil-Fuel-Fired EGUs 5
States to Establish Rate-Based CO_2 Performance Standards 6
EPA Projects "Modest" Emission Reductions under ACE 7
Heat Rate Improvement and Potential Rebound Considerations 8
ACE Does Not Address New Power Plants 9
ACE Does Not Reconsider the Endangerment Finding 10
Issues for Congressional Consideration 10
CAA Regulation of GHG Emissions 11
Federal and State Roles to Implement the ACE Rule 12

Contacts

Author Information 13

Introduction

In 2019, the U.S. Environmental Protection Agency (EPA) finalized its repeal of the Clean Power Plan (CPP) rulemaking and promulgated new Clean Air Act Section 111(d) emissions guidelines for carbon dioxide (CO_2) emissions from existing coal-fired electric utility generating units (EGUs), more commonly referred to as power plants,[1] in the Affordable Clean Energy (ACE) rule.[2] EPA also finalized new general regulations to implement the ACE rule and any future emission guidelines issued under CAA Section 111.[3]

EPA promulgated the CPP in 2015 to limit greenhouse gas (GHG) emissions—specifically, carbon dioxide (CO_2)[4]—resulting from the combustion of fossil fuels at existing fossil-fuel-fired EGUs. The CPP was the subject of ongoing litigation and was never implemented due to a stay from the Supreme Court.[5]

In 2017, EPA reviewed the CPP under Executive Order (E.O.) 13783, which directed federal agencies to "review existing regulations and policies that potentially burden the development or use of domestically produced energy resources."[6] EPA's review concluded that the CPP exceeded EPA's statutory authority by using measures that applied to the power sector as a whole rather than measures carried out within an individual facility. The agency therefore proposed repeal of the CPP in 2017 and proposed the ACE rule to replace the CPP in 2018.[7]

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[1] The term *power plant* is a general term referring to a facility that has at least one electric utility generating unit to generate electricity. A power plant may have more than one generating unit, and some generating units are capable of using more than one type of fuel. This report uses the terms *power plant* and *electric utility generating unit* (EGU) interchangeably.

[2] EPA, "Repeal of the Clean Power Plan; Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units; Revisions to Emission Guidelines Implementing Regulations," 84 *Federal Register* 32534, July 8, 2019 (hereinafter "ACE Final Rule").

[3] The general implementing regulations establish procedures for state plans submitted under CAA Section 111. The general implementing regulations for CAA Section 111 are different from existing source-specific regulations that EPA has promulgated under CAA Section 111(d), such as the ACE rule. EPA refers to the ACE rule and other existing source-specific regulations promulgated under CAA Section 111(d) as "emission guidelines."

[4] Under the CAA, the pollutants regulated in the CPP and the ACE rule are GHGs with standards expressed in the form of CO_2 limits. See 40 C.F.R. §60.5705a (for the ACE rule); 40 C.F.R. §60.5705(a) (for the repealed CPP).

[5] The Supreme Court in 2016 stayed the implementation of the CPP pending resolution of the lawsuit challenging its legality. Order in Pending Case, West Virginia v. EPA (S. Ct. No. 15A773, Feb. 9, 2016), https://www.supremecourt.gov/orders/courtorders/020916zr_21p3.pdf. The Court dismissed the litigation challenging the CPP as moot after EPA finalized its repeal of the CPP and the ACE rule. Order, West Virginia v. EPA, No. 15-1363 (D.C. Cir. Sept. 17, 2019).

[6] Executive Order 13783, 82 *Federal Register* 16093 §7 (March 31, 2017). For more information on this executive order, see CRS Legal Sidebar WSLG1789, *New Executive Order Directs Agencies to Revise or Rescind Climate Change Rules and Policies*, by Linda Tsang.

[7] EPA proposed three actions in the ACE rule: (1) replace the CPP with new emission guidelines for existing coal-fired EGUs; (2) revised regulations to implement emission guidelines under CAA Section 111(d); and (3) modify an applicability determination for New Source Review (NSR), a CAA preconstruction permitting program for new and modified stationary sources. EPA, "Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units; Revisions to Emission Guideline Implementing Regulations; Revisions to New Source Review Program," 83 *Federal Register* 44761, August 31, 2018 (hereinafter "ACE Proposal"). As of October 2020, EPA has not finalized the proposed revision to the applicability test under NSR for certain power plants. EPA projected that it would finalize this proposal in December 2020. The Office of Management and Budget (OMB), Semiannual Regulatory Agenda, EPA, RIN 2060-AU58, Spring 2020.

Debate surrounding CO_2 performance standards and EPA's interpretation of its CAA authority continues with the repeal of the CPP and issuance of the ACE rule. Stakeholders have expressed divergent views regarding EPA's interpretation of its CAA authority and its "best system of emission reduction" (BSER) determination under Section 111(d). Twenty-three states, the District of Columbia, seven municipalities, and various stakeholders are challenging the CPP repeal and ACE rule in the U.S. Court of Appeals in the District of Columbia Circuit.[8] Various stakeholders and twenty-one states have intervened in the litigation in support of the CPP repeal and ACE rule.[9]

This report is an abridged version of CRS Report R46482, *EPA's Affordable Clean Energy Rule and Related Issues: Frequently Asked Questions*, and it provides a brief analysis of the CPP repeal and ACE rule. It begins with background on electricity sector GHG emissions and the Clean Air Act; discusses the legal basis for the repeal of the CPP; the structure of the ACE rule and related issues; and concludes with issues for congressional consideration. This report does not discuss EPA's 2018 proposal to modify the applicability determination under New Source Review (NSR)[10] nor does it discuss the new general regulations to implement the ACE rule and any future emission guidelines issued under CAA Section 111(d).[11] For more information about these topics as well as the CPP repeal, the ACE rule, and associated litigation, see CRS Report R46482, *EPA's Affordable Clean Energy Rule and Related Issues: Frequently Asked Questions*.

Electricity Sector GHG Emissions

Since 1990, GHG emissions from fossil fuel combustion—coal, natural gas, and petroleum—have accounted for 74%-78% of total U.S. GHG emissions, according to EPA.[12] The electricity sector historically accounted for the largest percentage of U.S. GHG emissions from fossil fuel combustion, but was surpassed by the transportation sector in 2016, as CO_2 emissions from fossil fuel combustion in the electricity sector declined by 25% between 2008 and 2018.[13]

Multiple factors have played a role in this decline. One key factor is the U.S. electricity generation portfolio of fuels and energy sources, the contributions of which have changed in recent years. The changes have altered emission levels in the electricity sector, since some fuels and sources—nuclear, hydropower, and some renewables—directly produce no CO_2 emissions with their electricity generation. For fossil fuels, on the other hand, the amount of CO_2 emitted during fossil-fuel-fired electricity generation is dependent upon the carbon content of the fuel and the efficiency of the generating unit in which it is combusted, among other variables. For example, natural-gas-fired electricity from a combined cycle unit typically yields approximately 43% of the CO_2 emissions of coal-fired electricity from a steam unit per kilowatt-hour of electricity.[14]

[8] See Docket, Am. Lung Assoc. v. EPA, No. 19-1140 (D.C. Cir.).

[9] See Docket, Am. Lung Assoc. v. EPA, No. 19-1140 (D.C. Cir.).

[10] ACE Proposal.

[11] ACE Final Rule.

[12] EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2018*, April 2020, https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2018.

[13] In 2018, the transportation sector accounted for 28% and the electricity sector accounted for 27% of total U.S. GHG emissions. EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2018*, April 2020, Table 2-10.

[14] For more information, see CRS Report R45453, *U.S. Carbon Dioxide Emissions in the Electricity Sector: Factors, Trends, and Projections*, by Jonathan L. Ramseur.

Several factors likely played a role in recent changes to the electricity generation portfolio, including technological advances in energy production (e.g., hydraulic fracturing), federal tax policies, and states' renewable portfolio standards. These factors have influenced the deployment of these technologies and resources and affected the relative price differences between energy sources, particularly coal, natural gas, and renewable sources.

Clean Air Act

Since the 1970s, EPA has promulgated rulemakings under CAA Section 111 and other authorities of the CAA to limit non-GHG emissions, such as sulfur dioxide (SO_2), nitrogen oxides (NO_x), and mercury, from fossil-fuel-fired power plants. In the past decade, EPA has used CAA Section 111 authority to address GHG emissions from these sources. CAA Section 111 requires EPA to establish nationally uniform, technology-based standards for categories of industrial facilities, also referred to as stationary sources of air pollution.[15] These standards were intended to help prevent new pollution problems and to "level the playing field for states competing for industrial growth," for example, by removing incentives for states or communities to weaken air pollution standards in order to attract industry.[16]

CAA Section 111(b) directs EPA to establish maximum emission levels (called New Source Performance Standards, or NSPS) for new and modified major stationary sources—power plants, steel mills, and smelters, for example. To set the emission levels, EPA determines the BSER that has been "adequately demonstrated," taking costs and any non-air-quality health and environmental impacts and energy requirements impacts into account.[17]

Section 111 also addresses existing stationary sources of pollution. Section 111(d) requires EPA to promulgate regulations, which EPA has historically referred to as "emission guidelines."[18] States must establish performance standards reflecting the BSER for existing sources,[19] which are determined by EPA. States, in their plans, provide for implementation and enforcement of the standards.[20]

The Clean Power Plan

EPA promulgated the CPP in 2015 to limit CO_2 emissions from existing fossil-fuel-fired power plants.[21] EPA set national performance standards for CO_2 emissions from existing fossil-fuel-fired

[15] 42 U.S.C. §7411(b).

[16] Robert J. Martineau Jr. and Michael K. Stagg, "New Source Performance Standards," in *The Clean Air Act Handbook*, ed. Julie R. Domike and Alec C. Zacaroli, 4th ed. (Chicago: American Bar Association, 2016).

[17] 42 U.S.C. §7411(a)(1).

[18] For emission guidelines promulgated prior to ACE, EPA defines *emission guideline* at Title 40, Section 60.21(e), of the *Code of Federal Regulations*. For ACE and any future emission guidelines, EPA defines *emission guideline* at Title 40, Section 60.21a(e).

[19] EPA refers to existing sources as "designated facilities." 42 U.S.C. §7411(d)(1). For EPA's definition of *designated facility* for emission guidelines promulgated prior to ACE, see 40 C.F.R. §60.21(b). For EPA's definition of *designated facility* for ACE and any future emission guidelines established after July 8, 2019, see 40 C.F.R. §60.21a(b).

[20] EPA cannot compel a state to submit a state plan pursuant to CAA Section 111(d). If a state does not submit a satisfactory plan by EPA's regulatory deadline, CAA Section 111(d) directs EPA to prescribe a plan for the state, often described as a federal plan (42 U.S.C. §7411(d)(2)).

[21] The pollutants regulated in the CPP and the ACE rule are GHGs with standards expressed in the form of CO_2 limits. 40 C.F.R. §60.5705a (for the ACE rule); 40 C.F.R. §60.5705(a) (for the repealed CPP). EPA, "Carbon Pollution Emission Guidelines for Existing Stationary Sources: Final Rule," 80 *Federal Register* 64661, October 23, 2015

power plants under the authority of CAA Section 111(d). One national performance standard would have applied to existing electric steam generating units (which are mostly coal), and the other applied to existing stationary combustion turbines—for example, natural gas combined cycle (NGCC) units. EPA based these standards on the BSER. EPA determined the BSER for the CPP based on a collection of measures that it referred to as three "building blocks": (1) improving the heat rate at coal-fired units, (2) shifting generation from coal-fired units to lower-emitting natural gas units, and (3) shifting generation from fossil fuel units to renewable energy generation. The CPP also set individual state targets for average emissions from existing power plants based on the CO_2 performance standards. Although EPA set state-specific targets, states were to determine how to reach these goals.

As previously noted, the CPP was the subject of ongoing litigation and was never implemented.[22]

Repeal of the Clean Power Plan

EPA repealed the CPP in 2019.[23] EPA based the CPP repeal on a change in its legal interpretation of its authority under CAA Section 111 from its interpretation in the CPP. EPA concluded that the CPP exceeded CAA statutory authority in setting the BSER as a combination of *on- and off-site* emission reduction measures that applied to the entire existing source category.[24] Because the CPP BSER was based, in part, on "beyond-the-source" measures (i.e., measures that apply to the source category as a whole or to entities entirely outside the regulated source category), EPA, after reconsidering the relevant statutory text, structure, and purpose of CAA Section 111, asserts that the CPP "significantly exceeded" its authority.[25] Based on this revised interpretation, EPA repealed the CPP and limited the BSER in the ACE rule to emission reduction measures that owners and operators can apply directly on site at individual existing EGUs.

EPA's interpretation of its CAA Section 111 authority in the CPP repeal and in the ACE rule was narrower than its previous interpretation in the CPP. CAA Section 111(a) requires standards of performance to reflect the emissions reductions achievable through "application" of the BSER. In the CPP, EPA reasoned that the "system" in the BSER reflected the "overall source category," taking into account the "unique characteristics of CO_2 pollution and the unique, interconnected and interdependent manner in which affected EGUs and other generating sources operate within the electricity sector."[26]

In the CPP repeal, EPA presented a different view of its authority to determine the BSER under Section 111. EPA asserted that the "application" of the BSER referenced in CAA Section 111(a) "unambiguously limits the BSER to those systems" that can be "applied" or "put into operation at

(hereinafter CPP Final Rule).

[22] The Supreme Court in 2016 stayed (paused) the implementation of the CPP pending resolution of the lawsuit challenging its legality. Order in Pending Case, West Virginia v. EPA (S. Ct. No. 15A773, Feb. 9, 2016), https://www.supremecourt.gov/orders/courtorders/020916zr_21p3.pdf. After EPA finalized its repeal of the CPP and the ACE rule, the Court dismissed the litigation challenging the CPP as moot, effectively ending the stay. [22] See Order, West Virginia v. EPA, No. 15-1363 (D.C. Cir. Sept. 17, 2019).

[23] The CPP repeal is one of three separate and distinct final rulemakings published in the same Federal Register notice. The CPP repeal is published at pp. 32522-32532 in EPA, "Repeal of the Clean Power Plan; Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units; Revisions to Emission Guidelines Implementing Regulations," 84 *Federal Register* 32520, July 8, 2019. Hereinafter, "CPP Repeal" refers to pp. 32522-32532 of this Federal Register notice.

[24] CPP Repeal.

[25] CPP Repeal, p. 32523.

[26] CPP Final Rule, p. 64726.

a building, structure, facility, or installation."[27] EPA stated that the CPP "beyond-the-source" approach "ignored or misinterpreted" the plain text of the CAA that "clearly precluded the unsupportable reading" of Section 111 used in the CPP to choose emission reduction measures that are not directly applied to the regulated EGU.[28]

For more discussion about the legal basis for the CPP Repeal and litigation related to the repeal and the ACE rule, see CRS Legal Sidebar LSB10325, *EPA Replaces the Clean Power Plan with the Affordable Clean Energy Rule* and CRS Report R46482, *EPA's Affordable Clean Energy Rule and Related Issues: Frequently Asked Questions*.

Affordable Clean Energy Rule

EPA finalized new emissions guidelines for existing coal-fired EGUs in the 2019 ACE rule.[29] Specifically, the final ACE rule establishes emission guidelines for states to use when they develop and submit a state plan to EPA that establish standards to reduce CO_2 emissions[30] from existing coal-fired units. States will also provide for the implementation and enforcement of the performance standards in the state plans.[31] State plans are due to EPA by July 8, 2022.[32]

The ACE rule defines BSER for existing, coal-fired power plant CO_2 emissions as "heat rate improvement" measures, also known as efficiency improvements.[33] The ACE rule does not establish a binding, numeric performance standard for CO_2 emissions from existing coal-fired units. Rather, EPA identified six candidate technologies along with operating and maintenance practices that states must evaluate in establishing a standard of performance for each source in their state plans under CAA Section 111(d).

No BSER Determined for Other Fossil-Fuel-Fired EGUs

EPA did not establish the BSER for integrated gasification combined cycle (IGCC) units, oil- or natural-gas-fired utility boilers, or stationary combustion turbines.[34] (Natural-gas-fired power plants, such as natural gas combined cycle units, are also referred to as stationary combustion

[27] CPP Repeal, p. 32524.

[28] CPP Repeal, p. 32527.

[29] EPA, "Repeal of the Clean Power Plan; Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units; Revisions to Emission Guidelines Implementing Regulations," 84 *Federal Register* 32534, July 8, 2019 (hereinafter "ACE Final Rule").

[30] In the ACE rule, EPA states that the "air pollutant regulated in this final action is GHGs. However, the standards in this rule are expressed in the form of limits solely on emissions of CO_2, and not the other constituent gases of the air pollutant GHGs." CPP Repeal, p. 32534. See 40 C.F.R. §60.5705a.

[31] A "state plan" provides for the implementation and enforcement of CAA Section 111(d) performance standards. State plans are different than a "state implementation plan," which is developed under CAA Section 110 and sets forth procedures for compliance with federal air quality standards for the criteria pollutants. See also CRS Report R46482, *EPA's Affordable Clean Energy Rule and Related Issues: Frequently Asked Questions*, coordinated by Kate C. Shouse.

[32] 40 C.F.R. §§60.5710a, 60.5800a. EPA is to promulgate a federal plan if (1) the state fails to submit a plan, (2) EPA determines that the state plan is incomplete, or (3) EPA disapproves the state plan. 40 C.F.R. §60.27a(c). See also ACE Final Rule, p. 32568.

[33] EPA identified other "systems of GHG emission reduction"—such as natural gas co-firing, use of biomass, and carbon capture and storage—that the agency concluded did not meet the criteria for the BSER. ACE Final Rule, pp. 32543-32549. EPA clarified that states can use natural gas co-firing as a compliance measure, however. See ACE Final Rule, p. 32555.

[34] ACE Final Rule, p. 32533. See also 40 C.F.R. §60.5780a.

turbines.[35]) EPA determined that it lacks "adequate information" to establish a BSER for these types of existing fossil-fuel-fired units.[36] EPA reported that it "is still evaluating the data for EGUs not covered by the ACE rule," noting that "only a handful" of IGCC units are in operation.[37] EPA stated that it "may issue emission guidelines" for stationary combustion turbines at a later date.[38] Comment letters revealed support for and opposition to EPA's decision not to identify a BSER for stationary combustion turbines in the ACE rule.[39]

States to Establish Rate-Based CO_2 Performance Standards

The final ACE rule does not establish a binding, numeric performance standard for CO_2 emissions from existing coal-fired units. Rather, states are to establish a rate-based standard for each covered unit in their state plan.

States are to consider a list of candidate technologies when they establish the unit-specific CO_2 performance standards. EPA established the candidate technologies list, which comprises six heat rate improvement (HRI) measures and improved operation and maintenance practices.[40]

According to EPA, the estimated potential HRI for the six candidate technologies at existing coal-fired EGUs ranges from 0.1% to 2.9%[41] States have the option to establish performance standards reflecting an HRI "that falls outside of these ranges."[42] In addition, states may consider technologies not on the list provided that they meet EPA's compliance criteria.[43] EPA determined that certain measures, such as biomass co-firing which EPA concluded did not meet compliance measure criteria, cannot be used for compliance with state plans.[44]

EPA discussed several reasons why it did not establish a numeric CO_2 performance standard or specify a standard that, while not required, would meet the requirements for EPA approval (i.e., "presumptively approvable").[45] First, EPA asserted that "CAA Section 111(d)(1) squarely places

[35] Stationary combustion turbines that are used to generate electricity are generally fueled by natural gas. The ACE final rule defines *simple cycle* and *combined cycle units* as stationary combustion turbines. It defines *stationary combustion turbine* as the equipment "that provides electricity or useful thermal output to the combustion turbine engine, heat recovery system or auxiliary equipment." For the complete definitions, including the types of equipment specified, see 40 C.F.R. §60.5805a.

[36] ACE Final Rule, p. 32533. Commenters expressed varying opinions regarding EPA's conclusion that it lacks "adequate information" to determine the BSER for existing stationary combustion turbines. See CRS Report R46482, *EPA's Affordable Clean Energy Rule and Related Issues: Frequently Asked Questions*, coordinated by Kate C. Shouse.

[37] ACE RTC, see chap. 2, p. 12.

[38] ACE RTC, see chap. 2, p. 27.

[39] For more discussion, see CRS Report R46482, *EPA's Affordable Clean Energy Rule and Related Issues: Frequently Asked Questions*, coordinated by Kate C. Shouse.

[40] The candidate technologies and practices are as follows: Neural Network/Intelligent Sootblowers, Boiler Feed Pumps, Air Heater and Duct Leakage Control, Variable Frequency Drives, Blade Path Upgrade (Steam Turbine), Redesign/Replace Economizer, Improved Operations and Management Practices. ACE Final Rule, p. 32536.

[41] Range reflects improvement estimated for application of a single candidate technology, not the candidate technologies collectively. ACE Final Rule, p. 32537.

[42] ACE Final Rule, p. 32538.

[43] States may rely on measures that are not on the candidate technologies list to establish performance standards in their state plans provided that the measures meet EPA's criteria. ACE Final Rule, p. 32555.

[44] EPA concluded that biomass co-firing did not meet compliance measure criteria because "biomass firing in and of itself does not reduce emissions of CO_2 emitted from that source. Specifically, when measuring stack emissions, biomass emits more CO_2 per Btu than fossil fuels, thereby increasing the CO_2 emission rate at the source." See ACE Final Rule, pp. 32547, 32557-32558.

[45] According to EPA, "numerous" state and industry commenters requested a presumptive standard or additional clarity

the responsibility of establishing a standard of performance for an existing designated facility on the state as part of developing a state plan."[46] Second, EPA determined that it could not establish national performance standards due to variation among existing coal-fired units.[47] Factors that may affect HRI potential for a particular unit include, but are not limited to, the EGU's "past and projected utilization rate, maintenance history, and remaining useful life."[48] Third, EPA concluded that states are best positioned to account for site-specific considerations that influence HRI potential.[49]

Stakeholders expressed varying opinion on the "unit-specific, state-led" approach for establishing performance standards, ranging from agreement to disagreement.[50] Stakeholders that favored the unit-specific, state-led approach commented that it is not possible to establish uniform, nationally applicable performance standards "because each individual unit is subject to a unique combination of factors that can affect the unit's heat rate and HRI potential, many of which are geographically driven and outside the control of a source."[51] Stakeholders that disagreed viewed the approach as inconsistent with the CAA legislative history as well as past practice to determine BSER based on a specific emission reduction technology. These commenters concluded that the unit-specific, state-led approach would not result in significant emission reductions.[52] In addition, some commenters maintained that EPA has a statutory responsibility to establish the level of stringency for the performance standards.[53]

EPA Projects "Modest" Emission Reductions under ACE

EPA's power sector modeling projected "modest" CO_2 reductions (less than 1% by 2030) under the final ACE rule compared to a baseline, which excludes the CPP. EPA also projected modest changes in SO_2, NO_x, and hazardous air pollutants, including mercury, under the ACE rule.[54] While these non-CO_2 pollutants have implications for air quality and public health,[55] they are not directly targeted by the ACE rule. For more information about EPA's analysis of projected emissions and the associated benefits and costs, including stakeholder views regarding the way that EPA estimated the climate and human health co-benefits, see CRS Report R46482, *EPA's Affordable Clean Energy Rule and Related Issues: Frequently Asked Questions*.

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about the CO_2 performance standards. ACE Final Rule, p. 32537.

[46] ACE Final Rule, p. 32550.

[47] ACE Final Rule, p. 32536.

[48] ACE Final Rule, p. 32536.

[49] ACE Final Rule, pp. 32535-32536.

[50] For additional discussion, see CRS Report R46482, *EPA's Affordable Clean Energy Rule and Related Issues: Frequently Asked Questions*, coordinated by Kate C. Shouse.

[51] ACE Final Rule, pp. 32535-32536.

[52] ACE Final Rule, p. 32536.

[53] According to EPA, these commenters stated that "EPA is legally obligated to identify 'the degree of emission limitation achievable through the application of the [BSER]' (i.e., a level of stringency) because such degree of emission limitation is inextricably linked with the determination of the BSER, which is the EPA's statutory role and responsibility." ACE Final Rule, p. 32537.

[54] EPA's ACE rule scenario generally projected non-CO_2 emission changes less than 1% from the baseline at the national level.

[55] For example, SO_2 and NO_x are criteria pollutants regulated under the CAA that directly affect air quality. SO_2 and NO_x are also "precursor emissions" that contribute to the formation of particulate matter and ozone, which are likewise regulated under the CAA.

Heat Rate Improvement and Potential Rebound Considerations

EPA determined that HRI is the BSER to reduce CO_2 emissions from existing coal-fired EGUs.[56] The "heat rate" measures the amount of energy that a power plant uses to generate one kilowatt-hour of electricity.[57] HRI is affected by a number of factors, such as the age and type of EGU, and may therefore vary across power plants.[58] A power plant with a lower, more efficient heat rate uses less fuel to generate the same amount of electricity as a power plant with a higher heat rate. Using less fuel per kilowatt-hour may result in lower emissions of CO_2 per hour of operation as well as lower levels of SO_2 and NO_x.[59]

HRI is affected by a number of factors, such as the fuel source and the age and type of EGU. For more information, see CRS Report R43343, *Increasing the Efficiency of Existing Coal-Fired Power Plants*.

HRI can lead to greater use of the more efficient fossil-fuel-fired power plants, which may contribute to a "rebound effect." That is, efficiency gains may lead to increased electricity generation by fossil-fuel-fired plants instead of relying on other electricity generation technologies, thereby increasing absolute emissions and, to some extent, offsetting the emission reductions from the HRI.

The extent to which a rebound effect, if any, would occur under the ACE rule depends on a variety of factors, such as the size of the efficiency gains achieved at coal plants and the market forces that influence the sector-wide mix of fuel sources used to generate electricity. EPA considered the potential for rebound in its modeling and analysis of the final ACE rule. The agency concluded that a projected decrease in power sector CO_2 emissions nationwide under the ACE rule would outweigh "any potential CO_2 increases related to increased generation by certain units."[60] Some stakeholders agreed with EPA's conclusion, noting, among other things, that "any rebound effect from more efficient units is most likely to come at [the] expense of lower-efficiency coal units, negating the effect."[61] Other stakeholders disagreed with EPA's conclusion, commenting that EPA's assumptions did not "reflect real world considerations" and that EPA "understated the amount of coal capacity that will likely retire in its analysis, and, thus, the remaining coal fleet will consist of more efficient and competitive units that may end up emitting more than the EPA's analysis shows."[62]

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[56] ACE Final Rule, p. 32532.

[57] EIA, *Analysis of Heat Rate Improvement Potential at Coal-Fired Power Plants*, May 19, 2015, https://www.eia.gov/analysis/studies/powerplants/heatrate/.

[58] For more information, see CRS Report R43343, *Increasing the Efficiency of Existing Coal-Fired Power Plants*, by Richard J. Campbell.

[59] EIA, *Analysis of Heat Rate Improvement Potential at Coal-Fired Power Plants*.

[60] ACE Final Rule, p. 32543. CRS identified one study that used EPA's modeling framework to estimate emissions under the ACE final rule. The authors estimated emissions reductions using an "updated version of the CPP," which included revised assumptions regarding renewable energy use, national trading, energy efficiency improvements, and mechanisms to address emissions from new sources. The authors concluded that the "magnitude of state-level emissions rebound of the ACE rule, and the resulting local air quality and health impacts, are likely to be larger than the magnitude estimated in the final ACE RIA." See Kathy Fallon Lambert et al., *Carbon Standards Re-Examined: An Analysis of Potential Emissions Outcomes for the Affordable Clean Energy Rule and the Clean Power Plan*, July 17, 2019, https://cdn1.sph.harvard.edu/wp-content/uploads/sites/2343/2019/07/Carbon-Standards-Re-Examined_Final1.pdf.

[61] ACE Final Rule, p. 32542.

[62] ACE Final Rule, p. 32542.

Although EPA estimated that in 2030 nationwide power sector CO_2 emissions would decrease under the ACE rule, EPA estimated some state-level increases in emissions. EPA projected that CO_2 emissions would increase in 15 states (and the District of Columbia) in 2030 compared with the agency's reference case.[63] On a state-by-state basis, EPA's CO_2 emissions projections for 2030 ranged from a decrease of 11.0% (Tennessee) to an increase of 1.6% (Minnesota).[64] Similarly, EPA projected that under the ACE rule scenario, SO_2 and NO_x emissions would decrease nationally while increasing in some states.

ACE Does Not Address New Power Plants

The ACE rule does not repeal or otherwise change CO_2 performance standards for new and modified power plants,[65] sometimes referred to as the "111(b) standards." Once EPA lists a source category, such as fossil-fuel-fired EGUs, Section 111(b) requires EPA to establish NSPS for new and modified sources within a listed source category.[66] Once EPA promulgates NSPS under Section 111(b) for new or modified sources in that category, Section 111(d) then directs EPA to establish procedures for the states to submit plans establishing standards of performance for existing sources that would be subject to NSPS if they were new, unless they are subject to an exclusion under Section 111(d).[67]

The GHG performance standards for new and modified power plants remain in effect, though EPA proposed to revise them on December 6, 2018.[68] The December 2018 proposal is a separate rulemaking from the CPP repeal and ACE rulemakings.

The semiannual regulatory agenda estimated a final decision by December 2020.[69] As of October 2020, EPA has not yet finalized this proposal. According to EPA's status report in the paused litigation challenging the 2015 GHG performance standards for new and modified power plants, the agency continues to review the comments submitted on the proposed rule and plans to send the final rule package to the Office of Management and Budget (OMB) for interagency review in the early summer of 2020.[70]

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[63] EPA's modeling analysis compared CO_2 emissions under an ACE policy scenario to a reference scenarios in the year 2030. EPA's state-level emissions projections for 2030 ranged from a decrease of 11.0% (Tennessee) to an increase of 1.6% (Minnesota). For additional discussion, see CRS Report R46482, *EPA's Affordable Clean Energy Rule and Related Issues: Frequently Asked Questions*, coordinated by Kate C. Shouse.

[64] Ibid.

[65] EPA, "Standards of Performance for Greenhouse Gas Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units," Final Rule, 80 *Federal Register* 64509, October 23, 2015.

[66] 42 U.S.C. §7411(b)(1).

[67] 42 U.S.C. §7411(d)(1). For discussion of the legal issues related to exclusions under CAA Section 111(d), see CRS Report R46482, *EPA's Affordable Clean Energy Rule and Related Issues: Frequently Asked Questions*, coordinated by Kate C. Shouse and CRS Report R44480, *Clean Power Plan: Legal Background and Pending Litigation in West Virginia v. EPA*, by Linda Tsang.

[68] EPA, "Review of Standards of Performance for Greenhouse Gas Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units," 83 Federal Register 65424, December 20, 2018.

[69] Office of Management and Budget (OMB), Semiannual Regulatory Agenda, EPA, RIN 2060-AU58, Spring 2020, https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202004&RIN=2060-AU58.

[70] EPA Status Report, North Dakota v. EPA at 4, No. 15-1381 (D.C. Cir. Apr. 24, 2020). In 2017, the court ordered the petitions for review of the 2015 GHG performance standards for new and modified power plants to be held in abeyance (paused) pending further order of the court. *Id*. at 3-4.

ACE Does Not Reconsider the Endangerment Finding

In 2009, EPA issued two findings under CAA Section 202, referred to collectively as the "GHG endangerment finding." EPA found (1) that GHGs currently in the atmosphere potentially endanger public health and welfare and (2) that new motor vehicle emissions cause or contribute to that pollution.[71] EPA subsequently promulgated regulations under CAA authority to limit GHG emissions from motor vehicles, the power sector, the oil and gas industry, and other sources.

Neither the CPP repeal nor the promulgation of the ACE rule reconsiders EPA's 2009 GHG endangerment finding.[72] Without reconsidering the GHG endangerment finding, EPA appears to have a continuing obligation to limit GHG emissions under the CAA.[73] Separate from the CPP repeal and ACE rulemaking, EPA has proposed specific changes to other GHG regulations, including those for motor vehicles and for the oil and gas sector. For a brief overview of these proposed changes, see CRS Report R45451, *Clean Air Act Issues in the 116th Congress*.

Issues for Congressional Consideration

The CPP and the ACE rule present different legal interpretations of CAA Section 111 authority. EPA's 2017 review concluded that the CPP exceeded EPA's statutory authority by using measures that applied to the power sector as a whole rather than measures carried out within an individual facility. The final ACE rule applies a narrower interpretation than the CPP of the BSER, defining it as on-site HRIs for existing coal-fired units. These interpretations are being challenged in court and arguably raise broader questions about CAA regulation of GHG emissions. The ACE rulemaking may also raise questions about state and federal roles under the CAA.

[71] Specifically, EPA's first finding was that "elevated concentrations of greenhouse gases in the atmosphere may reasonably be anticipated to endanger the public health and to endanger the public welfare of current and future generations." See EPA, "Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act," Final Rule, 74 *Federal Register* 66496 and 66516, December 15, 2009. The Supreme Court upheld EPA's "endangerment finding" in *Util. Air Regulatory Group v. EPA*, 573 U.S. 302 (2014).

[72] In the lawsuits challenging the CPP and the ACE rule, petitioners claimed that EPA failed to make the required endangerment finding under CAA Section 111 and that EPA could not rely on the endangerment finding that it made in 2009 in the context of CAA Section 202 for motor vehicles. See, for example, Brief of Pac. Legal Found., Tex. Pub. Policy Found., Morning Star Packing Co., Merit Oil Co., Loggers Ass'n of N. Cal., and Norman Brown in Supp. of Pet'rs 20-24, West Virginia v. EPA, No. 15-1363 (D.C. Cir. Feb. 23, 2016) (challenging the CPP); Statement of Issues to be Raised by Petitioner Texas Public Policy Foundation, Am. Lung Ass'n. v. EPA, No. 19-1140 (D.C. Cir. Oct, 7, 2019) (challenging the ACE rule). In the ACE rule litigation, EPA argues that an endangerment finding is required only when EPA seeks to regulate new sources under Section 111(b) and that Section 111(d) does not require EPA to make a separate endangerment finding when regulating existing sources. Proof Brief for the U.S. EPA, and EPA Admin. Andrew Wheeler at 163-68, Am. Lung Ass'n. v. EPA, No. 19-1140 (June 16, 2020). Intervening states, municipalities, and public health and environmental organizations reiterate the agency's argument. Page-proof Brief for State and Municipal Respondent-Intervenors at 12-24, Am. Lung Ass'n. v. EPA, No. 19-1140 (July 16, 2020). For additional discussion, see CRS Report R46482, *EPA's Affordable Clean Energy Rule and Related Issues: Frequently Asked Questions*, coordinated by Kate C. Shouse.

[73] See Massachusetts v. EPA, 549 U.S. 497, 533 (2007) ("Under the clear terms of the Clean Air Act, EPA can avoid taking further action only if it determines that greenhouse gases do not contribute to climate change or if it provides some reasonable explanation as to why it cannot or will not exercise its discretion to determine whether they do.").

CAA Regulation of GHG Emissions

EPA and stakeholders continue to debate the scope of EPA's authority and its methods for regulating GHG emissions under the CAA. EPA's varying legal interpretations and regulatory approaches to regulating GHG emissions from existing power plants has raised novel issues that policymakers and the courts have not addressed previously. Because of the interconnected nature of the power sector, EPA's legal interpretation and regulatory approach in the CPP are distinct from previous Section 111(d) guidelines for other industries.[74]

Although the Supreme Court clarified EPA's authority to regulate GHGs under specific CAA programs in *Massachusetts v. EPA* and subsequent cases,[75] regulatory developments and judicial decisions raise questions concerning the breadth of EPA's authority under CAA Section 111 to consider various emission reduction measures for existing industrial sources of pollution.[76] Stakeholders critical of the ACE rule have argued that EPA has authority to expand the scope of the BSER to achieve greater emissions reductions by including other systems of emission reduction and other types of EGUs. Other stakeholders view EPA's authority under CAA Section 111 as limited to measures implemented directly at the designated facility regardless of GHG reduction policy goals. Stakeholders and EPA may continue to litigate and debate the scope of EPA's authority to regulate GHG emissions under CAA Section 111.

Many in Congress have taken an active interest in EPA's interpretation of its authority to determine the BSER under CAA Section 111 for power plants. Some Members of Congress filed amici curiae briefs in the litigation challenging the CPP repeal and ACE rule.[77] In 2016, several Members of Congress also filed amici curiae briefs on both sides of the CPP litigation.[78]

Progress toward more ambitious GHG targets supported by some Members[79] would likely require reductions throughout the economy, not just the power sector. The electricity sector has historically accounted for the largest percentage of anthropogenic U.S. CO_2 emissions, though transportation activities have more recently accounted for a slightly larger share. Congress may consider current and future GHG emissions targets and whether and how regulatory tools under

[74] In the ACE rule, EPA states that prior to the CPP, all previous Section 111(b) NSPS and Section 111(d) emission guidelines "applied technologies, techniques, processes, practices, or design modifications directly to individual sources." ACE Final Rule, p. 32526.

[75] Massachusetts v. EPA, 549 U.S. 497 (2007). See, e.g., Util. Air Regulatory Group v. EPA, 573 U.S. 302, 314-334 (2014); Am. Elec. Power Co. v. Connecticut, 564 U.S. 410 (2011).

[76] EPA has also considered GHG emissions from other sectors in separate rulemakings. In 2016, EPA promulgated emission standards for methane, a GHG, under Section 111(b) for the oil and gas sector without a cause and contribute finding. EPA subsequently proposed to rescind these limits on methane. For more information about Section 111 regulations applicable to the oil and gas sector, see CRS Report R42986, *Methane and Other Air Pollution Issues in Natural Gas Systems*, by Richard K. Lattanzio. EPA has also proposed and finalized a cause and contribute finding for GHG emissions from aircraft. For more information, see CRS Report R40506, *Cars, Trucks, Aircraft, and EPA Climate Regulations*, by James E. McCarthy and Richard K. Lattanzio.

[77] Brief for Members of Congress as *Amici Curiae* in Support of Petitioners at 2-4, Am. Lung Ass'n. v. EPA, No. 19-1140 (D.C. Cir. Apr. 24, 2020); Brief for U.S. Senators Sheldon Whitehouse, Jeff Merkley, Kirsten Gillibrand, Brian Schatz, and Edward J. Markey as *Amici Curiae* in Supporting the State and Muni. Petitioners, Pub. Health and Envtl. Petitioners, Power Co. Petitioners, and Clean Energy Trade Ass'n. Petitioners at 3-4, Am. Lung Ass'n. v. EPA, No. 19-1140 (D.C. Cir. Apr. 24, 2020).

[78] Brief for Members of Congress as *Amici Curiae* in Support of Petitioners at 13-25, West Virginia v. EPA, No. 15-1363 (D.C. Cir. Feb. 23, 2016); Brief for Current Members of Congress and Bipartisan Former Members of Congress as *Amici Curiae* in Support of Respondents at 8-14, West Virginia v. EPA, No. 15-1363 (D.C. Cir. Mar. 31, 2016).

[79] For example, S. 3269, the Clean Economy Act of 2020, sets and aims to meet a national goal of net-zero GHG emissions by 2050.

the CAA could support cost-effective economy-wide strategies to meet GHG emissions goals from the power sector as well as the transportation, industrial, commercial, and residential sectors.

Federal and State Roles to Implement the ACE Rule

Congress may consider how the final ACE rule may affect federal and state roles to implement CAA Section 111(d), in particular with respect to establishing performance standards for existing sources. The ACE rule allows states to establish CAA Section 111(d) performance standards that, based on site-specific considerations, are less stringent than the standard expected to result from a direct application of the BSER identified by the EPA. EPA characterized this approach as consistent with the "cooperative federalism structure of CAA section 111."[80] Some stakeholders agree with this unit-specific, state-led approach, while others disagree.[81] Those who disagree maintain that it is "inconsistent with the EPA's role under the CAA: to establish a minimum level of environmental protection and to allow states the flexibility to be more protective."[82]

In addition, there are concerns about implementing the ACE rule at the state level. For example, the National Association of Clean Air Agencies reported that establishing unique performance standards for each unit in a state's jurisdiction would draw on limited agency resources and staff hours and possibly trigger a public review process.[83] Further, some have identified that the lack of uniform, national emission standards in the ACE rule could increase the litigation risks for states as stakeholders may challenge the standards the state sets for each EGU.

Congress may consider the interaction of the ACE rule and state and local GHG reduction programs and the resulting implications for state planning efforts.[84] For example, it may be more efficient for states to rely on existing, nonfederal programs to fulfill the ACE rule requirements rather than implementing separate state and federal standards for the same emission sources. While the ACE rule does not prohibit states from implementing GHG programs under state authority, it may be unclear whether state plans that incorporate nonfederal GHG emission reduction programs would meet the ACE rule requirements. This may raise questions about how these states would demonstrate compliance with the ACE rule in addition to continuing their participation in nonfederal programs that reduce GHGs.

[80] ACE RTC, see chap. 3, p. 3. See also ACE Final Rule, p. 32567. EPA cites Title 42, Section 7411(d)(1)(B), of the *U.S. Code*, among other things, as the basis for its interpretation.

[81] ACE Final Rule, p. 32536.

[82] ACE RTC, see chap. 3, p. 3.

[83] Letter from National Association of Clean Air Agencies to EPA, ACE rulemaking docket, EPA-HQ-OAR-2017-0355-23788, October 31, 2018, p. 5.

[84] For more information about potential interactions between ACE and state and local programs, see CRS Report R46482, *EPA's Affordable Clean Energy Rule and Related Issues: Frequently Asked Questions*, coordinated by Kate C. Shouse.

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