RESOURCES *for the* FUTURE

10 Big Little Flaws in EPA's Affordable Clean Energy Rule

Issue Brief 19-05 **Dallas Burtraw** and **Amelia Keyes** — July 2019

Introduction

In June 2019, the Environmental Protection Agency (EPA) issued the final Affordable Clean Energy (ACE) rule to regulate greenhouse gas emissions from existing sources in the electricity sector. The rule presents a narrow view of EPA's regulatory authority, resulting in fewer emissions reductions than the rule it replaces, the Clean Power Plan (CPP). An inflexible framework is built into ACE, reversing 40 years of scholarship and regulatory reform aiming to make regulation smarter, more effective, and less expensive. The effect is to restrict the reach of the Clean Air Act in achieving emissions reductions from existing stationary sources. However, the rule has not been implemented and will face legal challenges.

The Clean Air Act has thus far been the centerpiece of US federal climate policy. Because of the Supreme Court's 2007 affirmation of EPA's authority to regulate greenhouse gases *(Massachusetts v. EPA)* and EPA's scientific finding that greenhouse gases endanger the health and welfare of current and future generations, EPA has an obligation to act to mitigate the harm. EPA chose to apply Section 111(d) of the act to regulate existing stationary sources in the electricity sector, finalizing the CPP in 2015. However, after the Circuit Court denied a stay (freeze) of the rule pending various legal challenges, in 2016 the Supreme Court reached down and, in an unprecedented move, proactively stayed the rule. Subsequently, newly elected President Donald Trump moved to repeal the CPP and replace it with ACE.

Our conceptual approach in analyzing the ACE rule is to examine EPA's determination of the **"best system of emission reduction"** (BSER). The Clean Air Act directs EPA to establish standards for emissions of air pollutants based on what is achievable under EPA's determination of BSER.[1] EPA has discretion in determining candidate technologies under BSER, but we identify numerous inconsistencies in EPA's determination. Whether the rule is arbitrary is something that ultimately the courts will resolve. Here, we examine 10 flaws that individually bring the coherence of the rule into question and collectively suggest that the scope of the rule could be substantially broader.

The *Best* System of Emission Reduction?

EPA has identified heat rate improvement (HRI) measures that can be installed at regulated coal-fired electricity-generating units (EGUs) as the exclusive set of candidate technologies for BSER. HRI measures reduce the amount of fuel needed and consequently reduce the emissions associated with production of electricity. EPA has excluded other ways that emissions can be reduced at coal EGUs—importantly, co-firing with natural gas, as well as biomass co-firing, carbon capture and sequestration, and averaging across units within a plant. EPA does not provide a consistent argument for including specific technologies while excluding others, and the consequences of these exclusions have outsized effects on the magnitude of emissions reductions that ACE can achieve.

1. EPA's "*best* system of emission reduction" is inconsistent because EPA anticipates that regulated entities will implement an "*even better* system."

Implementation of the rule has three steps. First, EPA determines BSER. Second, states are charged with developing a plan to implement BSER, subject to additional considerations such as the remaining useful life of facilities and nonair environmental and energy outcomes. Third, regulated entities take steps to comply. The regulatory approach is dynamically inconsistent. Regulated entities can (and are anticipated to) use at-the-source methods for compliance, such as natural gas co-firing, that are not included as candidates for the best system of emissions reductions. Regulated entities can thus use an "even better system" for compliance. EPA anticipates that sources may choose measures that it does not include as part of BSER, but which would enable greater reductions at lower cost.[2] Paradoxically, EPA writes elsewhere in the ACE rule that an implementation mechanism that "was not factored into the determination of the BSER … should not be authorized for implementation" (EPA 2019, p. 32557). This inconsistency suggests that EPA has the authority to design more flexibility into the rule but has chosen a design that is misaligned with the environmental goal. Generally, flexibility should be a foundational principle and has administrative precedent when it makes sense in the environmental context. Flexibility and stringency should be joined at the hip, with flexibility enabling greater stringency.

2. EPA has cherry-picked technologies to exclude natural gas co-firing and include technologies that are not generally available.

Natural gas co-firing is excluded as a candidate technology for BSER in the rule because according to EPA, it is not generally available. This appears to be arbitrary reasoning: elsewhere, EPA argues for the inclusion of specific HRI technologies in BSER despite its acknowledgment that they are not generally available.[3] EPA writes that those technologies should be included in BSER because states can evaluate their availability, but states can even more easily evaluate the availability of natural gas at a facility, with no engineering assessment as would be required for evaluating the feasibility of its specified HRI measures. Commentators on the draft rule argued, based on existing natural gas pipeline infrastructure and flow volumes, that about 75 percent of coal-fired plants could co-fire with natural gas, and 60 percent could convert completely (EDF 2018).

3. EPA sees the absence of evidence as evidence of absence. The use of distillate fuel to fire up many boilers does not imply natural gas is not cost-effective for co-firing.

EPA's assumption that natural gas is not available for co-firing is based in part on the use of distillate or some other fuel, instead of natural gas, as a start-up fuel at 65 percent of coal-fired boilers (EPA 2019, p. 32544). If the alternative start-up fuel is used only in small quantities, then it may be worth paying up to four times as much for it to avoid an investment in gas-related infrastructure. However, if natural gas co-firing were identified as a candidate technology for BSER, subject to evaluation of proximity of supply by the state, then many units would likely find co-firing to be cost-effective. The state is placed in just such an evaluative role in considering the availability of other HRI options at specific facilities.

The Best *System* of Emission Reduction?

The CPP used the conventional definition of "system," interpreting a "system of emission reduction" as a "set of measures that work together to reduce emissions" (EPA 2015, p. 64720). This definition would allow regulated entities to identify the best opportunities for emissions reductions within the electric power system. In finalizing ACE, EPA has not defined a system; it has identified the best *machine* for emission reduction. EPA rejects system-based thinking in favor of identifying specific, generally available technologies that target emission rates by reducing the heat rate at individual generating units. This strategy delivers few emissions reductions and gives regulated entities little flexibility in compliance options.

4. EPA acknowledges it has authority to allow averaging across units at a plant, the most basic form of flexibility, but has declined to implement this.

EPA excludes measures that could reduce emissions by shifting generation or averaging between EGUs, not even for two units that might be connected with ducts and wires at the same plant. These measures are neither included in BSER nor allowed for compliance by firms. Averaging between units within a single plant is the most basic form of flexibility, and EPA acknowledges that it likely has authority under the Clean Air Act to allow averaging; however, EPA argues that because it has narrowly established EGUs as the point of regulation, it cannot look beyond the EGU in implementing ACE.[4] It appears EPA has tied its own hands to constrain itself to the narrowest regulatory approach.

5. Limiting the "system" to specific source-based technologies makes sense for local pollutants at a facility with a short stack; it doesn't make sense for greenhouse gases.

EPA argues that limiting the system to specific technologies at individual EGUs has precedent under the Clean Air Act Section 111(d) (EPA 2019, p. 32526). Indeed, most previous applications of 111(d) have targeted pollutants from small sources with short stacks that have a primarily local effect.[5] Limiting the system to target emissions from specific stacks makes sense in such a context, since the environmental motivations are of a local nature. In contrast, the ACE rule addresses emissions of carbon, a global pollutant, from sources with tall stacks. The argument of administrative precedent under 111(d) therefore appears weak, given the different context of the previous regulations. Further, flexible regulations have been proposed previously under Section 111. An existing trading program for nitrogen oxides emissions from solid waste combustors enables states to allow owners or operators of municipal waste combustor plants to engage in trading of nitrogen oxides emissions credits (EPA 2006). Another example is the Clean Air Mercury Rule, a cap-and-trade program to limit mercury emissions from coal EGUs; built on a system-based interpretation of BSER, it was proposed by the Bush administration but rejected by the courts for reasons unrelated to the applicability of trading under Section 111.[6]

6. EPA's argument for excluding natural gas co-firing based on alternative, more efficient uses of the fuel is inconsistent with its new criteria for establishing BSER.

In justifying its decision to exclude natural gas co-firing from BSER, EPA argues that natural gas is more efficiently used in natural gas combined-cycle (NGCC) units than in coal-fired boilers, and that redirecting natural gas from NGCC units to coal units would not be an environmentally positive outcome (EPA 2019, p. 32544). Appealing to alternative, more efficient uses for natural gas to preclude natural gas co-firing employs system-based reasoning that is inconsistent with the limited focus on individual EGUs that EPA has imposed. If EPA were to follow its own logic, it would examine only the availability and cost of emissions reduction options and energy outcomes at individual coal EGUs and would not employ a system-based argument—the effect on NGCC units—as a justification for exclusion of natural gas co-firing.

The Best System of *Emission Reduction*?

The ACE rule would have minimal effects on power sector emissions and in many areas would lead to higher emissions compared with having no policy at all. EPA's source-based regulation should require emissions reductions at every source. Even better, the lackluster emissions outcomes could be improved in a cost-effective manner by expanding the scope of BSER.

7. EPA's source-based standard would not reduce emissions at every source and would actually raise emissions at some plants.

Data from the Regulatory Impact Analysis accompanying the rule project that ACE would lead to higher emissions at 18 percent of coal plants and in 15 states plus the District of Columbia. This adverse outcome is due to the emissions rebound effect, a phenomenon in which heat rate improvements allow plants to operate more efficiently and thus encourage them to operate more (Keyes et al. 2019). This projected outcome does not account for EPA's planned reforms to the New Source Review (NSR) program, which EPA expects would enable greater average heat rate improvements. Previous analysis of the draft ACE rule found that greater heat rate improvements can worsen emissions outcomes because of a greater rebound effect, suggesting that emissions rebound may be higher than projected if NSR reform is finalized and further questioning the finding that heat rate improvements qualify as BSER (Keyes 2019; Lambert et al. 2019). Many of the states that are expected to experience increased emissions have signed on to the Climate Alliance, and ACE may make it harder for them to achieve their climate goals. ACE would also increase emissions of local pollutants in 20 states plus the District of Columbia. In the context of a narrow, at-the-source standard, BSER should lead to emissions reductions at each source.

8. The cumulative emissions reduction under the ACE rule is 1/1000th of national emissions by 2050, which does not appear responsive to EPA's obligation to mitigate the harm of greenhouse gases.

ACE's total projected emissions reductions are very small. The rule is expected to reduce cumulative national carbon dioxide (CO_2) emissions by 0.1 percent between 2021 and 2050, based on data from EPA's Regulatory Impact Analysis. It is difficult to believe that this magnitude of emissions reduction is a sufficient regulatory response to the harms of greenhouse gases confirmed in EPA's endangerment finding. Further, ACE would impose a regulatory cost on states and EGUs in exchange for few benefits, an outcome antithetical to the Trump administration's goal of reducing the burdens of ineffective regulations. For many states, developing and enforcing plans to comply with ACE will require using resources that could otherwise be allocated to more substantial state-level efforts to reduce emissions.

9. Although biomass co-firing can be expected to reduce global emissions, ACE precludes its use because it would increase emissions at regulated facilities—even though heat rate improvements would do the same at many facilities.

EPA excludes biomass co-firing from BSER because the emissions reductions associated with biomass use occur outside the coal plant and biomass co-firing increases emissions measured at the source.[7] This reasoning appears arbitrary, given that HRIs are expected to increase emissions at many plants as well. Moreover, the structure of the rule effectively prohibits expanded use of biomass co-firing at existing coal plants because it requires states to establish emissions rate standards at each plant, and biomass co-firing would increase emissions rates at plants. The ancillary benefits associated with biomass co-firing, including local employment and wildfire prevention, are arbitrarily denied by the structure of the regulation.

10. In excluding natural gas co-firing, ACE ignores an easy, cost-effective opportunity to achieve real emissions reductions.

Expanding monthly natural gas co-firing levels at just 4 percent of plants to an annual average would apply at the source and would double the emissions reductions under ACE. Substantially more is possible. As discussed in points 2 and 6, EPA has employed questionable reasoning to exclude natural gas co-firing from BSER. The issue of natural gas co-firing's inclusion in BSER is important because it has the potential to multiply available emissions reductions. In formal comments on the proposed ACE rule, we demonstrated that increasing co-firing at 4 percent of coal plants (those that already co-fire) by turning the peak monthly natural gas use into an annual standard would reduce emissions by 5 million to 15 million tons

of CO_2 per year (compared with ACE's average annual reduction of 6 million tons) (Krupnick et al. 2018). In other words, a highly cautious approach to increasing natural gas co-firing would more than double the emissions reductions under ACE. If natural gas were included in BSER, there would be no clear stopping rule for the required level of co-firing because the marginal cost of natural gas use in lieu of coal is essentially flat over a large range, meaning that many plants could convert completely to natural gas. The opportunities for emissions reductions using HRIs are far more limited.[8] Including natural gas co-firing in BSER would allow EPA to require stronger standards without reaching outside the narrow, source-based framework to which the agency has constrained itself.

Conclusion

These 10 flaws, taken together, suggest that EPA has not identified the best system of emission reduction in the power sector. ACE is a rule with self-inflicted wounds. Even though EPA has argued that ACE represents the upper limit of its authority to regulate greenhouse gas emissions from the power sector, each decision it has made in identifying BSER and procedures for compliance seems to identify the least EPA can do to reduce emissions.

One may ask, why are these criticisms important to raise? What is the value in critiquing a rule that would have a negligible effect on power sector emissions? To answer these questions, it is necessary to zoom out. To avoid the tremendous costs of climate change, the US economy must decarbonize rapidly. The lowest-cost opportunities for decarbonization in the near term lie in the power sector, which will enable other sectors to rely on electrification to a greater extent. The power sector therefore plays a critical role in near-term efforts to address climate change and requires a durable regulatory framework that leverages existing market and technological trends to drive low-cost emissions reductions. Instead, ACE creates a narrow, inflexible regulatory framework that is not a sensible match for power sector decarbonization opportunities.

EPA's Net Benefit Analysis

In taking stock of ACE's benefits, EPA estimates climate benefits (due to reductions in CO_2) and health co-benefits (due to reductions in local air pollutants). Climate benefits represent the domestic effects of CO_2 reductions, a calculation that departs from the scientifically informed approach of accounting for international economic interactions based on the global nature of climate change (Krupnick et al. 2018). The climate benefits under EPA's estimation procedure are small enough that when only climate benefits are considered, the ACE rule's cumulative net benefits (benefits minus costs) are negative: between –$910 and –$980 million in 2016 dollars. When health co-benefits are added in, the rule has positive net benefits of $1.1 billion to $8.8 billion.

EPA has indicated its interest in removing consideration of co-benefits in rulemakings on the grounds that co-benefits do not relate to the primary purpose of the regulation. Prior to ACE's finalization, EPA acted on this intention in its proposed Mercury Air Toxics Standards, which excluded the co-benefits of reducing other pollutants. If the mercury rule sets a precedent to exclude co-benefits in EPA rulemakings, the agency must reckon with the fact that this new procedure would leave the ACE rule with net costs of almost $1 billion.

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Notes

1 Section 111 of the Clean Air Act specifies that the best system of emissions reduction should be adequately demonstrated and take into account "the cost of achieving such reduction and any nonair quality health and environmental impact and energy requirements."

2 In formal comments on the ACE rule we estimate natural gas co-firing costs of $36 per ton of carbon dioxide (CO_2) reduced (Krupnick et al. 2018).

3 "The EPA agrees that low-leakage seals are not feasible for certain units (e.g., those using recuperative air heaters). However, the EPA is finalizing a determination that this candidate technology is an element of the BSER because limiting air in-leakage in the air heater and associated duct work can be evaluated on all units and limiting the amount of air in-leakage will improve the efficiency of the unit." (EPA 2019, p. 32539)

4 "Although the D.C. Circuit has recognized that the EPA may have statutory authority under CAA section 111 to allow plant-wide emissions averaging, the Agency's determination that individual EGUs are subject to regulation under ACE precludes the Agency from attempting to change the basic unit from an EGU to a combination of EGUs for purposes of ACE implementation" (EPA 2019, p. 32556).

5 The Congressional Research Service (Tsang 2018) found that prior to 2016, EPA had issued Section 111(d) emissions guidelines to address the following:

- greenhouse gas emissions from existing fossil fuel–fired power plants (known as the Clean Power Plan, or CPP);
- volatile organic compound and methane emissions from MSW landfills;
- organics, metals, and nitrogen oxides from municipal waste combustor units;
- acid mist from sulfuric acid production units;
- air pollutants from hospital, medical, or infectious waste incinerators;
- fluoride emissions from phosphate fertilizer plants;
- reduced sulfur emissions from kraft pulp mills; and
- fluoride emissions from primary aluminum plants.

6 EPA's 2005 Clean Air Mercury Rule (CAMR) delisted coal-fired power plants from CAA Section 112 and, instead, established a cap-and-trade system for mercury under Section 111(d) (EPA 2005). The DC Circuit vacated CAMR in 2008 on grounds unrelated to the guidelines' substantive requirements (Tsang 2018).

7 "While the firing of biomass occurs at a designated

facility, biomass firing in and of itself does not reduce emissions of CO_2 emitted from that source. Specifically, when measuring stack emissions, combustion of biomass emits more mass of emissions per Btu than that from combustion of fossil fuels, thereby increasing CO_2 emissions at the source" (EPA 2019, p. 32546)

8 Linn et al. (2014) estimate that that heat rate improvements can achieve emissions rate reductions of only 6 percent or less.

Resources for the Future (RFF) is an independent, nonprofit research institution in Washington, DC. Its mission is to improve environmental, energy, and natural resource decisions through impartial economic research and policy engagement.

Dallas Burtraw has worked to promote efficient control of air pollution and written extensively on electricity industry regulation and environmental outcomes. Burtraw's current research includes analysis of the distributional and regional consequences of climate policy, the evolution of electricity markets including renewable integration, and the interaction of climate policy with electricity markets. He has provided technical support in the design of carbon dioxide emissions trading programs in the Northeast states, California, and the European Union. He also has studied regulation of nitrogen oxides and sulfur dioxide under the Clean Air Act and conducted integrated assessment of costs, and modeled health and ecosystem effects and valuation, including ecosystem improvement in the Adirondack Park and the southern Appalachian region. Burtraw currently serves as Chair of California's Independent Emissions Market Advisory Committee. Burtraw holds a Ph.D. in economics and a master's degree in public policy from the University of Michigan and a bachelor's degree from the University of California, Davis.

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