

**Joint Comments of Environmental and Public Health Organizations on the Regulatory Impact Analysis Accompanying EPA’s Proposed Emission Guidelines for Greenhouse Gas Emissions From Existing Electric Utility Generating Units; Revisions to Emission Guideline Implementing Regulations; Revisions to New Source Review Program**

**Docket No.  
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Environmental and public health organizations<sup>1</sup> Appalachian Mountain Club, Center for Biological Diversity, Clean Air Council, Clean Air Task Force, Clean Wisconsin, Coalition to Protect America’s National Parks, Conservation Law Foundation, Earthjustice, Environmental Defense Fund, Environmental Law & Policy Center, Minnesota Center for Environmental Advocacy, National Parks Conservation Association, Natural Resources Defense Council, Sierra Club, and Union of Concerned Scientists hereby submit the following comments on the Regulatory Impact Analysis accompanying EPA’s proposed rule “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 Fed. Reg. 44,746 (Aug. 31, 2018).

The sources cited in these comments can be found in either the “Joint Appendix of Environmental and Public Health Organizations and States Regarding the Proposed Repeal of Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units” submitted to this docket on Apr. 20, 2018, or the “Joint Appendix of Environmental and Public Health Organizations to Comments Regarding EPA’s Proposed Emission Guidelines for Greenhouse Gas Emissions From Existing Electric Utility Generating Units; Revisions to Emission Guideline Implementing Regulations; Revisions to New Source Review Program” submitted to this docket on Oct. 31, 2018.

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## Attachments

- A. Joint Comments of Environmental and Public Health Organizations Specific to “Regulatory Impact Analysis for the Review of the Clean Power Plan: Proposal” (Apr. 26, 2018)
- B. Comments on Flawed Estimates of the Social Cost of Carbon in the Proposed Repeal of Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units (Apr. 26, 2018)

## I. Introduction

EPA’s proposed rule “Emission Guidelines for Greenhouse Gas Emissions From Existing Electric Utility Generating Units; Revisions to Emission Guideline Implementing Regulations; Revisions to New Source Review Program,”<sup>2</sup> unlawfully fails to adequately consider the potential costs and benefits of the proposed “best system of emission reduction” (BSER) and the accompanying proposed New Source Review (NSR) changes.

First, Clean Air Act Section 111 requires EPA to identify the “degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction and any nonair quality and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated.”<sup>3</sup>

Because Section 111 requires the standard to reflect the degree of emission reduction achievable by the best system of emission reduction, taking into account cost, EPA must engage in a factual assessment of both the costs and the benefits of reductions—including both direct benefits and co-benefits of reducing power plant emissions.<sup>4</sup> No such analysis appears in the ACE Proposal’s discussion of the factors relevant to the determination of the “best system of emission reduction.”<sup>5</sup> A separate section of the proposal<sup>6</sup> summarizes the Regulatory Impact Analysis<sup>7</sup> conducted under E.O. 12,866, but nothing in the proposal connects any analysis of costs or benefits with the decision-making on the proposed repeal and replacement as required under Section 111. Nor does the ACE Proposal distinguish or refute EPA’s prior E.O. 12,866 analysis conducted to support the Clean Power Plan (CPP).

The ACE RIA’s analysis of the costs and benefits of the proposed ACE Rule is deeply flawed, as we discuss below. These flaws inflate the emissions forecast and costs of the CPP relative to the ACE Rule and undercount the benefits of reducing pollution from power plants. Yet even with these analytical flaws stacking the deck in the ACE Rule’s favor, EPA’s analysis of the ACE illustrative policy cases shows billions of dollars per year in net costs and lost benefits compared

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<sup>2</sup> 83 Fed. Reg. 44,746 (Aug. 31, 2018) (“ACE Proposal”).

<sup>3</sup> 42 U.S.C. § 7411(a)(1).

<sup>4</sup> See *Sierra Club v. Costle*, 657 F.2d 298, 326 (D.C. Cir. 1981) (quantity of emission reductions is an important factor in determining “best” system of emissions reduction); see also *Michigan v. EPA*, 135 S. Ct. 2699, 2707 (2015) (“Consideration of cost reflects the understanding that reasonable regulation ordinarily requires paying attention to the advantages *and* the disadvantages of agency decisions.”).

<sup>5</sup> 83 Fed. Reg. at 44,759-60.

<sup>6</sup> *Id.* at 44,783-90.

<sup>7</sup> EPA, *Regulatory Impact Analysis for the Proposed Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units; Revisions to Emission Guideline Implementing Regulations; Revisions to New Source Review Program* (Aug. 2018) (“ACE RIA”).

to the CPP base case.<sup>8</sup> Moreover, because the ACE Proposal fails to establish a binding emission limit,<sup>9</sup> the analysis is entirely speculative.

Second, the ACE Proposal's analysis of the results of its proposed changes to the NSR program is fundamentally flawed. EPA offers no analysis or modeling that bears any rational relationship to the reality that the agency *knows* will result from its broad changes to the applicability provisions of the NSR regulations. From its experience to date with the NSR enforcement cases, EPA knows that opening the door to plant modifications without the accompanying requirement to undergo NSR review or install pollution controls will incentivize projects that can extend the lives of older coal plants for 30 years or more, leading to hundreds of thousands of tons of uncontrolled air pollution per year.<sup>10</sup> Yet the EPA has not modeled *anything* except the emissions increases from three heat rate improvement (HRI) options and cost scenarios, two of which simply assume that the proposed NSR exemption is in place.

Relying on this flawed and incomplete analysis to justify finalizing the ACE Proposal, or any of its allegedly severable component parts separately, would constitute arbitrary and capricious decision making.<sup>11</sup> The analysis EPA does provide shows the likelihood of increased emissions at a significant net cost compared to the CPP, further evidence of unreasoned decisionmaking.

## **II. EPA's analytical assumptions are flawed.**

EPA makes several flawed modeling assumptions in the ACE RIA that result in misleading or inaccurate comparisons between the costs and benefits of the ACE Rule and the CPP. EPA's CPP base case modeling scenario inflates the projected costs of the CPP, and understates the anticipated emission reductions the CPP would achieve. Additionally, the gas price forecast used across EPA's modeling fails to account for future gas price uncertainty, which leads to further underestimation of the benefits of the CPP. EPA's reliance on these flawed assumptions is arbitrary and capricious.<sup>12</sup>

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<sup>8</sup> ACE RIA at ES-17, Table ES-13.

<sup>9</sup> Joint Comments of Environmental and Public Health Organizations on the Best System of Emission Reduction and Other Issues, submitted Oct. 31, 2018 to Docket No. EPA-HQ-OAR-2017-0355 ("Joint Environmental Comments on BSER Issues") and Joint Comments of Environmental and Public Health Organizations on Proposed Revisions to the Section 111(d) Framework Regulations, submitted Oct. 31, 2018 to Docket No. EPA-HQ-2017-0355 ("Joint Environmental Comments on Framework Regulations").

<sup>10</sup> Joint Comments of Public Health and Environmental Organizations on the Proposed Amendments to the New Source Review Regulations, submitted Oct. 31, 2018 to Docket No. EPA-HQ-OAR-2017-0355 ("Joint Environmental Comments on NSR Issues").

<sup>11</sup> *Motor Vehicles Manufacturers Ass'n v. State Farm*, 463 U.S. 29, 43 (1983).

<sup>12</sup> *See Small Refiner Lead Phase-Down Task Force v. EPA*, 705 F.2d 506, 534 (D.C. Cir. 1983) (EPA "retains a duty to examine key assumptions as part of its affirmative burden of promulgating and explaining a non-arbitrary, noncapricious rule.").

### A. The CPP base case scenario does not accurately represent the CPP.

In the ACE RIA, EPA notes that its chosen CPP base case scenario “utilizes mass-based implementation of CPP at the state level, with intra-state trading covering existing sources only, and no incremental demand-side energy efficiency investments.”<sup>13</sup> These modeling assumptions inflate the resulting carbon dioxide (CO<sub>2</sub>) emission forecast and costs in EPA’s CPP base case, which affects the comparative costs and benefits of EPA’s illustrative policy scenarios.

First, by modeling targets for existing sources only, without any mitigation of leakage to new sources as required under the CPP, the ACE RIA does not accurately represent the CPP. In the final rule for the Clean Power Plan issued in August 2015, EPA required states to implement measures to address or otherwise show that emissions leakage was appropriately mitigated if they adopted a cap that only covered existing plants. But the ACE RIA assesses mass-based targets that apply only to existing fossil fuel-fired power plants (defined as those operating or under construction as of January 7, 2014). In the ACE RIA, the modeled CPP targets do not include new fossil fuel-fired plants and also include no measures to address emissions leakage to non-covered sources (like new plants). By contrast, leading analyses of the CPP—including those from the U.S. Energy Information Administration (EIA),<sup>14</sup> M.J. Bradley & Associates (MJB&A),<sup>15</sup> and Rhodium Group<sup>16</sup>—have primarily modeled mass-based targets covering both existing plants and new plants.

The failure to account for required measures to address leakage to new sources inflates the ACE RIA’s emissions forecast for the CPP base case scenario. By excluding emissions from new gas-fired facilities, the ACE RIA’s CPP scenario gives existing coal capacity additional “headroom” in the modeled budget that allows existing coal plants to continue operating or operate at higher levels, while also allowing unchecked emissions growth from new fossil fuel-fired facilities.<sup>17</sup> The ACE RIA’s misrepresentation of the CPP narrows the gap between the emissions outcomes of the CPP and ACE scenarios and therefore minimizes the impacts of EPA’s proposed repeal and replacement of the CPP. It is inaccurate, and therefore not reasoned decisionmaking, for

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<sup>13</sup> ACE RIA at 3-7.

<sup>14</sup> EIA, *Effects of the Clean Power Plan* (June 2016), <https://www.eia.gov/outlooks/archive/aeo16/cpp.php>.

<sup>15</sup> M.J. Bradley & Associates, *EPA’s Clean Power Plan: Summary of IPM Modeling Results With ITC/PTC Extension* (June 2016), <https://www.mjbradley.com/reports/updated-modeling-analysis-epas-clean-power-plan>.

<sup>16</sup> Rhodium Group, *What the CPP Would Have Done* (October 2017), <https://rhg.com/research/what-the-cpp-would-have-done/>.

<sup>17</sup> For example, MJB&A 2016 found that an existing-only approach (i.e., the CPP without leakage mitigation) would result in significant leakage and result in higher total emissions than an existing-plus-new approach (i.e., the CPP with leakage mitigation in the form of a single mass-based emissions cap covering existing and new sources). In MJB&A’s analysis, emissions from coal-fired power plants were greater under an existing-only limit than a limit on existing and new sources.

EPA to compare the costs and benefits of ACE to a scenario that misrepresents the CPP by excluding the rule's leakage mitigation requirements.

The ACE RIA also does not account for cost-effective demand-side energy efficiency investments as a compliance option. Demand-side energy efficiency measures are improvements to appliances, heating and cooling systems, building envelopes, and other energy-consuming devices and structures, that allow electricity customers to use less energy to perform the same tasks. Energy efficiency investments are often facilitated through utility programs and are implemented when their benefits exceed their costs over a given time period. Energy efficiency will be critical to achieve long-term emissions reductions, and states and utilities are increasingly recognizing the importance of incentivizing and encouraging energy efficiency measures. As of 2017, 26 states had adopted Energy Efficiency Resource Standards, which are policies that require utilities and other efficiency program administrators to meet defined energy savings targets.<sup>18</sup>

Despite recent growth in energy efficiency opportunities and their ability to cost-effectively reduce emissions, the ACE RIA's CPP base case does not include energy efficiency as a compliance option, further tipping the scales to make the comparative CPP base case seem less effective and more expensive. Demand-side energy efficiency would have been an eligible compliance measure under the CPP. Energy efficiency is a highly cost-effective way to reduce CO<sub>2</sub> emissions, and it is reasonable to expect that the final CPP rule would have driven investment in a diverse set of cost-effective CO<sub>2</sub> emission-reduction measures in the electricity sector, including energy efficiency improvements.

EPA did conduct a more realistic CPP base case that included incremental energy efficiency growth assumptions, but it did not use the "CPP-plus-EE" case for comparison with the proposed ACE policy scenarios. The ACE RIA shows that the power sector costs for the CPP-plus-EE case are less than for the CPP case without energy efficiency. The CPP-plus-EE case also resulted in lower emissions than any of the other CPP or ACE cases (see Figure 1). The CPP-plus-EE case also resulted in lower emissions than any of the other CPP or ACE rule cases (see Figure 2). By comparing the impacts of the proposed ACE rule to the CPP without energy efficiency instead of the more realistic CPP-plus-EE case, the ACE RIA artificially inflates the costs of the CPP and reduces the benefits foregone under the ACE rule. Moreover, EPA provided no justification for excluding energy efficiency from its modeled scenarios. EPA acknowledged the role of energy efficiency in the electricity system—and rightfully included energy efficiency in one scenario—but still arbitrarily and unreasonably excluded energy efficiency from the analysis that it used to justify the proposed rule.

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<sup>18</sup> American Council for an Energy-Efficient Economy, *State Energy Efficiency Resource Standard (EERS)* (Jan. 2017), <https://aceee.org/policy-brief/state-energy-efficiency-resource-standard-activity>.

Figure 1. System Costs Compared to CPP w/ EE, for all EPA runs from 2020-2035

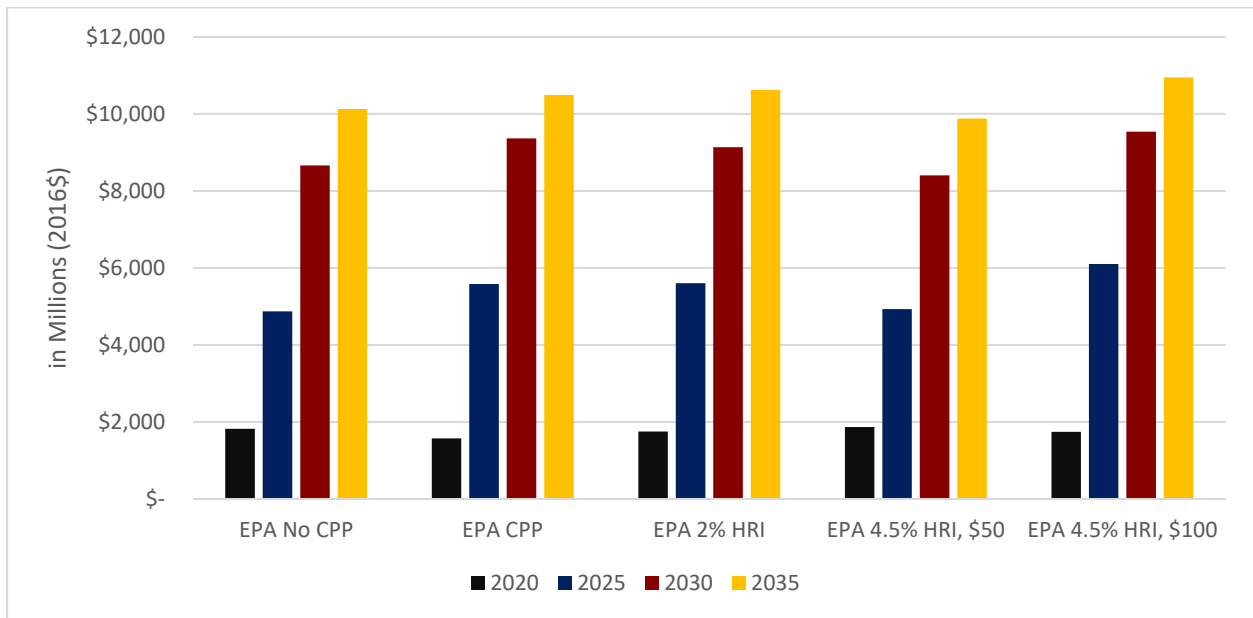
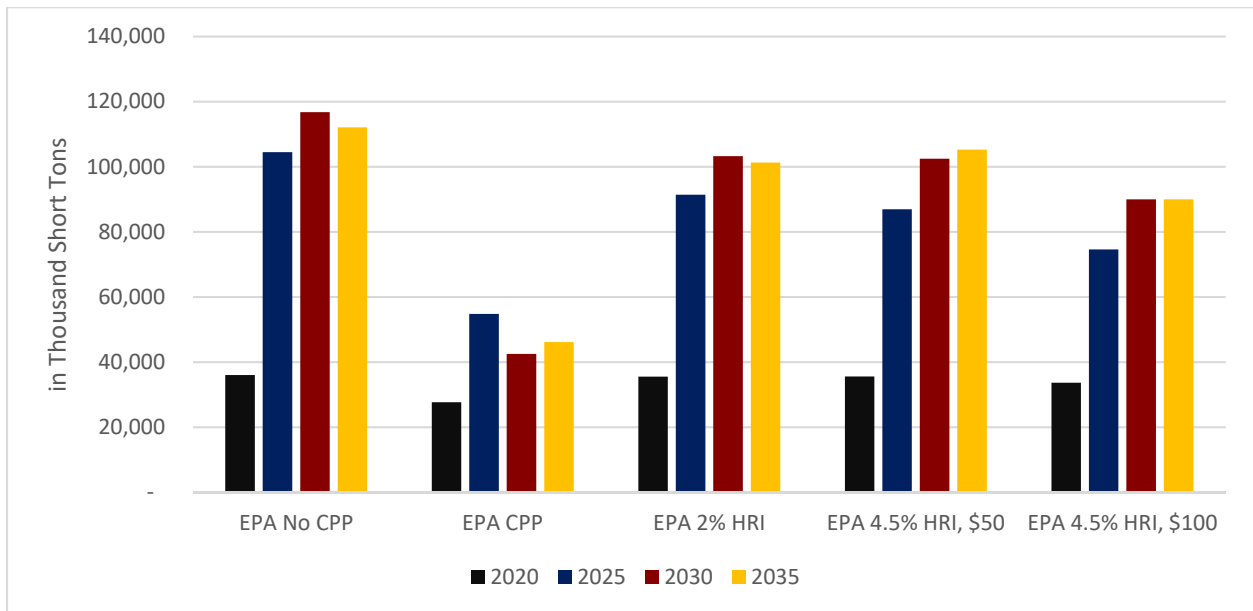


Figure 2. CO<sub>2</sub> Emissions Compared to CPP w/ EE, for all EPA runs from 2020-2035



Even the ACE RIA’s CPP-plus-EE scenario underestimates energy efficiency savings. The ACE RIA assumes 159 terawatt-hours (TWh) of electricity savings from energy efficiency by 2030.<sup>19</sup> By contrast, as estimated in the CPP RIA, the U.S. could save an estimated 327 TWh of electricity by 2030, assuming all states achieve modest incremental energy efficiency savings of

<sup>19</sup> ACE RIA at 3-36.

1 percent annually by 2030.<sup>20</sup> The CPP RIA efficiency estimate, while more than double the ACE RIA's estimate, is already proving relatively conservative – nationwide, reported savings from electric efficiency programs in 2017 were equivalent to approximately 0.72 percent of total retail electricity sales, and higher-performing states are already achieving more than 2.5 percent incremental electricity savings.<sup>21</sup> If all states achieved incremental efficiency savings of 2 percent annually by 2030 the U.S. could save roughly 500 TWh of electricity – more than three times the ACE RIA's estimate.<sup>22</sup>

Other analyses of the CPP have included more significant levels of energy efficiency than ACE RIA does, demonstrating that including energy efficiency as a compliance measure improves emissions outcomes and reduces costs. For example, MJB&A modeled scenarios with current annual energy efficiency savings rates, one percent incremental efficiency, and two percent incremental efficiency in their analysis of the CPP.<sup>23</sup> The analysis demonstrated that increased levels of energy efficiency resulted in greater emissions reductions and lower electricity bills.<sup>24</sup> The low energy efficiency savings levels in the ACE RIA do not accurately characterize energy efficiency potential in the CPP and discount the benefits of the broader CPP approach.

#### **B. EPA's use of low gas price projections results in underestimation of emissions in the ACE analysis.**

The ACE RIA also fails to consider the potential impacts if gas prices are higher than the single price forecast relied upon in the ACE analysis.<sup>25</sup> EPA's gas price forecast lies at the lower end of publicly available forecasts, and the low gas prices result in lower modeled emissions from the power sector. Due to the uncertainty in future gas prices, a reasonable analysis would have taken into consideration a range of price assumptions, including higher gas price forecasts.

Gas prices are a significant driver of coal plant operating and retirement decisions in the real world and in IPM—the model platform used by EPA. EPA's use of lower gas prices improves the competitiveness of existing and new natural gas plants compared to coal plants, such that coal units are less likely to be economically dispatched; this results in decreased coal unit utilization rates and more coal plant retirements. Conversely, higher gas prices result in more

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<sup>20</sup> EPA, *Regulatory Impact Analysis for the Clean Power Plan Final Rule* at 3-13 to 3-14 (Aug. 2015) (“CPP RIA”).

<sup>21</sup> See American Council for an Energy-Efficient Economy, *The 2018 State Energy Efficiency Scorecard* at 13, 28 (Oct. 2018), <https://aceee.org/sites/default/files/publications/researchreports/u1808.pdf>.

<sup>22</sup> Estimated total energy efficiency savings assuming that every state improves its incremental energy efficiency savings by 0.2 percent annually (the pace of improvement assumed in the 2015 CPP RIA to reflect historic efficiency performance and state efficiency requirements) until a target rate of 2.0 percent is achieved.

<sup>23</sup> MJB&A 2016.

<sup>24</sup> *Id.*

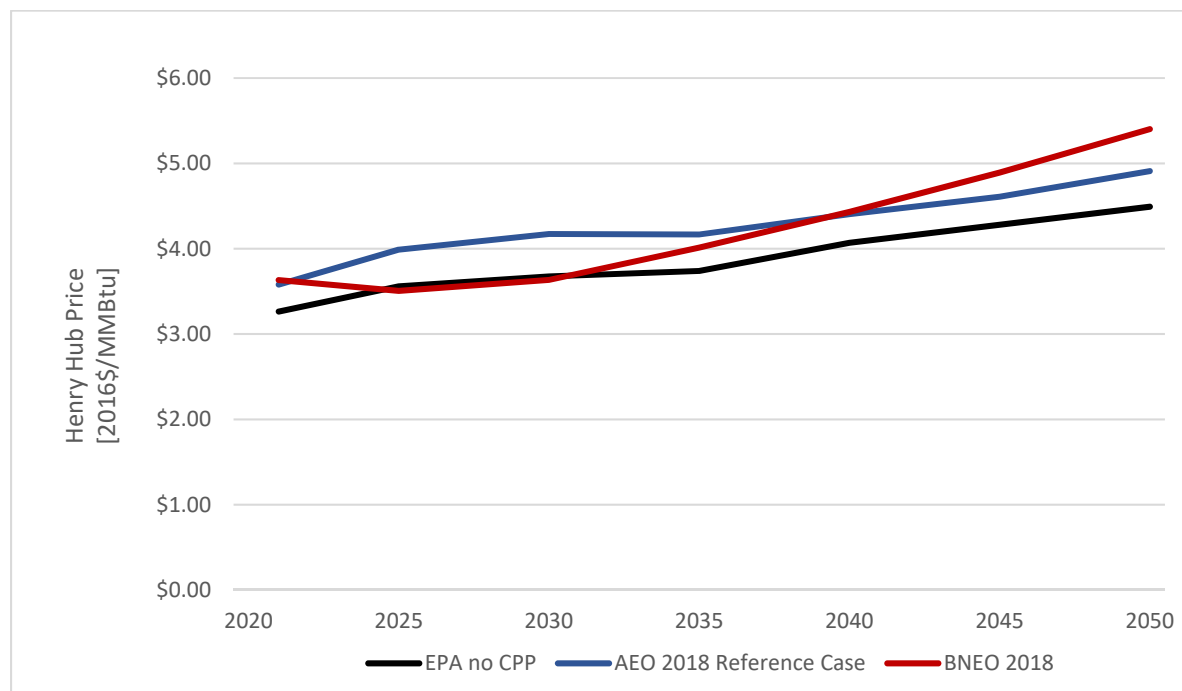
<sup>25</sup> EPA, *Documentation for EPA's Power Sector Modeling Platform v6 Using the Integrated Planning Model* at Chapter 8 (May 2018), Docket ID EPA-HQ-OAR-2017-0355-21153.



dispatch from coal units, and fewer retirements. Assessing the impacts of a range of gas prices is especially critical in evaluating the impacts of a rule centered on the performance of coal plants and that, by EPA’s own admission, would extend their useful lives.

EPA’s analysis should have bounded its projections of the CPP and ACE rules with a higher, though still realistic, gas price sensitivity consistent with market fundamentals analysis, such as the price projections given in the U.S. EIA Annual Energy Outlook (AEO) Reference Case.<sup>26</sup> Figure 3 shows a comparison between gas prices from EPA’s no CPP scenario, EIA’s AEO 2018 reference case, and Bloomberg New Energy Outlook (BNEO) 2018.<sup>27</sup> Averaged across the reported years, AEO 2018 and BNEO 2018 gas prices are about 11 percent and 8 percent higher, respectively, than EPA’s prices. Though BNEO’s forecast is in line with EPA’s in 2025 and 2030, the significant divergence in the later years would influence decisions to retire coal and build new gas plants in the early years.

Figure 3. Comparison of natural gas price projections



The ACE RIA’s reliance on just one low gas price forecast leads to substantially less coal generation and lower total CO<sub>2</sub> emissions (as well as co-pollutants, like sulfur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>)) than would occur assuming AEO 2018 gas prices.

<sup>26</sup> See EIA, *Annual Energy Outlook 2018* (Feb. 6, 2018), <https://www.eia.gov/outlooks/aeo/>.

<sup>27</sup> Bloomberg New Energy Finance, *New Energy Outlook 2018*, <https://about.bnef.com/new-energy-outlook/#toc-download>.

NRDC used IPM to model the impacts of the ACE RIA’s low gas price assumptions on the reference case results. Figure 4 shows the modeled electricity generation from coal and natural gas combined cycle (NGCC) power plants. The scenario with AEO 2018 gas prices results in 24 percent more generation from coal power plants in 2030 than the scenario with EPA gas prices. Figure 5 and Figure 6 show coal retirements and new NGCC capacity, respectively, under the two scenarios. Under AEO 2018 prices, fewer coal plants retire and fewer NGCC plants are built. Figure 7 shows total CO<sub>2</sub> emissions; AEO 2018 gas prices result in an estimated 50 million more tons of CO<sub>2</sub> emissions in 2030.

Figure 4. Projected coal and NGCC generation under different natural gas prices

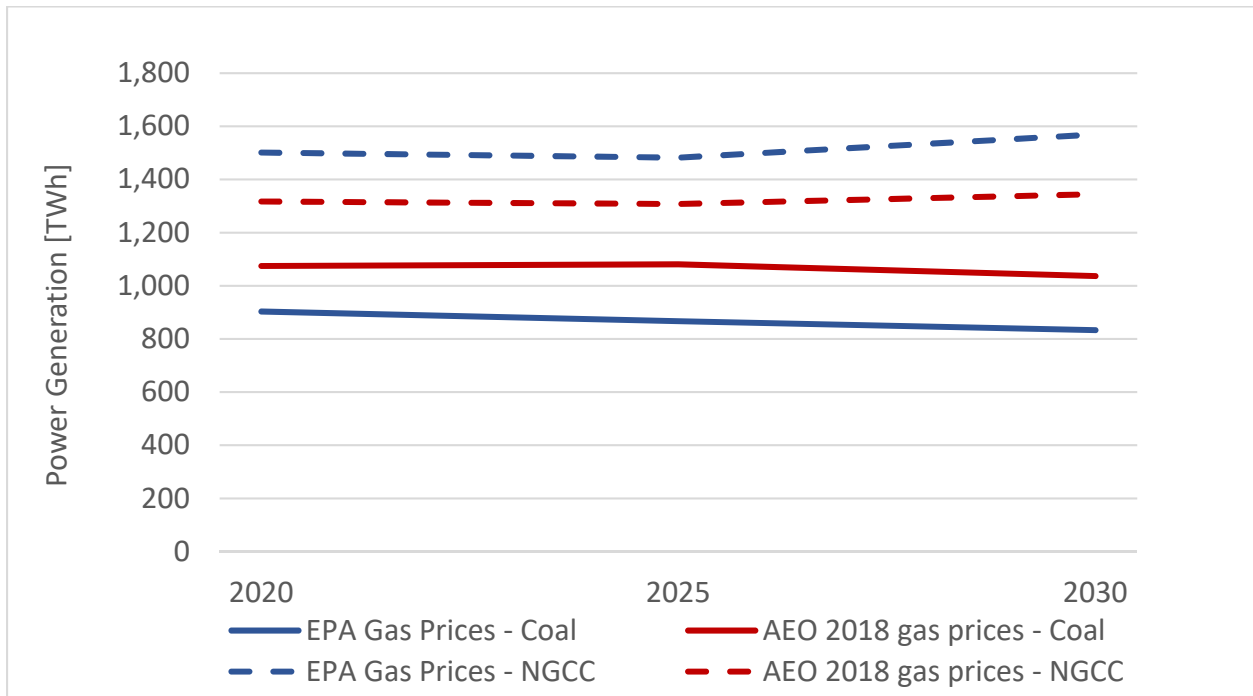


Figure 5: Projected coal retirements with different natural gas prices

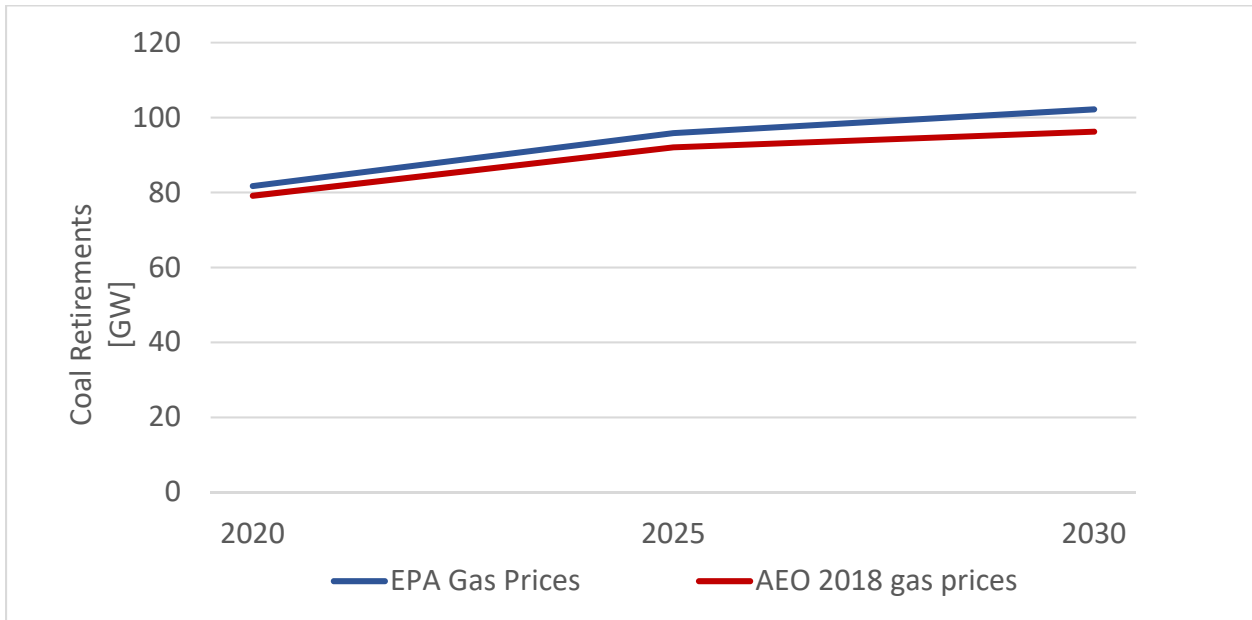


Figure 6: New NGCC capacity under different natural gas prices

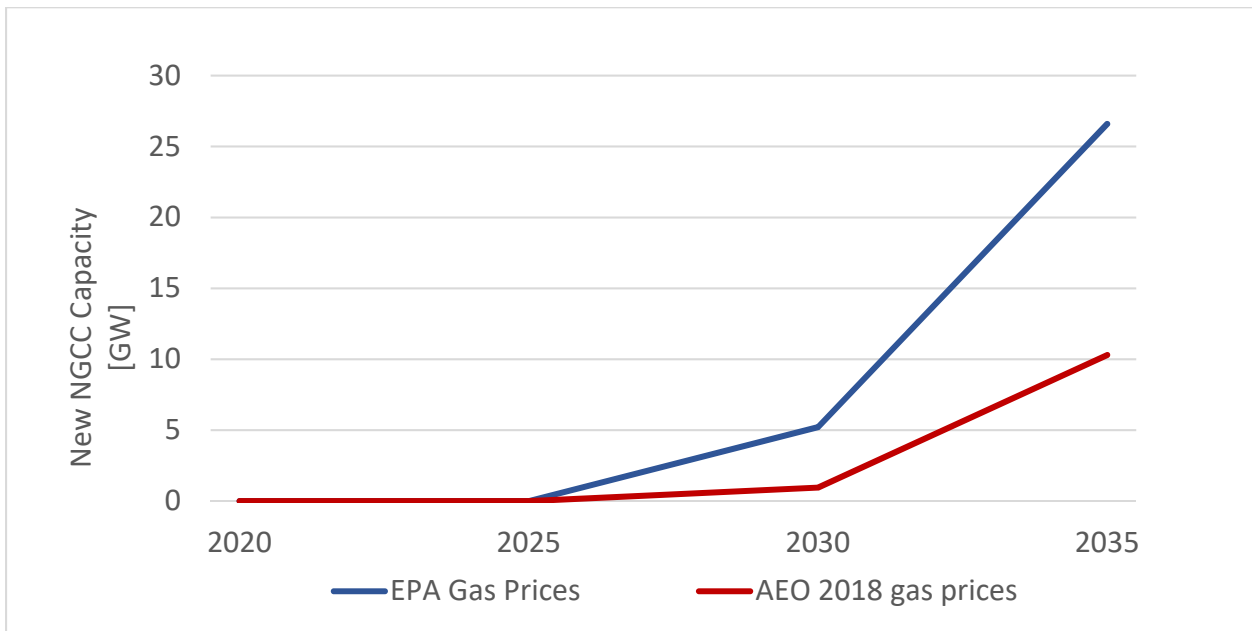
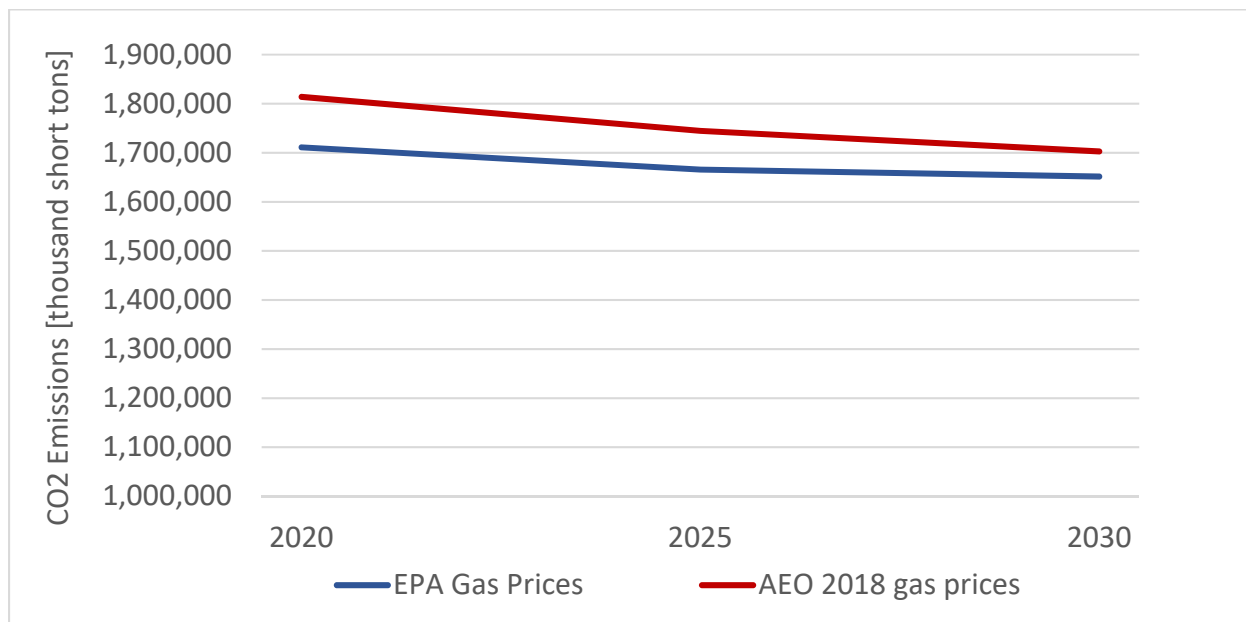


Figure 7: Projected CO<sub>2</sub> emissions under different natural gas prices



The impact of the low gas price assumptions on the policy scenarios is likely similar to the impact of those assumptions on the reference cases. The lower gas price assumptions lead to lower levels of generation from coal and therefore lower emissions. EPA’s lower gas price assumptions dampen the undesired impacts of the ACE rule—including a potential rebound effect—by suppressing coal generation. At the same time, EIA’s most recent modeling for its Annual Energy Outlook shows that the CPP would continue to deliver significant emission reductions even if gas prices are higher than forecast.<sup>28</sup> Under higher gas price assumptions that are more in line with other publicly available forecasts, therefore, EPA would likely have found that the ACE rule results in substantially higher emissions from the power sector than the CPP. Modeling a credible, higher gas price sensitivity that is more in line with EIA’s reference case projections would provide an informative and important range of values for all emissions—including CO<sub>2</sub>, SO<sub>2</sub>, NO<sub>x</sub>, fine particulate matter (PM<sub>2.5</sub>), and ground level ozone. The failure to consider these more-realistic outcomes represents a failure to consider an important aspect of the problem and renders EPA’s analysis invalid and its proposed ACE rule arbitrary and capricious.<sup>29</sup>

<sup>28</sup> See EIA, *Annual Energy Outlook 2018*, Low Oil and Gas Resource and Technology Side Case and Low Oil and Gas Resource and Technology Side Case w/ CPP (2018), [https://www.eia.gov/outlooks/aeo/tables\\_side.php](https://www.eia.gov/outlooks/aeo/tables_side.php) (showing that power sector emissions with the CPP in 2030 would be 1,488 million metric tons in a low oil and gas resource scenario, compared to 1,534 million metric tons in the reference case).

<sup>29</sup> *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983).

### **III. EPA’s modeling bears no rational relationship to the reality it purports to represent.**

The ACE RIA’s modeled policy scenarios are both unrealistic and do not accurately depict the outcomes to be expected under the proposed ACE rule, including the accompanying proposed NSR revisions. First, the proposed ACE rule contains no binding emission guideline in the form of a numeric limit – it merely provides a menu of HRI measures that could modestly improve the heat rate of coal-fired electric generating units (EGUs) and leaves it up to the states to decide which, if any, of these measures to apply.<sup>30</sup> Therefore, EPA’s policy scenarios, which assume that different HRI levels and costs are applied uniformly to all affected coal-fired EGUs, are unrealistic and EPA’s assessment of costs and benefits is too uncertain to meet minimum standards of reasoned agency decisionmaking. EPA’s uncorroborated speculations about what measures states may decide to adopt do not constitute substantial evidence sufficient to support its conclusions.<sup>31</sup>

Second, EPA also assumes no heat rate degradation in its base case, an assumption that is contrary to fact and undervalues the Clean Power Plan. EPA further assumes that turbine blade and economizer upgrades are not available in its ‘No New Source Review (NSR) Reform’ case, based on the agency’s assertion that power plant owners will not choose to install those technologies at the \$50/kW scenario cost out of desire to avoid triggering NSR.

Finally, EPA fails to include any assessment or estimate of the large increases in emissions associated with the significant life extension projects that the agency knows will result from its proposed revisions to NSR.

The ACE RIA’s use of flawed and incomplete modeling is arbitrary and capricious.<sup>32</sup>

#### **A. EPA’s illustrative policy scenarios for the application of its BSER are unrealistic and its assessment of costs and benefits is highly uncertain**

The ACE RIA models what it claims are three “purely illustrative” policy scenarios: (1) 2% HRI at \$50/kW; (2) 4.5% HRI at \$50/kW; and (3) 4.5% HRI at \$100/kW.<sup>33</sup> According to EPA, the 2% HRI scenario represents a policy case that reflects modest improvements in heat rate absent any revisions to NSR requirements while the 4.5% HRI scenarios represent policy cases that

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<sup>30</sup> As discussed in Joint Environmental Comments on BSER Issues and Joint Environmental Comments on Framework Regulations, this approach is unlawful under Clean Air Act Section 111(d).

<sup>31</sup> See, e.g., *Cablevision Systems Corp. v. FCC*, 597 F.3d 1306, 1310 (D.C. Cir. 2010); *Fl. Gas Trans. Co. v. FERC*, 604 F.3d 636, 639 (D.C. Cir. 2010); *Ass’n of Data Processing Serv. Orgs. v. Bd. of Governors*, 745 F.2d 677, 683-84 (D.C. Cir. 1984).

<sup>32</sup> *Columbia Falls Aluminum Co. v. EPA*, 139 F.3d 914, 923 (D.C. Cir. 1998) (“An agency’s use of a model is arbitrary if that model ‘bears no rational relationship to the reality it purports to represent.’” (quoting *American Iron & Steel Inst. v. EPA*, 115 F.3d 979, 1005 (D.C. Cir. 1997))).

<sup>33</sup> ACE RIA at 1-7 to 1-8.

couple HRI with NSR reform.<sup>34</sup> Under each of these policy scenarios, the ACE RIA assumes that the different HRI levels and costs are applied uniformly to all affected coal-fired EGUs.<sup>35</sup>

There are multiple flaws with this analytic approach. First, the proposed ACE rule does not provide a binding, numeric emission guideline – it merely provides a menu of HRI measures that would modestly improve near-term heat rates at coal-fired EGUs and leaves it up to the states to decide which, if any, of these measures to apply.<sup>36</sup> Because the proposed rule does not actually require states to mandate any heat rate improvements or any emission reductions at all, the RIA’s illustrative policy scenarios—under which uniform heat rate improvements are applied across the fleet—are unrealistic, unsupported by substantial evidence, and not representative of outcomes EPA itself says are expected under the proposed rule. According to EPA, key elements of uncertainty in its analysis include “[t]he extent to which all coal-fired EGUs will improve heat rates under this proposal, on average” and “[t]he cost to improve heat rates at all affected coal-fired EGUs nationally.”<sup>37</sup> The RIA further acknowledges that “[t]he cost, suitability, and potential improvement for any of these HRI technologies is dependent on a range of unit-specific factors such as the size, age, fuel use, and the operating and maintenance history of the unit” and “[a]s such, the HRI potential can vary significantly from unit to unit.”<sup>38</sup>

Despite these acknowledgments, the ACE RIA assumes that states will adopt all HRI measures within a specific capital cost range, irrespective of the cost-effectiveness of those measures – in other words, irrespective of the cost per tons of reduction in CO<sub>2</sub> emissions compared to other measures – an unrealistic assumption that is not grounded in any binding emission limitation. Further, EPA provides no ‘test’ specifying how states must implement the HRI measures. With the discretion afforded states under the proposed ACE rule, it is highly unlikely that all states would impose those HRI requirements uniformly for each coal-fired EGU.

The ACE RIA claims to lack sufficient information to assess HRI potential on a unit-by-unit basis,<sup>39</sup> but this is simply not accurate. EPA has ample information available in the National Electric Energy Data System (NEEDS) database and in the Clean Air Markets Division’s other databases to enable the agency to conduct a more robust and granular assessment of unit-, plant-, or even state-level impacts.

The ACE RIA’s assessment of the costs and benefits of the application of its BSER is highly uncertain, but certainly does not reflect what EPA knows and claims will occur. The RIA acknowledges the limitations and uncertainty given the lack of specificity in the proposed rule. But this uncertainty does not relieve EPA’s obligation to analyze the impacts of its proposal

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<sup>34</sup> *Id.*

<sup>35</sup> *Id.* at 1-7.

<sup>36</sup> See Joint Environmental Comments on BSER Issues and Joint Environmental Comments on Framework Regulations for detailed discussions regarding the legal flaws of this approach.

<sup>37</sup> ACE RIA at ES-21.

<sup>38</sup> *Id.* at 1-7.

<sup>39</sup> *Id.*

using modeling assumptions that bear a “rational relationship” to the actual policy proposal.<sup>40</sup> Conducting only a fleet-wide analysis of a plant-specific proposal is arbitrary and capricious.

### **B. EPA’s assumption of no heat rate degradation is contrary to fact**

When evaluating the potential regulatory impacts of its three illustrative HRI policy scenarios, EPA assumes that the base ‘no action’ heat rate for all coal-fired EGUs remains constant over time. In reality, however, EGU heat rates deteriorate over time.<sup>41</sup> EPA’s assumption is therefore contrary to fact and overestimates the efficiency of coal-fired EGUs in the illustrative policy scenarios.<sup>42</sup> EPA’s assumption of no heat rate degradation in its base case also underestimates coal-fired EGU operating costs and coal retirements because the model fails to reflect that these EGUs will become less efficient over time as the EGU’s heat rate degrades and therefore become more expensive to operate. In addition, because the effects of some HRI improvements are short-lived, EPA fails to consider that EGUs may have to frequently make capital investments and spend more on operations and maintenance in order to continue to comply with a standard based on HRI over time.<sup>43</sup>

This deficiency overstates the overall net benefit of EPA’s HRI-only proposal. If, as is reasonable to anticipate, only modest HRI improvements are in fact required in many states, it may well be the case that overall emission rates from covered units in those states merely offset that degradation, resulting in little or no net reduction in the CO<sub>2</sub> emissions from such units. EIA has commissioned an analysis<sup>44</sup> to correct this deficiency in future projections, but EPA has not incorporated this information into its modeling or analysis for this rule. Because the ACE Proposal is based solely on heat rate improvements, EPA’s assumption that EGU heat rates

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<sup>40</sup> See *Chem. Mfrs. Ass’n v. EPA.*, 28 F.3d 1259, 1265 (D.C. Cir. 1994).

<sup>41</sup> EPA, *Greenhouse Gas Mitigation Measures – Technical Support Document for Carbon Pollution Guidelines for Existing Power Plants: Emission Guidelines for Greenhouse Gas Emissions from Existing Stationary Sources: Electric Generating Units* at 2-61 (Aug. 3, 2015).

<sup>42</sup> See Sierra Club’s individual comments on the ACE Proposal at 14-15 (provided to this docket in a separate submission); see also Comments of the Utility Air Regulatory Group on EPA’s Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Proposed Rule at Attachment D (Dec. 1, 2014), Docket ID EPA-HQ-OAR-2013-0602-22768.

<sup>43</sup> See, e.g., Comments of the Electric Power Research Institute at 6-7 (Oct. 15, 2018), Docket ID EPA-HQ-OAR-2017-0355-22738 (“Most heat rate improvement actions and technologies will have an initial cost of implementation. Some have an ongoing cost to operate and maintain. All have a finite lifetime. For example, replacing the seals in a steam turbine upgrade may provide a ½ percent heat rate improvement upon initial installation. However, under normal operating conditions, that gain will slowly diminish and ultimately disappear after ~6 years. If an upset occurs prior to the end of the technology’s normal life – for example, a rough plant startup or shutdown – the entire heat rate improvement could be immediately lost.”).

<sup>44</sup> Memorandum from Jim Diefenderfer, Director, Office of Electricity, Coal, Nuclear, and Renewables Analysis, to Ian Mead, Assistant Administrator for Energy Analysis, Re: Summary of AEO2019 Coal Working Group (June 14, 2018), [https://www.eia.gov/outlooks/aeo/workinggroup/coal/pdf/AEO2019\\_First\\_Coal\\_Working\\_Group\\_summary.pdf](https://www.eia.gov/outlooks/aeo/workinggroup/coal/pdf/AEO2019_First_Coal_Working_Group_summary.pdf).

remain constant without degradation fails to consider an important aspect of the problem and is arbitrary and capricious.

### **C. EPA has entirely failed to analyze the results of the proposed changes to NSR**

Accompanying the ACE Proposal, EPA also proposes revisions to the applicability determination for the NSR program, such that projects that do not increase hourly pollutant emissions rates will not trigger NSR review or any resulting requirement to control increases in actual (tons per year) air emissions. According to EPA the changes to the NSR program being proposed “will provide owners and operators of existing EGUs greater ability to make efficiency improvements without triggering provisions of NSR.”<sup>45</sup> But the proposal is not at all limited to efficiency improvements – it applies to *any* modification made at an existing EGU.<sup>46</sup> As explained below, the ACE RIA analysis is not rationally related to the reality EPA knows will occur under its broad changes to the NSR applicability provisions for EGUs.<sup>47</sup>

#### *1. EPA fails to analyze the increases in emissions associated with life extension projects that would result from the proposed NSR changes.*

As mentioned above, EPA’s 4.5% HRI scenarios are meant to represent policy cases that couple HRI with NSR reform.<sup>48</sup> According to EPA, “this higher heat rate improvement potential is possible because without NSR a greater number of units may have the opportunity to make cost effective heat rate improvements such as turbine upgrades that have the potential to offer greater heat rate improvement opportunities.”<sup>49</sup> EPA states that its 4.5% HRI at \$50/kW represents “an optimistic bounding where NSR reform unleashes significant new opportunity for low-cost heat rate improvements” and its 4.5% HRI at \$100/kW represents “a higher cost scenario, particularly for lower capacity factor units and those with limited remaining useful life.”<sup>50</sup> This analysis fails to include an estimate of the large increases in emissions associated with the life extension projects EPA knows its proposed NSR reforms will encourage. It also fails to consider the higher investment scenarios with NSR requirements in place. Nor does the agency model the impacts of its NSR proposal on air quality and other Clean Air Act programs which the NSR provisions complement.

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<sup>45</sup> ACE RIA at 1-8.

<sup>46</sup> 83 Fed. Reg. at 44,78 (“EPA is proposing to include an hourly emissions increase test for EGUs.”), Table 5 (describing the proposed new NSR applicability test), 44,798-800 (proposed language for new 40 C.F.R. § 51.167(f) and options for the assessment of whether an hourly rate increase is projected due to any physical or operational change at an EGU).

<sup>47</sup> See Joint Environmental Comments on NSR Issues.

<sup>48</sup> ACE RIA at 1-8.

<sup>49</sup> *Id.* Contrary to this assertion, we note that units always have the opportunity to make such improvements, they simply must do so without increasing their annual emissions or undergo NSR, as required by the Clean Air Act.

<sup>50</sup> ACE RIA at 1-8 to 1-9.



For instance, if only 10 percent of the coal-fired EGU fleet adds 30 years to their useful lives through life extension projects, millions of tons of additional carbon pollution will be emitted – along with large increases in other dangerous and toxic air pollution.<sup>51</sup> The proposed physical and operational changes that would escape NSR review (and the requirement to install pollution controls) are *not* limited to heat rate efficiency improvements performed to comply with the guidelines—EPA acknowledges this in asking whether the new effective exemption from NSR *should* be limited to the HRI projects needed to comply with the new guidelines.<sup>52</sup>

EPA has failed to model the air emissions and associated health impacts of the proposed broad effective exemption from NSR, including the effect of the extended plant lifetimes it enables. EPA knows, from its history enforcing NSR, the kinds of EGU life extension projects that can be expected to be undertaken as a result of the changes to NSR applicability included in the proposal, *and* the significant annual emissions increases that can result from such projects, even where the hourly emissions rate for regulated NSR pollution arguably has not increased.<sup>53</sup> EPA nevertheless chose not to model the likely emissions increases that would result, thereby failing to consider an important aspect of the problem.

Finally, the ACE RIA’s analysis does not look far enough into the future. The kinds of life extension projects (even HRI) that will occur in response to the NSR applicability changes EPA proposes will extend the useful lives of the power plant units at which they are undertaken by up to 30 years.<sup>54</sup> EPA must model the impacts of the proposed NSR changes over that time frame if its modeling is to have any relationship to the reality EPA knows it can expect as a result of this proposal.

2. *EPA’s assumptions concerning which HRI technologies are not available in the ‘No NSR Reform’ case are unsupported.*

EPA provides a list of candidate HRI technologies that it has determined are “the most impactful,” including: neural networks and intelligent sootblowers; boiler feed pumps; air heater and duct leakage control; variable frequency drives; blade path upgrade (steam turbine); and economizer redesign or replacement.<sup>55</sup> Many of these projects are among those that are undertaken either as routine maintenance and repair projects, or as part of major life extension projects that would trigger NSR. EPA asserts, based on nothing more than anecdotal evidence provided by the regulated industry, that under business as usual (the ‘No NSR Reform’ case), the

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<sup>51</sup> See Joint Environmental Comments on NSR Issues for discussion of case studies showing the potential for emissions increases.

<sup>52</sup> 83 Fed. Reg. at 44,781 (“EPA is proposing that this NSR hourly emissions test would apply to all EGUs...[and] solicits comment on whether to confine [it] to a smaller subset of the power sector, such as only affected EGUs that are making modifications to comply with...these section 111(d) emissions guidelines.”).

<sup>53</sup> See Joint Environmental Comments on NSR Issues.

<sup>54</sup> *Id.*

<sup>55</sup> ACE RIA at 1-9 to 1-12.

‘steam turbine upgrade’ and the ‘redesign/replace the economizer’ HRI options would not be available because “those are among the efficiency improvements that industry believes will trigger NSR.”<sup>56</sup> For the ‘NSR Reform’ case, EPA assumes that those options would be available for some units.<sup>57</sup> The result of this assumption is to increase the emission reduction benefits of the ‘NSR Reform’ case relative to the ‘No NSR Reform’ case.

These assumptions about the three HRI scenarios are not adequately supported, and as a result EPA’s findings regarding the impacts of the proposed NSR revisions are likewise arbitrary. There is no record evidence demonstrating that an owner or operator of an existing coal plant would not make the decision to upgrade turbine blades or the economizer in order to obtain decades of additional life from older coal fired units, even if NSR were triggered. There is absolutely no discussion in the RIA of the economics of this decision. Moreover, EPA’s analysis conflates *industry* perceptions of the economics of NSR with the decisions that *states* would make in response to an emission guideline. That industry commenters might (correctly or not) see NSR as an impediment to certain HRI technologies when they are considering such investments as a business proposition does not mean that states would decline to direct those HRI investments as part of an emission guideline to limit carbon pollution.

Other evidence suggests that the two categories included in EPA’s list of HRI options but excluded from the ‘No NSR Reform’ case have in fact each been widely used in the past. An industry survey by the Electric Power Research Institute<sup>58</sup> and a separate report submitted to EPA by the Utility Air Regulatory Group in the CPP rulemaking each provide a clear fact-based rebuttal to EPA’s unsupported claim with respect to this issue.<sup>59</sup>

A draft report by Sargent & Lundy provides additional detail with respect to the number of units that have undertaken these upgrades, stating that roughly one-third of the existing coal-fired EGU fleet (over 100 GW) has undertaken turbine blade upgrades.<sup>60</sup> Whether or not those upgrades should have triggered NSR, these data demonstrate that EPA’s assumption that these

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<sup>56</sup> *Id.* at 1-14.

<sup>57</sup> *Id.*

<sup>58</sup> Electric Power Research Institute, *Compilation of Results and Feedback Regarding Turbine Upgrades at Nuclear and Fossil Power Plants* (Nov. 24, 2008), <https://www.epri.com/#/pages/product/1018346/?lang=en>.

<sup>59</sup> Comments of the Utility Air Regulatory Group on EPA’s Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Proposed Rule, Attachment D at 4-3 (Dec. 1, 2014), Docket ID EPA-HQ-OAR-2013-0602-22768 (“Steam turbine upgrades are perhaps the heat rate improving method with the highest payoff, as the payoff results from notable improvements in design compared to legacy equipment (e.g., shape and configuration of blades). Consequently, steam path upgrade vendors have aggressively marketed such upgrades in the last two decades, and plant owners have deployed them in large numbers. . . . [M]any eligible units have already received steam turbine upgrades and further efficiency improvements for the proposed rule are unlikely.”).

<sup>60</sup> Sargent & Lundy, *Efficiency Improvement Techniques for Existing Coal Fired Power Plants for the Reduction of CO<sub>2</sub> Emissions*, Project Number 13147-001, at Table ES-1 (Dec. 27, 2013).

two categories of potential HRI projects should be excluded completely from consideration under its ‘No NSR Reform’ case is unsupported.

EPA’s analysis of its proposed NSR loopholes is inadequate and arbitrary for other reasons as well. EPA’s analysis never considers whether, absent the proposed revisions to NSR, EGU owners might use other mechanisms available to them under the *current* NSR regulations to avoid or mitigate the costs of NSR permitting. For example, EGU owners that are required to undertake HRI improvements could voluntarily adopt an enforceable limitation on annual emissions in order to avoid a projected emissions increase that would trigger NSR.

In addition, as our separate Joint Environmental Comments on NSR Issues point out, EPA’s analysis fails to assess what the costs and emission reduction benefits of NSR *would actually be* if the current regulatory framework were maintained. Instead, the preamble cites qualitative industry assertions about those costs and speculates that any NSR requirements that might result from HRI requirements would be inordinately costly.<sup>61</sup> In light of the many steam EGUs that have already installed controls for sulfur dioxide, nitrogen oxides, and particulate matter, it may well be the case that a NSR permitting process would simply result in many existing EGUs being required to operate their existing controls more consistently. And even if NSR did result in some EGUs being required to install controls for one or more major categories of pollutants, EPA’s RIA never considers how high those costs might be or whether the pollution reduction and health benefits would exceed those costs.

#### **D. EPA has failed to assess other costs and impacts associated with the proposal**

##### *1. Emissions rebound due to heat rate improvements*

As discussed in Part III.C.1. above, modifications that improve heat rate can increase a plant’s operating efficiency (causing it to be called on to run for more hours in a year), or extend its remaining useful life (causing it to run many more years), or both. Either of these circumstances can result in an emissions “rebound” effect that either erodes the emission reductions attributable to the HRI or actually causes a net increase in emissions.<sup>62</sup> The ACE Proposal concludes, without reasoned explanation or substantial evidence, that “system-wide emission decreases from heat rate improvements will likely outweigh any potential emission increases,”<sup>63</sup> even though the ACE RIA finds that system-wide emissions may be equal to or greater than the No CPP base case under some scenarios.<sup>64</sup> Additionally, the analysis does not extend far enough into the future to capture the emissions effect of lifetime-extending HRI modifications.

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<sup>61</sup> 83 Fed. Reg. at 44,775-76.

<sup>62</sup> Resources for the Future, *Carbon Standards Examined: A Comparison of At-the-Source and Beyond-the-Source Power Plant Carbon Standards* (Aug. 2018), <http://www.rff.org/files/document/file/RFF%20WP%2018-20.pdf>.

<sup>63</sup> 83 Fed. Reg. at 44,756 n.17.

<sup>64</sup> See ACE RIA at 3-15, Table 3-5, and 3-17, Table 3-9.

Moreover, as discussed in Part III.A. above, EPA only analyzed the system-wide application of a uniform HRI percentage, despite proposing a rule that would allow states to set varying plant-specific standards. Moreover, irrationally contradicting its own position, the ACE Proposal critiques the CPP for assessing HRI on a system-wide basis.<sup>65</sup> Although it acknowledges that “emissions might increase at some generators,”<sup>66</sup> the ACE RIA offers no reasoned analysis of the potential rebound effects of individual plants increasing generation and emissions.

## 2. State plan development and enforcement costs

As discussed above, the proposed ACE rule contains no binding numeric guideline. Instead, EPA proposes to provide states with a list of candidate HRI technologies that states must evaluate (but need not adopt) when establishing standards of performance.<sup>67</sup>

The ACE RIA itself acknowledges that “[t]he cost, suitability, and potential improvement for any of these HRI technologies is dependent on a range of unit-specific factors such as size, age, fuel use, and the operating and maintenance history of the unit” and “[a]s such the HRI potential can vary significantly from unit to unit.”<sup>68</sup> EPA also provides no requirements governing how states are to implement the HRI measures. Yet, nowhere in the ACE RIA does EPA consider the scope and cost to state and local regulators for undertaking the facility-specific engineering analyses that will be required to determine which HRI measures to impose on each individual EGU within their jurisdiction. As also discussed above, EGU heat rates deteriorate over time. Therefore, heat rates at affected coal-fired EGUs must be assessed over time. However, EPA fails to include any of the costs associated with accurately measuring small changes in HRI at particular EGUs that may deteriorate over time. The ACE RIA lists a number of monitoring, reporting, and recordkeeping costs, but neglects to account for state agency personnel time spent analyzing the availability of each HRI measure at each affected facility in order to determine the appropriate standard for each unit, as well as the costs of monitoring changes in heat rates over time.<sup>69</sup>

Further, the ACE RIA fails to assess the effects of the proposed NSR exemption on other Clean Air Act requirements on states. For example, the proposed NSR revisions could affect state

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<sup>65</sup> 83 Fed. Reg. at 44,756 (“the percent improvement applied as the BSER under CPP was determined at the interconnect-level, and did not take into account remaining useful life or other source-specific factors, which are addressed in this proposed rule”).

<sup>66</sup> ACE RIA at 3-19.

<sup>67</sup> *Id.* 1-7.

<sup>68</sup> *Id.*

<sup>69</sup> *Id.* at 3-10 to 3-14; *see also* Comments of the Electric Power Research Institute at 10 (Oct. 15, 2018), Docket ID EPA-HQ-OAR-2017-0355-22738 (“Under this proposed rule, states are expected to conduct unit specific evaluations of potential heat rate improvements. EPRI is in a unique position having conducted similar evaluations of 19 coal-fired units over a 6-year time period. Evaluating all the coal-fired units in a state will require a large engineering effort. EPRI would estimate those evaluations would cost between \$150,000 and \$200,000 per generating unit.”).

NAAQS attainment, cause increment violations, or contribute to regional haze or visibility impairments. EPA neglected to analyze any of these impacts or assess the costs they might impose on states.

#### **IV. EPA’s assessment of the forgone health benefits of replacing the CPP with the ACE Proposal is flawed.**

EPA must assess *all* costs and benefits of the agency’s proposal—both those benefits related to the direct target of the agency action and those that are ancillary, or “co-benefits.”<sup>70</sup> There is no justification for the ACE RIA’s inclusion of misleading tables that depict only the forgone benefits associated with CO<sub>2</sub> emission reductions and ignore the forgone co-benefits of reducing the other pollutants emitted by power plants—specifically, SO<sub>2</sub>, PM<sub>2.5</sub>, and NO<sub>x</sub>, which is a precursor to ground-level ozone.<sup>71</sup> By presenting the benefits associated with only the so-called “targeted pollutant” and excluding the co-benefits of reducing power plant air pollution, EPA impermissibly obscures the true costs of the ACE Rule.<sup>72</sup>

Moreover, in accounting for the full benefits of power plant emission reductions, EPA must use sound science in calculating the public health benefits of reducing fine particulate matter. Specifically, EPA must exclude from the RIA the scientifically unsupported scenarios where the health benefits of reducing fine particulate matter emissions are assumed to fall to zero at concentrations below certain thresholds. In ACE RIA Tables 6-13 and 6-14, EPA reports undercounted estimates of forgone particulate matter-related benefits: EPA irrationally, with neither reasoned explanation nor substantial evidence, assumed that such benefits drop to zero below the lowest measured levels (LML) of two long-term epidemiological studies, and the PM<sub>2.5</sub> National Ambient Air Quality Standard (NAAQS), respectively.<sup>73</sup>

Many of the signatories to this comment previously submitted comments expressing our deep concerns with EPA’s use of these same thresholds in the RIA supporting the proposed CPP Repeal.<sup>74</sup> We attach those comments here, and reiterate that both long- and short-term exposure

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<sup>70</sup> E.O. 12,866, *Regulatory Planning and Review*, 58 Fed. Reg. 51,735 (Oct. 4, 1993) (“agencies should assess all costs and benefits”); OMB Circular A-4 (Sept. 17, 2003) (“analysis should look beyond the direct benefits and direct costs of your rulemaking and consider any important ancillary benefits and countervailing risks”); E.O. 13,563, *Improving Regulation and Regulatory Review*, 76 Fed. Reg. 3,821 (Jan. 18, 2011) (analysis “must take into account benefits and costs, both quantitative and qualitative”). See also Institute for Policy Integrity, *The Importance of Evaluating Regulatory “Co-Benefits”* (Feb. 2017), [https://policyintegrity.org/files/publications/Co-Benefits\\_Factsheet.pdf](https://policyintegrity.org/files/publications/Co-Benefits_Factsheet.pdf).

<sup>71</sup> See ACE RIA at 4-7, 6-15 to 6-17.

<sup>72</sup> See *Ctr. for Biological Diversity v. Nat’l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1198 (9th Cir. 2008) (agency “cannot put a thumb on the scale by undervaluing the benefits and overvaluing the costs” of a regulation); *Michigan v. EPA*, 135 S.Ct. 2699, 2707 (2015) (“‘cost’ includes more than the expense of complying with regulations; *any disadvantage* could be termed a cost” (emphasis added)).

<sup>73</sup> ACE RIA at 6-16.

<sup>74</sup> Joint Comments of Environmental and Public Health Organizations Specific to the “Regulatory Impact Analysis for the Review of the Clean Power Plan: Proposal” at 13-20 (Apr. 26, 2018), Docket ID EPA-HQ-OAR-2017-0355-21051 (“Joint CPP Repeal RIA Comments”) (Attachment A). See also Kimberly

to PM<sub>2.5</sub> are causally associated with premature mortality and a variety of serious respiratory and cardiovascular harms, and that scientific assessments indicate there is no threshold ambient PM<sub>2.5</sub> concentration below which exposure does not cause deleterious health effects.<sup>75</sup>

In the ACE RIA, EPA purports to present these scenarios as “sensitivity analysis assumptions” under the guise of “transparency,” but the inclusion of these tables serves only to sow uncertainty. In fact, as EPA itself discusses in Chapter 4 of the ACE RIA, these two threshold scenarios are not justified by the science—EPA’s own Integrated Science Assessment for Particulate matter “concluded that the evidence supports the use of a ‘no-threshold’ model and that ‘little evidence was observed to suggest that a threshold exists.’”<sup>76</sup>

Additionally, as discussed above, the ACE RIA fails to assess the emissions impacts of the proposed changes to NSR, which are anticipated to result in significantly increased emissions of SO<sub>2</sub>, NO<sub>x</sub>, and PM<sub>2.5</sub>.<sup>77</sup> As explained above, the modifications that plants may undertake in the absence of NSR requirements could extend the lifetime of those plants by up to 30 years, dramatically increasing those plants’ emissions.<sup>78</sup> The ACE RIA’s failure to account for the expected emissions increases associated with the proposed changes to NSR contribute to the undercounting of the ACE Proposal’s emissions impacts and forgone benefits as a whole, and represents a failure to consider an important aspect of the problem.

Administrator Wheeler frequently emphasizes the significant reductions in emissions of the six criteria air pollutants achieved since 1970.<sup>79</sup> And while it is true that U.S. air pollution has decreased significantly over that nearly fifty years – thanks in large part to the Clean Air Act – recent trends and studies indicate that serious air quality problems remain unaddressed. For example, the total number of unhealthy air quality days for ozone and PM<sub>2.5</sub> have been trending up since 2014,<sup>80</sup> and average ozone levels have increased since 2013.<sup>81</sup> There are 24.4 million more Americans living in areas in nonattainment with the annual PM<sub>2.5</sub> standard than previously thought.<sup>82</sup> Additionally, a recent study indicates that long-term exposure to particulate air

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Castle & Richard L. Revesz, *Environmental Standards, Thresholds, and the Next Battleground of Climate Change Regulations*, NYU School of Law Public Law & Legal Theory Research Paper Series Working Paper No. 18-22, at 35 (Apr. 2018); Comments of Charles T. Driscoll et al., Docket ID EPA-HQ-OAR-2017-0355-20345 at 13 (Apr. 26, 2018).

<sup>75</sup> Joint CPP Repeal RIA Comments at 15.

<sup>76</sup> ACE RIA at 4-21.

<sup>77</sup> See *supra* Part III.C.

<sup>78</sup> *Id.*

<sup>79</sup> See, e.g., Andrew Wheeler, *EPA offers regulatory certainty*, Toledo Blade (Aug. 25, 2018), <http://www.toledoblade.com/opinion/op-ed-columns/2018/08/25/Andrew-Wheeler-Environmental-Protection-Agency-EPA-offers-regulatory-certainty/stories/20180825054/>.

<sup>80</sup> EPA, *Our Nation’s Air* (2018), <https://gispub.epa.gov/air/trendsreport/2018/>.

<sup>81</sup> EPA, *Ozone Trends*, <https://www.epa.gov/air-trends/ozone-trends>.

<sup>82</sup> Daniel M. Sullivan and Alan Krupnick, *Using Satellite Data to Fill the Gaps in the US Air Pollution Monitoring Network*, Resources for the Future (Sept. 2018),

pollution is a greater public health risk factor—and may result in twice as many deaths worldwide—than previously estimated.<sup>83</sup> But even if overall air quality were improving, large numbers of adverse impacts – including premature death and serious illness – continue to occur. Instead of focusing on preventing such unacceptable impacts, EPA has chosen to act arbitrarily by attempting to obscure the co-benefits of reducing power plant emissions and the forgone benefits of failing to reduce those emissions.

The ACE RIA’s attempts to distort the settled science regarding public health harms from industry pollution are especially concerning in light of EPA’s other recent actions to restrict the use of public health research<sup>84</sup> and to manipulate cost-benefit analysis.<sup>85</sup> Together, these proposals signal that EPA is retreating from relying upon the best available, peer-reviewed scientific data and the widely-accepted best practices for regulatory decisionmaking, and the ACE RIA analysis is consistent with that alarming trend.

#### **V. EPA arbitrarily and significantly underestimates the benefits of reducing carbon pollution.**

In assessing the costs and benefits of the proposal to replace the CPP with the ACE Rule, EPA must account for both the long-term and the global benefits of reducing carbon pollution. As discussed above, the ACE RIA’s analytical errors—including entirely failing to assess the emissions impacts of the proposed NSR revisions—result in underestimation of the increases in CO<sub>2</sub> emissions expected under the ACE Rule. In addition, the ACE RIA arbitrarily cuts estimates of the benefits of reducing CO<sub>2</sub> emissions (the social cost of carbon), drastically underestimating the enormous risks associated with climate change. Several of the signatories to these comments also submitted extensive comments on the proposed CPP repeal detailing the flaws in EPA’s use of new “interim” estimates of the domestic-only social cost of carbon.<sup>86</sup> Here, we reiterate those critiques of EPA’s use of the same estimates in the ACE RIA.

In the ACE RIA, as in the CPP Repeal RIA, EPA erroneously claims that OMB Circular A-4 requires “a domestic perspective in our central analysis.”<sup>87</sup> But as previous comments have

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<http://www.rff.org/valuables/research/publications/using-satellite-data-fill-gaps-us-air-pollution-monitoring-network>.

<sup>83</sup> Richard Burnett et al., *Global estimates of mortality associated with longterm exposure to outdoor fine particulate matter*, Proceedings of the National Academy of Sciences (Sept. 2018), <http://www.pnas.org/content/115/38/9592>.

<sup>84</sup> EPA, *Proposed Rule: Strengthening Transparency in Regulatory Science*, 83 Fed. Reg. 18,768 (Apr. 30, 2018).

<sup>85</sup> EPA, *Advance Notice of Proposed Rulemaking: Increasing Consistency and Transparency in Considering Costs and Benefits in the Rulemaking Process*, 83 Fed. Reg. 27,524 (June 13, 2018).

<sup>86</sup> Comments on Flawed Estimates of the Social Cost of Carbon in the Proposed Repeal of Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units (Apr. 26, 2018) (“Joint SCC Comments”) (Attachment B).

<sup>87</sup> ACE RIA at 4-3; CPP Repeal RIA at 43.



shown, ignoring the global impacts of U.S. greenhouse gas emissions is plainly inconsistent with the best available science and economics, with the requirements of the Clean Air Act, and with the relevant executive orders and OMB guidance.<sup>88</sup> In an appendix, the ACE RIA acknowledges the much larger forgone global climate benefits of the ACE Rule: up to \$1.7 billion in 2025, and up to \$3.4 billion in 2035.<sup>89</sup>

EPA's use of a 7% discount rate in the ACE RIA is similarly unjustified. Applying a 7% discount rate in the context of long-term climate effects is inconsistent with best economic practices and contrary to OMB's guidance, including Circular A-4.<sup>90</sup> Moreover, the use of a 7% discount rate undervalues the costs of carbon pollution to future generations, inconsistent with EPA's Clean Air Act obligation to protect public health and welfare.<sup>91</sup> And EPA has offered no reasoned explanation for such an approach.

The Interagency Working Group's (IWG's) 2016 estimate of the social cost of carbon is the best tool the federal government has thus far developed for valuing the impacts of greenhouse gas emissions. However, the IWG's estimates—\$42 per ton for year 2020 emissions and \$50 per ton for year 2030 emissions, at a 3% discount rate—are widely regarded as conservative, and the true social cost of carbon may be far greater.<sup>92</sup> As scientific and economic understanding of the risks of climate change have continued to advance, estimates of the social cost of carbon have increased.<sup>93</sup> At the same time, advancements in the scientific understanding of the magnitude and rate of warming indicate that very significant near-term emissions reductions are necessary to avert the worst climate impacts.<sup>94</sup> Yet the Trump administration has responded by deleting from the ACE RIA references to the mounting evidence of these imminent risks.<sup>95</sup>

In light of the dire and well-established threats of climate change, EPA's use – without reasoned explanation or substantial evidentiary support – of a domestic-only and highly discounted methodology for the social cost of carbon, with benefits estimated at only \$1 to \$2 per ton, is thoroughly unreasonable and arbitrary and capricious.

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<sup>88</sup> Joint SCC Comments at 5-19.

<sup>89</sup> ACE RIA at 7-7 to 7-8. As noted in Part II.A. above, the RIA also inaccurately models the CPP in a way that undercounts its true benefits. Correcting the RIA to better reflect the CPP as it was finalized (and as it was modeled by EPA in the CPP RIA) would demonstrate that the global carbon pollution damages associated with the ACE Proposal are even higher.

<sup>90</sup> Joint SCC Comments at 19-25.

<sup>91</sup> *Id.* at 20.

<sup>92</sup> *Id.* at 1.

<sup>93</sup> See, e.g., Katherine Ricke et al., *Country-level social cost of carbon*, Nature Climate Change (Sept. 24, 2018), <https://doi.org/10.1038/s41558-018-0282-y>.

<sup>94</sup> IPCC, *Special Report: Global Warming of 1.5°C* (Oct. 6, 2018), <http://www.ipcc.ch/report/sr15/>.

<sup>95</sup> Zack Colman & Maxine Joselow, *White House cut climate warnings from rule on power plants*, E&E News (Sept. 5, 2018), <https://www.eenews.net/climatewire/stories/1060095807/>.



## **VI. EPA has failed to properly account for environmental justice concerns and employment impacts.**

EPA entirely failed to conduct any analysis of the distributional air pollution impacts of the proposed ACE rule. EPA also failed to analyze the employment impacts of the proposed rule.

### **A. EPA entirely failed to conduct any analysis of the distributional air pollution impacts of the proposed ACE rule**

Executive Order 12,898 directs federal agencies to identify and address disproportionate adverse health or environmental effects of agency programs, policies, and activities on communities of color and low-income populations within the United States and its territories.<sup>96</sup> Incorporating environmental justice into rulemaking processes is one of EPA's goals under its EJ2020 Action Agenda, which aims to institutionalize "rigorous assessments of environmental justice analyses in rules."<sup>97</sup> OMB Circular A-4, building upon Executive Order 12,866, which provides guidance to agencies on the regulatory analysis required by Executive Order 12,866, provides that a regulatory analysis "should provide a separate description of distributional effects (i.e., how both benefits and costs are distributed among sub-populations of particular concern) so that decision makers can properly consider them along with the effects on economic efficiency."<sup>98</sup>

EPA has failed to provide the required analysis of its proposal. The RIA inadequately includes a one-line acknowledgement that the "proposed rule would affect the level and distribution of air pollutants in the atmosphere."<sup>99</sup> Instead of assessing those impacts, EPA punts: "While the Agency did not perform a quantitative distributional analysis for this proposed policy, the Agency anticipates doing so in the Regulatory Impact Analysis for the final promulgated policy."<sup>100</sup> This approach frustrates the public's ability to understand and comment on the distributional impacts of the ACE Proposal in a way that would inform EPA's final decision and is not enough to satisfy the mandates of Executive Order 12,898, Executive Order 12,866, OMB Circular A-4, or EPA's own policies to integrate environmental justice into all of the agency's activities in order to reduce environmental disparities.<sup>101</sup>

It is well-established that communities of color and low-income communities disproportionately live near power plants and are disproportionately harmed by environmental hazards. EPA has previously demonstrated that it has the capacity to undertake an environmental justice analysis of

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<sup>96</sup> Executive Order 12,898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, 59 Fed. Reg. 7629 (Feb. 16, 1994).

<sup>97</sup> EPA, *EJ 2020 Action Agenda: The U.S. EPA's Environmental Justice Strategic Plan for 2016-2020* at iii (Oct. 2016), [https://www.epa.gov/sites/production/files/2016-05/documents/052216\\_ej\\_2020\\_strategic\\_plan\\_final\\_0.pdf](https://www.epa.gov/sites/production/files/2016-05/documents/052216_ej_2020_strategic_plan_final_0.pdf).

<sup>98</sup> OMB Circular A-4 at 14.

<sup>99</sup> ACE RIA at 5-7.

<sup>100</sup> *Id.*

<sup>101</sup> *See* EPA, *EJ 2020 Action Agenda*.

its proposals. In the CPP proposed rule EPA provided a proximity analysis which, using its EJSCREEN tool, analyzed demographical and pollution burden data for populations living near power plants affected by the rule.<sup>102</sup> This analysis concluded that a higher percentage of people of color and low-income communities live near power plants compared to the national averages.<sup>103</sup> Communities of color and low-income communities thus face greater exposure to pollution from power plants such as SO<sub>2</sub>, NO<sub>x</sub>, PM<sub>2.5</sub>, and hazardous air pollutants, and EPA discussed the environmental conditions faced by overburdened communities in the Clean Power Plan final rule.<sup>104</sup>

Similarly, many authoritative climate assessments have found that communities of color and low-income communities are most vulnerable to the impacts of climate change. The Third National Climate Assessment, for example, stated: “Climate change will disproportionately affect low-income communities and some communities of color. . . raising environmental justice concerns. Existing health disparities and other inequities increase vulnerability. Climate change related issues that have an equity component include heat waves, air quality, and extreme weather and climate events.”<sup>105</sup>

EPA must provide, at a minimum, a distributional analysis of the proposed ACE rule, and make it available for public comment *before* finalizing any action. This is particularly critical in light of the high likelihood that the proposal – including the proposed emission guideline, the proposed amendments to the framework regulations removing the requirement that EPA issue binding numerical emission limits, and the proposed changes to the NSR program – will affect and likely increase pollution from power plants, disproportionately located near environmental justice communities. As discussed further in the Joint Environmental Comments on Framework Regulations, BSER Issues, and NSR Issues, the proposal will make it more difficult for EPA to enforce and ensure compliance with the level of emission reductions required by the Clean Air Act, and as such presents an environmental justice concern.<sup>106</sup>

EPA’s environmental justice guidance states that three questions that should be addressed to assess differential impacts are: (1) are there potential EJ concerns associated with environmental stressors affected by the regulatory action for population groups of concern in the baseline? (2) are there potential EJ concerns associated with environmental stressors affected by the regulatory action for population groups of concern for each regulatory option under consideration? and (3)

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<sup>102</sup> 80 Fed. Reg. at 64,915.

<sup>103</sup> EPA, *EJ Screening Report for the Clean Power Plan* (2015), <https://archive.epa.gov/epa/sites/production/files/2016-04/documents/ejscreencpp.pdf>.

<sup>104</sup> 80 Fed. Reg. at 64,941.

<sup>105</sup> U.S. Global Change Research Program, *Climate Change Impacts in the United States: The Third National Climate Assessment; Chapter 9: Human Health* at 229 (2014), <https://nca2014.globalchange.gov/report/sectors/human-health>.

<sup>106</sup> EPA, *Guidance on Considering Environmental Justice During the Development of Regulatory Actions* 11 (May 2015), <https://www.epa.gov/environmentaljustice/guidance-considering-environmental-justice-during-development-action> (“EPA EJ Guidance”).

for each regulatory option under consideration, are potential EJ concerns created or mitigated compared to the baseline?<sup>107</sup> EPA has failed to address these questions or to consider other regulatory options which will benefit environmental justice communities instead of increasing the environmental burdens they face. EPA must address these analytical questions for each of these components of the proposal.

EPA's environmental justice guidance describes the specific type of information EPA should provide in its analysis to increase transparency: information about the specific populations and individuals affected by the regulatory action; main exposure pathways and expected health and environmental outcomes; evidence for why risk, exposure, or outcomes may vary by population group; relevant geographic scale; descriptions of the main methods of analysis used; summary statistics for the baseline and each regulatory option (both the mean and distribution) by population group; an easy-to-understand description of what the summary statistics show; conclusions based on the information available; robustness of results across options presented and; data quality and limitations that affect conclusions regarding potential differential impacts.<sup>108</sup>

EPA must withdraw this unlawful proposal and repropose an emission guideline for power plants that ensures emissions reductions and meets the requirements of Section 111. However, if EPA insists on finalizing this unlawful proposal, recognizing that a robust (and accurate) analysis is a challenge because EPA is not establishing a numeric guideline, at the very least this analysis must include: information about the power plants that adversely affect environmental justice communities (the baseline) and how the proposed rule may affect those communities; information about the pollutants those plants emit; the expected potential increase or decrease in those pollutants on the basis of the emissions increases expected from the measures that EPA has allowed for compliance with the guideline; and the corresponding impact on public health. At the very least this analysis should compare the emissions outlook estimated by EPA in the ACE proposal with the benefits expected under the CPP. It would be arbitrary for EPA to finalize a proposal without any information about how environmental justice communities would be adversely affected and without providing protections to ensure there are no disparate impacts, intentional or unintentional, from the proposal. EPA must map air pollution and calculate air impacts from the pollution increases expected from the ACE rule by using models such as BenMAP, (again) understanding that the expected adverse impact could be much worse in light of the fact that there is no known target for affected power plants. EPA must also map the demographics and pollution burden in areas affected by plants that the agency knows need capital improvements that would constitute major modifications triggering NSR, as well as the effect of the proposed exemption of these plants from these requirements.

This analysis must also assess the climate-related impacts of the proposal on environmental justice communities and the harm that will occur to these communities from a lack of more

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<sup>107</sup> EPA, *Technical Guidance for Assessing Environmental Justice in Regulatory Analysis* 11 (June 2016), [https://www.epa.gov/sites/production/files/2016-06/documents/ejtg\\_5\\_6\\_16\\_v5.1.pdf](https://www.epa.gov/sites/production/files/2016-06/documents/ejtg_5_6_16_v5.1.pdf).

<sup>108</sup> *Id.* at 46.

aggressive action to limit carbon pollution from the power sector. Moreover, OMB Circular A-4 provides: “Where distributive effects are thought to be important, the effects of various regulatory alternatives should be described quantitatively to the extent possible, including the magnitude, likelihood, and severity of impacts on particular groups. You should be alert for situations in which regulatory alternatives result in significant changes in treatment or outcomes for different groups.”<sup>109</sup> In light of this, EPA must analyze the distributional impacts of the ACE rule for environmental justice communities compared to the Clean Power Plan.

EPA must provide an analysis of the adverse health impacts of this rule and how they will be distributed. In the RIA, EPA provides limited analysis of the foregone climate and human health co-benefits of the rule. EPA acknowledges that as compared to the Clean Power Plan, the proposal will increase emissions of CO<sub>2</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>x</sub>, and mercury.<sup>110</sup> However, EPA states that because of “timing constraints” it did not conduct explicit air quality modeling for each of the base cases and illustrative scenarios.<sup>111</sup> Additionally, EPA states that it was unable to quantify or monetize “several important benefit categories” including “forgone co-benefits associated with exposure to several [hazardous air pollutants] (including mercury and hydrogen chloride), SO<sub>2</sub> and NO<sub>2</sub>, as well as ecosystem effects, and visibility impairment.”<sup>112</sup> EPA must not promulgate a replacement rule without fully analyzing all of the impacts when it has a final rule that is anticipated to have better public health outcomes—the Clean Power Plan—already in place.

EPA has also failed to provide for meaningful involvement of environmental justice communities in this proposal. EPA’s environmental justice guidance states an environmental justice concern may be implicated when “the Agency does not provide meaningful involvement opportunities to minority populations, low-income populations, tribes, and indigenous peoples during the development of the action.”<sup>113</sup> EPA defines meaningful involvement as “1) potentially affected populations have an appropriate opportunity to participate in decisions about a proposed activity [i.e., rulemaking] that will affect their environment and/or health; 2) the population’s contribution can influence [the EPA’s] rulemaking decisions; 3) the concerns of all participants involved will be considered in the decision-making process; and 4) [EPA will] seek out and facilitate the involvement of populations potentially affected by EPA’s rulemaking process”<sup>114</sup> EPA has acknowledged that to achieve this goal “rule-writers will likely need to go beyond the minimum requirements of standard notice and comment procedures and engage minority populations, low-income populations, tribes, and indigenous peoples early in the process.”<sup>115</sup> Yet by

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<sup>109</sup> OMB Circular A-4 at 14.

<sup>110</sup> ACE RIA at 4-1.

<sup>111</sup> *Id.* 4-11.

<sup>112</sup> *Id.* at 4-45.

<sup>113</sup> EPA EJ Guidance at 10-11.

<sup>114</sup> *Id.* at 32.

<sup>115</sup> *Id.* at 10-11.

providing a mere 60-day comment period and only one public hearing, EPA has provided only the bare minimum of participation. This does not constitute meaningful engagement of communities. In order to ensure that the distributional impacts of this proposed action are fully considered, EPA must ensure that environmental justice communities participate in the process.

Further, meaningful involvement of affected communities will not be attained by EPA merely providing a distributional analysis in a final rule. In order to actually allow for environmental justice communities to engage in and have a voice in this process, EPA must provide an accessible distributional analysis and allow for a comment period in which communities can consider the analysis and provide feedback and any concerns they have on the analysis itself or on EPA's decision-making in light of the analysis. This is further supported by Executive Order 12,866, which requires agencies to provide the public "a meaningful opportunity to comment on any proposed regulation," which at minimum would be 60 days. Without full information about how the climate and air benefits and costs will be distributed it is impossible for environmental justice communities, who are key stakeholders to this rule, to have a meaningful opportunity to comment on the rule.

#### **B. EPA similarly failed to analyze the employment impacts of the ACE Proposal**

The ACE RIA does not include any quantitative analysis of the employment impacts of the proposed ACE rule. EPA claims that "[g]iven the range of approaches to heat rate improvements that may be used to meet the requirements of the proposed rule, and the flexibility for States to determine these requirements, it is challenging to quantify the associated employment impacts."<sup>116</sup> The RIA then proceeds to dismiss the employment impacts of the proposed rule by concluding that EPA "expects there may be potential for changes in the amount of labor needed in different parts of the utility power sector, but overall employment impacts are expected to be relatively small."<sup>117</sup> According to EPA, "[t]he pattern of how these impacts may be distributed, across projected changes in electricity generation, by fuel type, indicates that coal-fired power sector employment and coal mining employment may be unaffected or positively impacted by this rule, whereas natural gas generation and fuels, nuclear, and renewable generation employment may be unaffected or negatively impacted by the rule."<sup>118</sup>

This is in stark contrast to EPA's analysis of employment impacts in the Clean Power Plan. In fact, the ACE RIA ignores EPA's own modeling of the Clean Power Plan, which found that new jobs associated with renewable energy production and demand-side energy efficiency are expected to far exceed any job losses associated with coal extraction and generation.<sup>119</sup> Studies have also shown that per dollar invested, solar and wind projects generate double the number of

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<sup>116</sup> ACE RIA at 5-11.

<sup>117</sup> *Id.*

<sup>118</sup> *Id.*

<sup>119</sup> 82 Fed. Reg. at 64,881; *see also* Joint CPP Repeal RIA Comments at 27-30.

jobs compared to fossil fuel projects.<sup>120</sup> According to a June 2017 analysis by Environmental Entrepreneurs, the Clean Power Plan could add up to 560,000 jobs and \$52 billion in economic value in 2030.<sup>121</sup>

The ACE RIA not only fails to rebut the Clean Power Plan’s robust record on employment and the economy—it offers absolutely no evidence of the overall economic effect that it now claims would result from replacing the Clean Power Plan with the ACE Proposal. EPA must remedy these deficiencies before finalizing the proposal.

## VII. Conclusion

The analysis in the ACE RIA shows that the ACE Proposal would likely increase emissions at a significant net cost compared to the CPP. Given the flaws and inadequacies we identify here, relying on the ACE RIA analysis to justify finalizing the ACE Proposal, or any of its component parts, would constitute arbitrary and capricious decisionmaking.

Respectfully submitted,

Appalachian Mountain Club  
Center for Biological Diversity  
Clean Air Council  
Clean Air Task Force  
Clean Wisconsin  
Coalition to Protect America’s National Parks  
Conservation Law Foundation  
Earthjustice  
Environmental Defense Fund  
Environmental Law & Policy Center  
Minnesota Center for Environmental Advocacy  
National Parks Conservation Association  
Natural Resources Defense Council  
Sierra Club  
Union of Concerned Scientists

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<sup>120</sup> Environmental Integrity Project, *Don’t Believe The “Job Killer” Hype: Decades of Economic Research Show that Environmental Regulations are Good for the Economy* (Jan. 16, 2017), <http://www.environmentalintegrity.org/wp-content/uploads/2017/01/Jobs-and-environment-report.pdf>.

<sup>121</sup> Environmental Entrepreneurs, *Opportunity Lost: How Rolling Back the Clean Power Plan Hurts America’s Economy* (June 2017), <https://www.e2.org/wp-content/uploads/2017/06/FINAL-CPP-jobs-report-6.21.17.pdf>.