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March 18, 2019

U.S. Environmental Protection Agency
EPA Docket Center
Docket ID No. EPA-HQ-OAR-2013-0495
Mail Code 28221T
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Attention: Docket ID No. EPA-HQ-OAR-2009-0234

Re: Comments of the National Mining Association on Proposed Rule, "Review of Standards of Performance for Greenhouse Gas Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units," 83 Fed. Reg. 65,424 (Dec. 20, 2018)

Dear Administrator Wheeler:

The National Mining Association (NMA) submits these comments in response to the U.S. Environmental Protection Agency's (EPA) proposed rule, "Review of Standards of Performance for Greenhouse Gas Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units," 83 Fed. Reg. 65,424 (Dec. 20, 2018). NMA is the national trade association representing the producers of most of America's coal, metals, industrial and agricultural minerals; the manufacturers of mining and mineral processing machinery, equipment and supplies; and engineering, transportation, financial and other businesses that serve the mining industry. NMA has been involved in every aspect of the rulemaking under reconsideration in this proposed rule. NMA's members have a significant and direct economic and business interest in the outcome of this rulemaking.

As provided in greater detail in our attached comments, NMA supports the agency's reconsideration of the Clean Air Act Section 111(b) new source performance standards for coal-fired electric generating units (EGUs) that the agency promulgated in 2015. EPA's proposal to amend its previous determination that partial carbon capture and storage (CCS) is the best system of emissions reduction (BSER) for newly constructed coal-fired steam generating units (EGU) is a critical step to ensuring that fuel-secure baseload power is available in the United States in the future. EPA's new BSER determination – the most efficient demonstrated steam cycle (*e.g.*, supercritical steam conditions for large units and subcritical steam units for small units) in combination with the best operating practices – represents a return to a sound and lawful standard that provides a path forward for commercially viable, advanced coal technology. This technology produces real and substantial emission reductions while maintaining a diverse, reliable and affordable electricity supply. By removing the unachievable CCS-based standard, EPA's revised BSER ensures that the market, not the government, will determine the future viability of new coal-fired EGUs.

While NMA fully supports EPA's proposed BSER determination, NMA is concerned that the agency's proposed standards of performance may not provide sufficient compliance margins to ensure the standards are realistically achievable. The proposed emission rates – 1900 pounds per megawatt-hour (lb/MWh) for new large units and 2000 lb/MWh for small units – are a significant improvement over the 2015 rule. NMA, however, urges EPA to reevaluate the level of the standard to ensure it can be met under actual operating conditions. In particular, NMA recommends that the agency reexamine its "normalizing" methodology, which does not appropriately account for unavoidable natural variability in carbon dioxide (CO_2) emission rates and the inevitable degradation in performance of new units over time.

In addition, NMA strongly urges EPA to adopt a separate subcategory for lignite-fired EGUs. These facilities are substantially different from their bituminous, subbituminous and anthracite counterparts, which have inherently different moisture and heat content levels. Simply put, lignite-fired EGUs are unable to achieve the same levels of efficiency or CO_2 emissions per amount of electricity generated. Consequently, EPA's one-size-fits-all CO_2 standard is not appropriate. EPA's assumptions that "ultra-supercritical" steam cycle technology and drying technology could surmount these differences are unavailing. In the end, EPA's proposal puts forth an unachievable standard that would result in the unfair disincentive for the use of lignite coal, which would have significant economic repercussions for the coal mining industry. Consequently, a separate standard for lignite-fired EGUs is warranted. NMA also recommends that EPA establish separate standards for low duty cycle units and low load operation, regardless of coal type.

Finally, NMA opposes a standard of performance for "small modifications" that affect a unit's CO_2 emission rate by less than 10 percent. These modifications will be difficult to identify, creating significant compliance uncertainty and risk, yet provide no environmental benefits. Furthermore, to the extent any separate standard for reconstructed units is needed at all, NMA urges EPA to adopt a standard for reconstructed units that resembles the standard for large modifications.

NMA appreciates this opportunity to comment on EPA's proposed rule and encourages EPA to finalize this rulemaking as expeditiously as possible. If you have any questions regarding NMA's comments, please contact Tawny Bridgeford, NMA's Deputy General Counsel and Vice President of Regulatory Affairs, at tbridgeford@nma.org.

Sincerely,

Katie Sweeney

ENVIRONMENTAL PROTECTION AGENCY

REVIEW OF STANDARDS OF PERFORMANCE FOR GREENHOUSE GAS EMISSIONS FROM NEW, MODIFIED, AND RECONSTRUCTED STATIONARY SOURCES: ELECTRIC UTILITY GENERATING UNITS

83 Fed. Reg. 65424 (Dec. 20, 2018)

EPA–HQ–OAR–2013–0495

COMMENTS OF THE NATIONAL MINING ASSOCIATION

March 18, 2019

TABLE OF CONTENTS

Page

TABLE OF CONTENTS
(continued)

Page

EXECUTIVE SUMMARY

The National Mining Association (NMA) submits these comments on the proposed revisions to the standards of performance for greenhouse gas (GHG) emissions from new, modified, and reconstructed electric generating units (EGUs) issued by the Environmental Protection Agency (EPA or Agency) under Section 111(b) of the Clean Air Act (CAA).[1] NMA is a nonprofit incorporated national trade association whose members include the producers of most of America's coal, metals, and industrial and agricultural minerals; manufacturers of mining and mineral processing machinery, equipment, and supplies; and engineering and consulting firms that serve the mining industry.

NMA supports the proposed revisions to the Section 111(b) standards. As NMA asserted its 2014 comments on the current standards,[2] and as explained further below, the best system of emission reduction (BSER) that has been adequately demonstrated and can be applied to reduce GHG emissions from a new coal-fired EGU (primarily carbon dioxide (CO_2)) is a highly efficient steam cycle. As compared to less advanced designs, today's state-of-the-art high-efficiency, low-emitting supercritical[3] boiler technology is capable of cost-effectively reducing GHG emissions per unit of energy produced by more than 20 percent.

By proposing to determine that an efficient steam cycle constitutes the BSER for coal-fired EGUs under Section 111(b), EPA has rightly chosen to correct the mistake it made by identifying carbon capture and sequestration (CCS) as the BSER in 2015. While perhaps a promising technology for the future, CCS has yet to be adequately demonstrated. Although

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[1] *Review of Standards of Performance for Greenhouse Gas Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units*, 83 Fed. Reg. 65424 (Dec. 20, 2018).
[2] NMA Comments on *Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units*, 79 Fed. Reg. 1430 (Jan. 8, 2014) (Docket ID EPA-HQ-OAR-2013-0495-9201) ("NMA 2014 Comments").
[3] Like EPA's proposal, these comments will use the term "supercritical" to refer to all forms of highly efficient boiler designs, including supercritical, ultra-supercritical, and advanced ultra-supercritical steam generators.

unique circumstances have led to the recent development of a single fully integrated CCS system in Canada, that one-of-a-kind example does not sufficiently demonstrate a system of emission reduction that can be deployed across the industry as a whole. Quite the opposite, commercial-scale CCS projects have far more commonly faced insurmountable challenges, even with substantial government assistance. For instance, the only domestic CCS project currently in operation treats merely a slipstream from one medium-sized EGU, and the CCS system itself cannot function without the help of an entirely separate fossil-fueled EGU, resulting in additional GHG emissions that likely render compliance with EPA's current standard impossible. Never before has EPA considered such minimal operating experience to be an adequate demonstration for a standard of performance under Section 111 of the CAA.

Even if the minimal experience with CCS to date were enough to qualify as a reliable demonstration of the technology, CCS certainly is not the "best" system for reducing GHG emissions from new coal-fired power plants. CCS remains both cost-prohibitive and insufficiently available. It would make new coal-fired EGUs more expensive than any other conceivable form of new electricity generation capacity. Even if a company succeeded in building a new coal-fired EGU with CCS, it would be too costly to run. Instead of advancing CCS technology, EPA's current standard of performance ensures CCS is too risky to even try, as confirmed by EPA's projection that no new coal-fired EGUs will be built anytime soon while the CCS standard remains on the books. That projection is also heavily influenced by recent and entirely unanticipated market shifts, including the Great Recession and the development of competing (and far less regulated) fossil energy resources. Combined with the heavy burden of EPA regulations, the lack of new coal projects should come as no surprise, but it is neither inevitable nor irreversible.

By removing the unachievable CCS-based standard, EPA's revised BSER would ensure that the market, not the government, will determine the future viability of new coal-fired EGUs. Then, when the next unanticipated market shifts occur, the industry can be ready to respond by building units capable of efficiently utilizing the nation's most abundant natural resource capable of providing dispatchable electricity generation—coal. In fact, recent analyses confirm that new coal-fired EGUs can be competitive even with relatively minor market shifts, so long as EPA finalizes its proposal to make the standard of performance for new sources, in fact, achievable.

Although NMA fully supports EPA's proposed BSER determination of supercritical design, the standards of performance that EPA has crafted to reflect that BSER raise several concerns. First, EPA's proposed standard, which is based on "normalizing" the best performance ever achieved, may not provide sufficient compliance margin. NMA encourages EPA to reevaluate the level of the standard to ensure it can be met under actual operating conditions, much like the other standards that EPA has previously established for other industries, including the standards for GHG emissions from gas-fired combustion turbines. Second, while NMA supports EPA's decision to adopt a common standard for bituminous and subbituminous coal-fired EGUs, NMA asks EPA to consider adopting a separate standard for the subcategory of lignite coal-fired EGUs, much like the separate standard EPA has proposed for coal-refuse EGUs. Since both lignite-fired EGUs and coal refuse-fired EGUs cannot operate at the same level of efficiency as other types of coal-fired EGUs, separate standards are warranted. Third, NMA asks EPA to remove industrial units from the standards for EGUs because EPA has neither identified a demonstrated BSER for those sources nor determined whether those sources could achieve the standards.

That said, NMA supports many attributes of EPA's proposed standards, such as the 12-month averaging approach, the option of converting the standards to a net-generation basis, and the alternatives for part-load operation or low-"duty cycle" units. Those aspects of the proposed standards will provide much needed flexibility to ensure compliance is achievable and the emission reductions are cost-effective. In the comments below, NMA also recommends several potential options for providing additional flexibility and compliance assistance, such as expanding the opportunities for EGUs seeking to employ emerging technologies, such as CCS.

Finally, NMA provides input on EPA's proposals for modified and reconstructed units. Specifically, NMA opposes a standard of performance for "small modifications" that affect a unit's CO_2 emission rate by less than 10 percent. Such "small modifications" will be difficult to identify, and thus create significant compliance uncertainty and risk. Moreover, a standard for "small modifications" would provide no environmental benefits because it would be duplicative—all existing EGUs, whether modified or not, will soon be subject to efficiency-based standards of performance under state plans adopted pursuant to EPA's Section 111(d) emission guidelines.

In addition, NMA asks EPA to reconsider whether an existing coal-fired EGU that is deemed to be "reconstructed" could cost-effectively install an entirely different steam cycle. Because the economic and technical viability of such a conversion is likely to be highly case-specific, EPA should consider adopting a standard for reconstructed units that resembles the standard for large modifications, to the extent any separate standard for reconstructed units is needed at all. That approach would allow state permitting authorities to establish a site-specific standard based on historical operating experience and realistic opportunities for improvement. Like existing units that are "modified," existing units that are "reconstructed" will already be subject to state plan requirements under Section 111(d), suggesting that overly prescriptive regulation of "reconstructed" units under Section 111(b) is largely unnecessary and could be counter-productive.

Each of these comments, and many others, are detailed in the sections that follow. Section I supports EPA's determination that the BSER for coal-fired EGUs is the most efficient demonstrated steam cycle, not CCS or any other system. Section II comments on the performance standards based on the BSER, which both support those standards generally but also ask EPA to reevaluate certain key concerns, such as the need for additional compliance margin to account for natural variability and degradation. Section III responds to the wide variety of other requests for comment that EPA included in its proposal, including comments related to EPA's proposed standards for reconstructed and modified units. Finally, Section IV comments on EPA's analysis of the potential economic and environmental impacts of the proposal.

I. EPA's BSER Determination Is Correct and Lawful.

At the heart of the proposal is EPA's new BSER determination for new coal-fired EGUs. With that determination, EPA is exercising its authority under Section 111 of the CAA to select the "best" "adequately demonstrated" "system of emission reduction" for an industrial source category.[4] Specifically, EPA has proposed to find that, for CO_2 emissions from new coal-fired EGUs, the "BSER" is the most efficient steam cycle and best operating practices to maximize the efficiency, and thus minimize the CO_2 emissions. That choice is highly reasonable, and NMA supports it.

[4] 42 U.S.C. § 7411(a) & (b) (defining "standard of performance" as one that reflects the "best system of emission reduction which … the [EPA] Administrator determines has been adequately demonstrated.").

However, EPA appropriately recognizes that this new BSER determination is a reversal of EPA's prior determination in 2015 that the BSER is partial CCS. Although that prior determination by no means precludes EPA's ability to reevaluate the information available and reach a different conclusion, it does mean that EPA must explain its change of heart by fully evaluating the information underlying its prior decision. The courts have long recognized agencies' inherent authority to re-evaluate a prior determination and reach a different conclusion,[5] so long as the agency demonstrates that the new determination is permissible under the statute and there are good reasons for it.[6] EPA has done exactly that in its proposal and, in doing so, has reached a far more reasonable conclusion. NMA supports both EPA's method of evaluation and its ultimate conclusion—that an efficient steam cycle is the BSER; and, almost as importantly, CCS is not.

A. The Most Efficient Steam Cycle Is the BSER Because It Will Reduce Emissions Cost-Effectively with Available Technology.

Unlike many air emissions from industrial processes, CO_2 cannot be treated by converting it into benign elements and compounds. Whereas sulfur dioxide (SO_2) can be converted into gypsum via flue gas desulfurization, and nitrogen oxides (NO_x) can be converted into elemental nitrogen and water via selective catalytic reduction (SCR), CO_2 cannot be neutralized with any known back-end control device. Thus, the options for addressing CO_2

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[5] 83 Fed. Reg. at 65434 (collecting cases on EPA's authority to revise existing regulations).

[6] *FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 515 (2009) ("[O]f course the agency must show that there are good reasons for the new policy. But it need not demonstrate to a court's satisfaction that the reasons for the new policy are better than the reasons for the old one; it suffices that the new policy is permissible under the statute, that there are good reasons for it, and that the agency believes it to be better, which the conscious change of course adequately indicates. This means that the agency need not always provide a more detailed justification than what would suffice for a new policy created on a blank slate. Sometimes it must--when, for example, its new policy rests upon factual findings that contradict those which underlay its prior policy; or when its prior policy has engendered serious reliance interests that must be taken into account. … In such cases it is not that further justification is demanded by the mere fact of policy change; but that a reasoned explanation is needed for disregarding facts and circumstances that underlay or were engendered by the prior policy.")

emissions from any industrial stationary source are limited to either reducing the rate at which the CO_2 is generated or capturing the CO_2 and disposing of it (or finding some use for it). In that way, CO_2 is more like particulate matter (PM), which is typically captured via baghouses or electrostatic precipitators (ESPs) and disposed of in landfills. However, while technology capable of PM controls is well-known, widely available, and cost-effective, the technology needed to capture and dispose of CO_2 in similar fashion remains unavailable and exorbitantly costly. Of the remaining options, all of which actually reduce the generation of CO_2 in the first instance, the most efficient steam cycle is clearly the "best."

As noted by EPA, the most efficient demonstrated steam cycle for coal-fired EGUs is a "supercritical" steam cycle—*i.e.*, one that "operates at pressures in excess of the critical pressure of water and heats water to produce superheated steam without boiling." With supercritical boiler technology comes a significant boost in efficiency levels compared to lower-pressure "subcritical" steam cycles that must first boil water before generating superheated steam. Although steam turbines capable of accepting the superheated and highly pressurized steam from a supercritical steam cycle are only available for coal-fired EGUs above a certain size,[7] the vast majority of the most recently constructed coal-fired EGUs in the United States have been large enough to employ a supercritical steam turbine.[8]

The improvement in efficiency with supercritical technology, and the resulting reduction in CO_2 emission rate, is significant. With a supercritical steam cycle, a new coal-fired EGU can reduce CO2 emissions by 20 percent or more below the emission rate associated with less

[7] 83 Fed. Reg. at 65448 ("steam turbines that operate on supercritical steam are currently not commercially available for smaller coal-fired EGUs.").
[8] *See* EPA Memorandum, "*Best System of Emissions Reduction (BSER) for Steam Generating Units and Integrated Gasification Combined Cycle (IGCC) Facilities*," at (December 2018) ("EPA BSER Memo") (listing nine units constructed between 2008-2012 that ranged in size from 2,800 to 8,100 mmBtu/hr.).

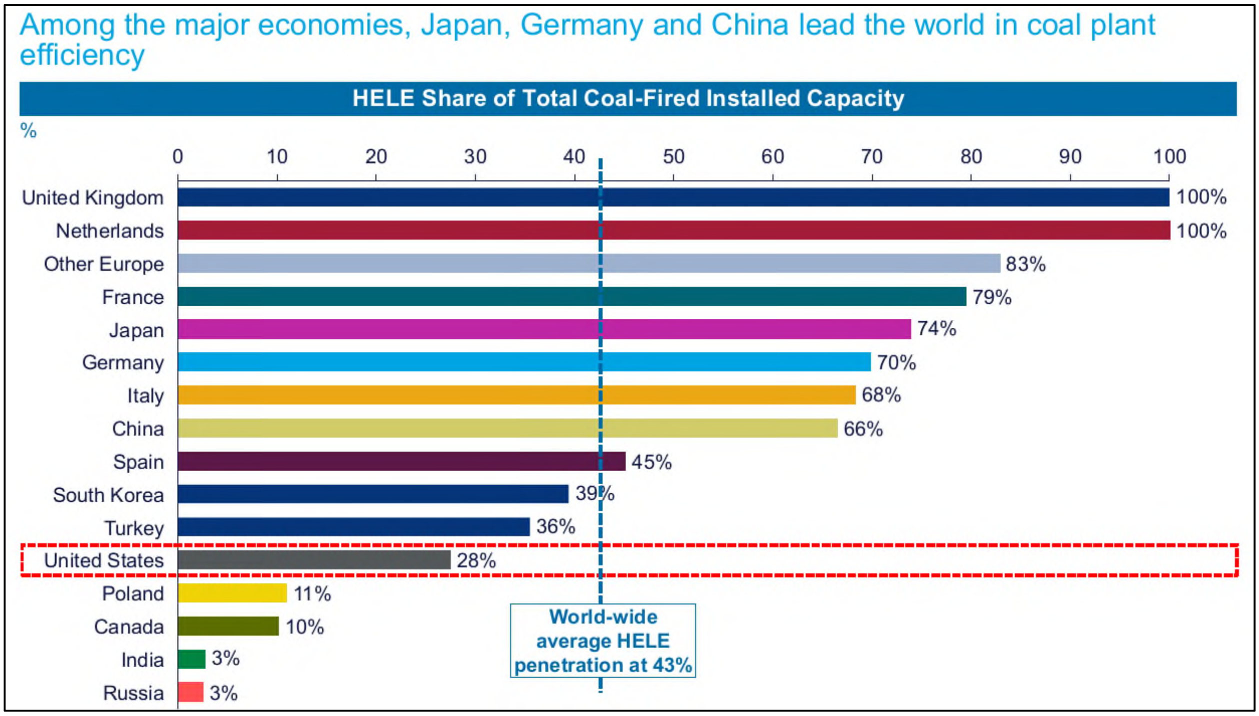
advanced steam cycles. In 2015, EPA complained that the emission reductions from supercritical technology would not be "meaningful,"[9] but EPA never explained why. EPA's decision to ignore the benefits of supercritical steam cycle was a mistake because the facts are clear—supercritical steam cycles represent a substantial improvement.

Based on data compiled in 2014 from EPA's Clean Air Markets Division (CAMD) database and the database supporting EPA's Mercury and Air Toxics (MATS) rulemaking, the average emission rate of subcritical units (less than 1,600 psia) was 2,293 pounds per megawatt-hour of CO_2 (lb/MWh), which is 20.5% higher than the average emission rate of 1,902 lb/MWh for supercritical units (greater than 3,200 psia).[10] The difference between the two technologies becomes even more clear when comparing the best performing supercritical units with the lowest performing low-pressure subcritical units—a difference of 32%—which is perhaps the more appropriate point of comparison, given that the lowest performing units are more likely to retire and be replaced with newer units that are likely to be the best performing.

In fact, the replacement of older units with more advanced and lower emitting units was already occurring within the coal-fired EGU fleet before 2012, with low efficiency units being replaced by higher efficiency units, resulting in real emission reductions overall.[11] That trend, if allowed to continue, would have reduced emissions for decades, given that currently only 28 percent of the coal-fired EGUs in the United States are supercritical.[12] At that level, the United States ranks only 12th in the world on the use of supercritical technology, as illustrated by the

[9] *Standards of Performance for Greenhouse Gas Emissions From New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units*, 79 Fed. Reg. 64510, 64548 (Oct. 23, 2015).
[10] NMA 2014 Comments, at 18 (based on 2012 data).
[11] NMA 2014 Comments, at 19 (comparing an average efficiency of 29.38% for units schedule for retirement to the average efficiency of 36.67% for new units, an overall improvement of about 20%).
[12] Wood Mackenzie, *Outlook and Benefits of An Efficient U.S. Coal Fleet*, at 5 (January 2019) ("HELE Report").

graph below, leaving plenty of room for significant improvement.[13] In light of the success other countries have had in adopting supercritical technology, the United States has a clear opportunity for emission reductions by replacing retired subcritical units with supercritical units.



However, EPA's first proposed standard for GHG emissions from coal-fired EGUs[14] brought new construction to a screeching halt in 2012. At that time, there were at least 15 new units under development, which EPA referred to as "potential transitional sources."[15] By the

[13] HELE Report, at 5 (January 2019) (illustrating the percentage of each country's coal-fired EGU fleet that utilizes "high efficiency, low emission" (HELE) technology, such as supercritical steam cycles).
[14] *Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units*, 77 Fed. Reg. 22392 (Apr. 13, 2012).
[15] 79 Fed. Reg. at 1462, n.128 ("In the April 2012 GHG NSPS proposal, the Wolverine, Washington County, and Holcomb projects were among a group of 15 projects distinguished from other EGU projects as 'potential transitional sources.'").

time EPA issued its revised proposal in 2014, the number had dwindled to two,[16] and as of 2018 proposal, the status of those units remains unclear.[17]

Now, with the current partial CCS-based standard in place, and under current market conditions, retiring coal-fired EGUs are being replaced by other energy resources. But that trend should not, and indeed cannot, continue forever. While other energy resources are able to replace coal to a point, coal-fired EGUs provide certain benefits that other resources cannot. Coal-fired EGUs are only ones that can stockpile fuel onsite and provide dispatchable electricity generation under almost any conditions and circumstances. In contrast, wind and solar resources rely on the wind to blow and the sun to shine. Even gas-fired EGUs, while normally dispatchable, depend on the just-in-time arrival of its fuel, which can be disrupted in the same circumstances in which the dispatch of reliable power may be most needed, such as severely cold or violent weather events. Particularly since coal is the nation's most abundant natural resource capable of providing dispatchable power during extreme weather, coal-fired EGUs provide a critical source of reliability and resiliency to the power grid upon which we all rely daily. For that reason, if nothing else, older and retiring coal-fired EGUs will need to be replaced at some point with new coal-fired EGUs. With EPA's proposed BSER, those replacements would become possible once market forces shift again, and they have the potential to generate significant emission reductions.

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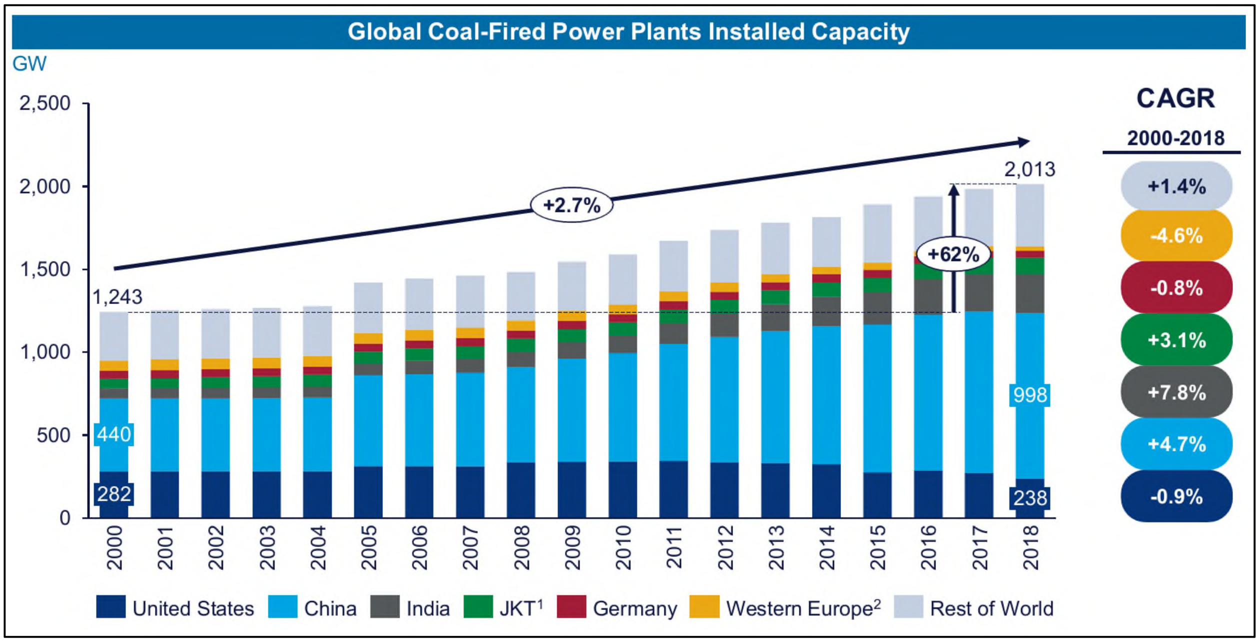
[16] 80 Fed. Reg. at 64542 ("In December 2013—after the proposed action was signed, but before it was published—Wolverine Power Cooperative announced that it was cancelling construction of the proposed coal-fired power plant in Rogers City, MI. … In the January 2014 proposal, the EPA also identified two other fossil fuel-fired steam generating EGU projects that, as currently designed, would not meet the proposed 1,100 lb CO2/MWh emissions standard—the Plant Washington project in Georgia and the Holcomb 2 project in Kansas. We indicated that, at the time of the proposal, those projects appeared to remain under development ….").

[17] 83 Fed. Reg. at 65435 ("[D]uring the 2015 rulemaking, the EPA identified the Washington County (GA) and Holcomb (KS) EGU projects as 'projects under development' that would not be able to meet the standard of performance without a complete redesign … . It is not clear if these projects will be constructed, …").

Selecting supercritical technology as the BSER for all future U.S. coal-fired EGUs will also promote the technology, not only in the United States, but also in the international community, which EPA has appropriately recognized as a relevant consideration in selecting the BSER under Section 111.[18] Unlike the United States, other countries are building new coal plants at a rapid clip—worldwide coal-fired EGU capacity is increasing at a rate of 2.7% per year, with China (4.7%) and India (7.8%) leading the way, resulting in a total coal-fired capacity increase of approximately 62% since 2000. At these growth rates, the world is expected to add another 79,000 MW of coal-fired generation capacity by the year 2020. China and India are particularly important, not only due to their high growth rates, but also because China now has far more coal-fired capacity than any other county (nearly 1,000,000 MW), while fast-growing India has a low percentage of supercritical units (only 3%). These trends, illustrated below, are all the more striking considering that the United States and western Europe significantly decreased their coal-fired capacity during the same period.[19]

[18] *See* 83 Fed. Reg. at 65448 ("Promotion of the Development and Implementation of Technology"). *See also Sierra Club v. Costle*, 657 F.2d 298, 346-47 (D.C. Cir. 1981) ("*Sierra Club*") ("Our interpretation of section 111(a) is that the mandated balancing of cost, energy, and nonair quality health and environmental factors embraces consideration of technological innovation as part of that balance. The statutory factors which EPA must weigh are broadly defined and include within their ambit subfactors such as technological innovation. … [W]hen balancing the enumerated factors to determine the basic standard it is appropriate to consider which level of required control will encourage or preclude development of a technology that promises significant advantages with respect to those concerns.").

[19] HELE Report, at 3 (January 2019) (providing the cumulative annual growth rate of coal-fired EGU capacity in various countries).



The trends depicted above confirm that supercritical technology not only presents an opportunity for emission reductions in the United States, but also around the world. Indeed, in the short term, the best opportunity for minimizing emissions through the utilization of the most efficient designs available is in those countries that are quickly growing their coal-fired fleet. EPA's previous determination that partial CCS is the BSER for coal-fired EGUs did not provide any meaningful encouragement regarding the adoption of that technology because it simply is not yet available, reliable, or cost-effective enough to be a real option. No amount of encouragement will convince fast-growing nations like China and India to use CCS, given the severe cost and energy penalty associated with that technology (addressed in more detail later in these comments). In contrast, supercritical technology is proven, and already in use at a higher percentage outside the United States than within it (43% worldwide, compared to only 28% in the U.S.),[20] and thus a viable option that should be fully endorsed.

[20] HELE Report, at 18 (January 2019).

To be the BSER, a system of emission reduction must not only reduce emissions, it must also be demonstrated, available, and capable of cost-effectively reducing emissions.[21] Supercritical steam cycle technology easily passes these tests. There can be no question that supercritical technology is demonstrated and available, given its penetration in the global marketplace and adoption as the state-of-the-art in this country and many others. Currently, there are approximately 865,000 MW of installed and operating supercritical coal-fired EGU capacity worldwide.[22] In the United States alone there are over 60,000 MW of supercritical capacity, and fourteen supercritical units—a total of nearly 10,000 GW—have started up since 2007.[23] The cost-effectiveness of the technology is equally well-established, since it has been employed without a government mandate, due to its ability to reduce fuel cost, the primary component of the marginal cost of energy production at coal-fired EGUs.[24] NMA also supports EPA's new BSER because it is is consistent with the 2015 BSER for gas-fired EGUs, EPA's other BSER determinations, and D.C. Circuit precedent.

1. Selecting a Supercritical Steam Cycle as the BSER Is Consistent with EPA's BSER Determination for Gas-Fired EGUs.

A convincing sign that EPA has finally proposed the right BSER for coal-fired EGUs is how much more consistent it is with the BSER that EPA adopted for gas-fired EGUs in 2015. The similarities between EPA's new BSER determination for coal and its prior BSER determination for gas confirm that EPA's proposal is not really anything new, but rather the application of longstanding precedent and the consistent methodology with which EPA has implemented Section 111 of the Clean Air Act for decades.

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[21] 42 U.S.C. § 7411(a).
[22] HELE Report, at 4 (January 2019).
[23] HELE Report, at 18 (January 2019).
[24] 83 Fed. Reg. at 65448 ("Fuel costs makeup a significant portion of the variable operating costs of a coal-fired EGUs and owners/operators of EGUs currently have a financial incentive to maximize efficiency and minimize CO_2 emissions.").

The similarity between EPA's 2015 BSER determination for gas and EPA's proposed BSER determination for coal is striking. In 2015, EPA determined that the best option available for reducing GHG emissions from gas-fired EGUs is efficient natural gas combined cycle (NGCC) technology, given that such designs were already in use to reduce fuel cost and represented a significant improvement in efficiency and emission rates over simple-cycle configurations. EPA reached that conclusion despite its recognition that owners of new gas-fired units were likely to install NGCC technology anyway, regardless of EPA's new standard, and therefore the standard was not expected to reduce emission compared to what was likely to occur under the status quo. However, in adopting NGCC technology as the BSER, EPA recognized that some turbines would still be needed for peaking power, and thus excluded certain units from the standards.

So too with EPA's 2018 proposal for coal. EPA has proposed to determine that the best option available for reducing GHG emissions from coal-fired EGUs is efficient steam cycle technology, given that such designs are already in use to reduce fuel cost and represent a significant improvement in efficiency and emission rates over subcritical steam cycle configurations. EPA reached that conclusion despite its recognition that any new coal-fired EGUs constructed would likely install some form of supercritical technology anyway, regardless of EPA's new standard, and therefore the standard is not expected to reduce emission compared to what is likely to occur under the status quo. However, in adopting supercritical technology as the BSER, EPA recognizes, as it must, that some boilers may not be large enough to support the supercritical steam turbines that are commercially available, and thus EPA excluded certain smaller units from the standards.

NMA disputes EPA's claim that a standard based on a technology likely to be installed regardless of regulation will for that reason have only "negligible" benefits.[25] That conclusion, which EPA noted in its 2015 BSER determination for gas and again in its 2018 BSER proposal for coal, is based on a myopic perspective of comparing the expected emission rates of new units subject to the standards with the emission rate at which new units would emit without the standards in place—essentially comparing two different futures. Although certainly a valid point of view for some purposes, that perspective fails to recognize the benefits of replacing older, less advanced existing units with newer, more efficient units. Accordingly, EPA should also consider a comparison of the past (subcritical technology) to the future (supercritical technology). In doing so, EPA's analysis would better reflect the true underlying intent of the Section 111 New Source Performance Standards program—ensuring that new sources adopt state-of-the-art emission reduction technology as they replace those built prior to the adoption of the standard without that technology, thus improving emissions performance over time as control technology advances. Nevertheless, the fact that EPA's newly proposed BSER for coal closely resembles its 2015 BSER determination for gas signals a much-needed return to EPA's normal practice and methodology for selecting a BSER under Section 111.

2. Selecting a Supercritical Steam Cycle as the BSER Is Consistent with EPA's Past BSER Determinations and D.C. Circuit Precedent.

Even more telling is the similarity of EPA's 2018 proposal with prior BSER determinations for other pollutants and for other industrial sectors. In every decision of the U.S. Court of Appeals for the D.C. Circuit that has considered EPA's authority under Section

[25] 80 Fed. Reg. at 64640 ("[T]he EPA does not anticipate that this final rule will result in notable CO_2 emission changes by 2022 as a result of the standards of performance for newly constructed EGUs. The owners of newly constructed EGUs will likely choose technologies, primarily [natural gas combined cycle] NGCC, which meet the standards even in the absence of this rule due to existing economic conditions as normal business practice.")

111(b)—evaluating EPA's most controversial decisions—the BSER selected by EPA was based on systems of emission reduction that had already been utilized at levels consistent with the current utilization of supercritical steam cycle technology.[26] In fact, the D.C. Circuit has *never* had occasion to hear a case involving a BSER that had not already been put into practice at several existing facilities; rather, the dispute in most litigated cases was whether the test data from existing facilities utilizing the BSER justified the standard set by EPA.[27]

However, the D.C. Circuit has spoken in dicta on the question of whether the BSER must have already been employed. While recognizing that Congress did not require EPA to select a BSER that was already "in actual routine use somewhere," the D.C. Circuit has confirmed that Congress did intend for the BSER to be "available."[28] Subsequent decisions by the court have also confirmed in quite clear terms that the BSER selected must be readily available to the "industry as a whole" and "anywhere in the country."[29]

The D.C. Circuit's prior Section 111 decisions comport with the statutory language, which requires EPA to identify a BSER that has been "adequately demonstrated"—past tense—and establish a standard that is "achievable"—in the future—even if not yet achieved. In other words, while Section 111(b) is "technology-forcing" in the sense that EPA may set an "achievable" *standard* to push existing technology to higher performance levels, the standard

[26] *See, e.g., Essex Chem. Corp. v. Ruckelshaus*, 486 F.2d 427, 436 (D.C. Cir. 1973) ("*Essex Chemical*") (evaluating EPA's BSER for sulfuric acid plants, noting that 76 dual absorption plants existed throughout the world and that "Industry is agreeable to using dual absorption technology").

[27] *See, e.g., Portland Cement Assoc. v. Ruckelshaus*, 486 F.2d 375, 391 (D.C. Cir. 1973) ("*Portland Cement I*") (remanding EPA's standards for cement kilns due to a lack of sufficient data, but recognizing that the BSER of ESPs and baghouses had already been employed at several units).

[28] *See, e.g., Portland Cement I*, 486 F.2d at 391 ("The Senate Report made clear that it did not intend that the technology 'must be in actual routine use somewhere.' The essential question was rather whether the technology would be *available* for installation in new plants.) (emphasis added)

[29] *See, e.g., Nat'l Lime Ass'n v. EPA*, 627 F.2d 416, 431 (D.C. Cir. 1980) ("*Nat'l Lime*") (indicating that EPA must provide "some assurance of the achievability of the standard for the *industry as a whole*, given the range of variable factors found relevant to the standards' achievability" and quoting EPA as recognizing that "standards of performance ... must ... meet these conditions for all variations of operating conditions being considered *anywhere in the country*.")

must still be based on a *system* that has already been demonstrated reliably enough to ensure that it will be available across an industry.[30] This tension, between forward-looking "technology-forcing" "achievable" *standards*, and *systems* that have already been "adequately demonstrated" is intentional. With the carefully crafted language of Section 111, Congress ensured that EPA could require new units to do their true best with the tools available, while requiring EPA to consider only those tools that are ready for deployment industry-wide.

Supercritical technology is the only system of reducing CO_2 emissions from coal-fired EGUs that comports with EPA precedent and the decisions of the D.C. Circuit evaluating EPA's prior standards. It is the only option that has actually been put to use and that could be available across the industry anywhere in the country. Thus, it is the only option that qualifies as the BSER for CO_2 emissions from coal-fired EGUs, and NMA supports EPA's decision to revise its Section 111(b) standards accordingly.

B. CCS Is Not the BSER Because it is Unavailable and Cost-Prohibitive

In stark contrast to supercritical steam cycle technology, CCS is neither available nor cost-effective. Quite the opposite, the availability of CCS is essentially non-existent because companies cannot obtain financing for a technology that has never successfully complied with EPA's current standards. As such, the current partial CCS-based standard serves as a complete bar to the development of new coal-fired EGUs, not a system of emission reduction that could be applied to one, because the high risk and cost of CCS renders it an imprudent investment in light of other options for new generation capacity. At a minimum, CCS is significantly limited in a

[30] *See, e.g.*, *Nat'l Lime*, 627 F.2d at 431. *Accord Sierra Club v. Costle*, 657 F.2d at 377 ("In order for EPA to demonstrate the achievability of the standard for particulate matter it must: (1) identify variable conditions that might contribute to the amount of expected emissions, and (2) establish that the test data relied on by the agency are representative of potential *industry-wide* performance, given the range of variables that affect the achievability of the standard.") (citing *Nat'l Lime*, emphasis added).

geographic sense, and EPA's 2015 standard failed to appropriately account for the unsolved problems inherent in disposing of captured CO_2. CCS is thus unlike any other BSER that EPA has ever before selected for any industry since Congress first penned Section 111 in 1970. EPA's strained attempt in 2015 to claim that CCS is consistent with past EPA and D.C. Circuit precedent was not convincing, but rather an unreasonable and results-oriented attempt to shift the energy markets. That determination was illegal and must be reversed.

Importantly, EPA need not indisputably prove that partial CCS *cannot* be the BSER, nor must EPA prove that another control option is a *better* system of emission reduction. On the contrary, as noted above, the D.C. Circuit has confirmed that EPA may revise its prior decisions at any time, so long as that determination itself is reasonable and consistent with the statute, and so long as EPA fully explains the reason for the change. Thus, EPA need not prove that CCS is entirely unavailable or fully cost-prohibitive, nor must EPA prove that greater emission reductions are achievable with another system, so long as it fully considers its prior determination and the facts and analysis underlying it, which EPA has done in its 2018 proposal. NMA supports that analysis and agrees that it demonstrates well how EPA underestimated the barriers to partial CCS in 2015 and why the proposed change in BSER is needed.

1. Far from Adequately Demonstrating CCS Technology, Existing Systems Prove CCS Is Not the BSER.

Particularly in light of the additional information now available, there can be no question that EPA's decision in 2015 to adopt partial CCS as the BSER for coal-fired EGUs was an error. Actual experience over the last three years with attempted CCS projects has confirmed what NMA and many others asserted in comments on EPA's 2014 proposal—CCS has not been adequately demonstrated.

EPA notes there are two operating CCS systems in existence today, but those examples actually prove that CCS is not ready for industry-wide deployment. The most complete CCS project is at the SaskPower Boundary Dam facility in Saskatchewan, Canada, which utilizes a post-combustion amine-based capture system to separate CO_2 from the exhaust of a relatively small lignite-fired EGU and then deliver the CO_2 for use in Enhanced Oil Recovery (EOR). Although the Boundary Dam CCS project is the only one to ever fully integrate its CCS system into a coal-fired EGU (*i.e.*, operate the CCS system without a supplemental energy source), many aspects of the project confirm that a similar project would not be possible elsewhere.

First, Boundary Dam was heavily subsidized by the Canadian government, which paid for 18% of the 1.35 billion-dollar project.[31] A similar level government-backed funding for all future coal-fired EGUs in the United States is not realistic. Second, the facility relies on income generated from the sale of the captured CO_2 for EOR, the opportunities for which are obviously limited to areas with mature oil fields, and thus unavailable to significant portions of the United States. Third, the facility encountered many technical problems that forced it to renegotiate its EOR contract in a way that will reduce the EOR revenue by $240-270 million over the life of the project,[32] drawing into question its economic viability.[33] Fourth, the economic concerns presented by the project were further confirmed when the Canadian Parliamentary Budget Office concluded that the project doubled the cost of the electricity it produced,[34] clearly an unsustainable result. Fifth, the CCS installed on that coal-fired unit consumes 50 MW of the 160

[31] NMA 2014 Comments, at 40.
[32] EPA Memorandum, *Review of the current status of the Carbon Capture and Sequestration projects referenced in the Standards of Performance for Greenhouse Gas Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units 2015 rulemaking.*, at 14 (March 2018) ("EPA CCS Update Memo").
[33] *See, e.g.*, "Nice Try, Shame About the Price," The Economist (Oct. 3, 2014) (available at https://www.economist.com/news/2014/10/03/nice-try-shame-about-the-price).
[34] EPA CCS Update Memo, at 14

MW unit.[35] That means another 50 MW must be generated somewhere else to make up for that lost parasitic load (likely generating additional CO_2 emissions in the process). Sixth, despite an initial expectation of capturing up to a million tons of CO_2 each year, the project has only proven capable of capturing about half of that amount.[36] Finally, even if the technology used at the Boundary Dam project could be scaled up to match the size of the latest coal-fired EGU technology, doing so would require a system at least five to six times larger, which would likely compound the economic challenges of the technology.

The only other currently operating commercial-grade CCS project in the world—NRG's Petra Nova project—is located in the United States (Texas), but it is even further afield from anything resembling an adequate demonstration of CCS technology. For starters, the CCS system at Petra Nova is not integrated with the coal-fired EGU it serves, which means it needs an entirely separate fossil fuel-fired power plant to operate the CCS system; in this case, a dedicated 75 MW gas fired combined cycle unit.[37] Although larger than Boundary Dam, the CCS system at Petra Nova is still only capable of treating a 240 MW slipstream from a much larger EGU, resulting in only a 33% reduction in CO_2 for the unit and only a diminutive 6.2% reduction for the entire power plant as a whole.[38] Considering both the limited size and the additional emissions from the dedicated power plant need to run the CCS system, the overall emission reductions from the unit to which it was applied are underwhelming and fall short of EPA's 1,400 lb/MWh standard of performance, as shown below:[39]

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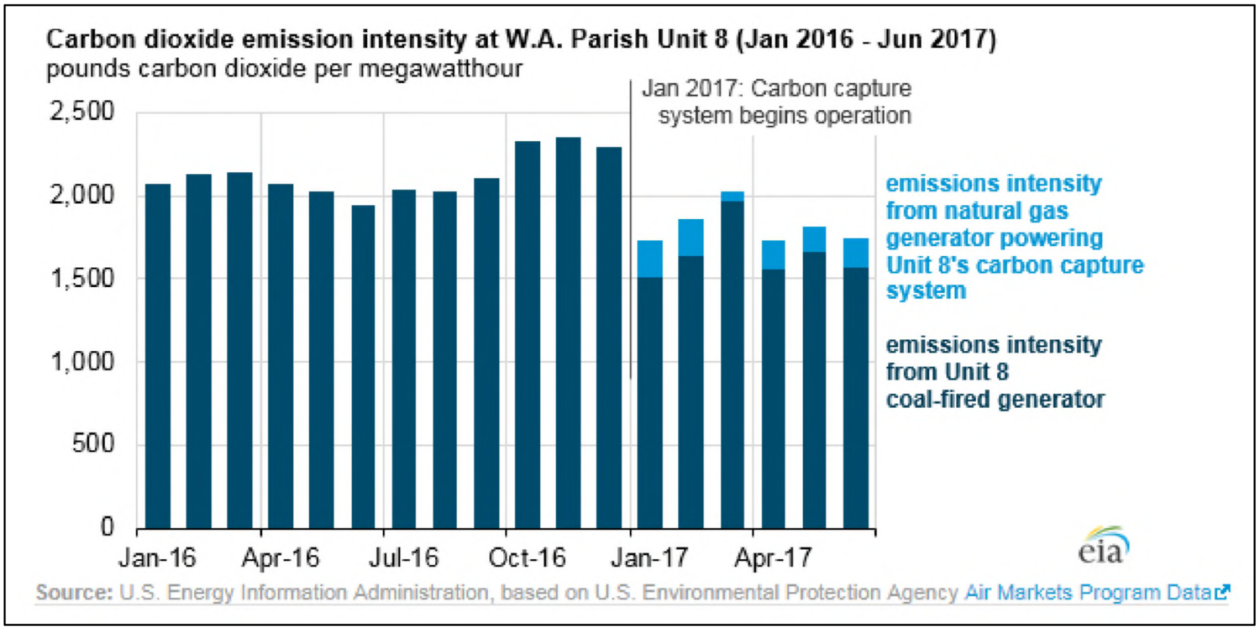
[35] EPA CCS Update Memo, at 15.
[36] EPA CCS Update Memo, at 13-15.
[37] EPA CCS Update Memo, at 22.
[38] EPA CCS Update Memo, at 21-22.
[39] EPA CCS Update Memo, at 23.



In fact, at a reduction of only 33%, the effectiveness of the CCS system at Petra Nova is on par with the reduction in emissions associated with replacing a retiring subcritical coal-fired EGU with a new supercritical unit, which, as noted above could result in as much as a 32% reduction compared to older, less efficient units most likely to retire soon. Petra Nova also shares two other negative characteristics with Boundary Dam—according to EPA, it has relied heavily on both government funding ($167 million) and revenues from EOR.[40] Projects that are not economically viable absent such assistance should not qualify as the BSER (Comment C-11).

In 2015, EPA also justified its determination that CCS was the BSER through reference to several other planned commercial-grade CCS projects at coal-fired EGUs, but all of those other projects have failed, as confirmed by an EPA memorandum, including the following:[41]

[40] EPA CCS Update Memo, at 24. Note that according to NRG, the owner of the project, it received $190 million in assistance, *see* https://www.nrg.com/case-studies/petra-nova.html.

[41] Although many of these projects are pre-combustion capture systems for IGCC facilities, which is different from the post-combustion CCS systems EPA selected as the BSER in 2015, the failure of these projects confirms that pre-combustion IGCC technology does not provide the alternative compliance option EPA deemed it to be in 2015 (Comment C-12).

- **Kemper County Energy Facility:** Abandoned the IGCC & CCS component of the project, after numerous severe technical difficulties pushed the cost of the project to $7.5 billion, three times higher than the original budget of $2.5 billion (despite $270 million in government support).
- **Texas Clean Energy Project:** Abandoned the entire IGCC & CCS project after costs more than doubled, causing loss of government funding and bankruptcy of the owner (despite $450 million in government support).
- **Hydrogen Energy California:** Abandoned hydrogen & CCS project following termination order by the California Energy Commission due to lack of progress (despite $408 million in government support).

Simply put, when a control system fails more often than not, the system cannot be considered "adequately demonstrated" under Section 111, particularly when even the "success" is questionable. Even more remarkable is the fact that these projects failed despite a combined total of well over a billion in taxpayer dollars. To be clear, NMA supports efforts by the government to help fund emerging technologies that have the potential to minimize the environmental impact of coal-fired generation. Nevertheless, Section 111 requires new technologies to be proven before EPA may rely on them to set mandatory standards. At a minimum, the experience with CCS to date does not provide any reliable indication that the technology is ready and available for industry-wide use (Comment C-13).

2. Prior EPA and D.C. Circuit Decisions Confirm EPA's 2015 Partial CCS BSER Demonstration Was Unprecedented.

In 2015, EPA cited numerous D.C. Circuit cases in an attempt to claim that its decision to adopt partial CCS as the BSER for coal-fired EGUs was no different than any of EPA's other BSER determinations. However, that 2015 analysis was entirely dependent on a misreading of the statute and the relevant D.C. Circuit precedent. As a result, EPA failed to recognize that CCS technology is fundamentally different from any other technology selected by EPA as a BSER in the past.

To support its partial CCS BSER determination, EPA relied heavily on the first case to consider a Section 111 standard, a 1973 case often referred to as *Portland Cement I*. EPA cited that decision for the proposition that "adequately demonstrated" "does not mean that the system 'must be in actual routine use somewhere,'" based on a quote from a Senate Report.[42] EPA's 2015 preamble also selectively quoted out-of-order the D.C. Circuit's own words to argue that:

> EPA, in identifying the "best system of emission reduction ... adequately demonstrated," may "look[ ] toward what may fairly be projected for the regulated future, rather than the state of the art at present. ..."[43]

From these quotes, EPA characterized Section 111 as a "technology-forcing" program and claimed that partial CCS could be the BSER even with extremely minimal operating experience.

But what EPA failed to recognize is that the BSER in *Portland Cement I*, unlike CCS, was clearly well-demonstrated and readily available.[44] In fact, the BSER in question—ESPs and baghouses for cement kilns—was already in use in the United States at "several" units, of which EPA had already inspected and tested two.[45] Thus, the D.C. Circuit's opinion in *Portland Cement I* did not address a situation in which the adequate demonstration of the BSER was in any doubt. Instead, the court's only focus was whether the *standard* based on that BSER was "achievable." The entire quote from the D.C. Circuit, without EPA's selective editing, makes

[42] *Portland Cement I*, 486 F.2d at 391 (quoting S.Rep.No.9-1196, 91st Cong., 2d Sess. 16 (1970)).
[43] 79 Fed. Reg. at 1479.
[44] *Portland Cement I*, 486 F.2d at 390 ("present types of emission control in the manufacture of Portland cement").
[45] *See* 37 Fed. Reg. 5767, 5770 (Mar. 21, 1972) ("The proposed standard was based principally on particulate levels achieved at a kiln controlled by a fabric filter. Several other kilns controlled by fabric filters had no visible emissions but could not be tested due to the physical layout of the equipment. After proposal, but prior to promulgation a second kiln controlled by a fabric filter was tested and found to have particulate emissions in excess of the proposed standard.")

the point clear—the court was evaluating whether the standard was achievable, not whether the BSER had been adequately demonstrated:

> We begin by rejecting the suggestion of the cement manufacturers that the Act's requirement that *emission limitations* be "adequately demonstrated" necessarily implies that any cement plant now in existence be able to *meet the proposed standards*. Section 111 looks toward what may fairly be projected for the regulated future, rather than the state of the art at present, since it is addressed to standards for new plants–old stationary source pollution being controlled through other regulatory authority. *It is the "achievability" of the proposed* <u>*standard*</u> *that is in issue.*[46]

Since *Portland Cement I* only addressed standard achievability, not the BSER demonstration, several statements in the court's opinion gloss over the distinction between "achievable" standards and "adequately demonstrated" technology (for instance, by stating that the statute requires the "technology be achievable"[47]). When taken out of context, these statements appear to support EPA's claim that it may select a BSER that *could be* demonstrated, instead of being limited to those that *have been* demonstrated.

EPA's 2015 interpretation of *Portland Cement I* is erroneous because it conflates the statutory requirement for an "adequately demonstrated" BSER with EPA's authority to establish "achievable" standards. As noted briefly above, the definition of "standard of performance" allows EPA to set a technology-forcing *standard*, so long as that standard is "*achievable*" with an "adequately demonstrated" (past tense) *system*. In other words, Congress quite clearly wanted EPA to push existing technology to new heights, but stopped short of authorizing EPA to require sources to adopt new technologies that have not yet been adequately demonstrated.

EPA overlooked that important distinction even though another D.C. Circuit decision issued in 1973, *Essex Chemical*, clarified that "[i]t is the *system* which must be *adequately*

[46] *Portland Cement I*, 486 F.2d at 391 (emphasis added).
[47] *Portland Cement I*, 486 F.2d at 402 ("The Administrator's objectives are laudable, but the statute expressly requires, for the standards he promulgates, that technology be achievable.")

demonstrated and the *standard* which must be *achievable*."[48] That holding in *Essex Chemical* has been quoted repeatedly by the D.C. Circuit several times since it was written in 1973.[49] Those more on-point decisions confirm that EPA may "look[ ] toward what may fairly be projected for the regulated future" in setting the standard, but not in selecting a BSER. This approach is not only more consistent with the statute but good policy as well. Before a mandate is imposed to maximize the performance of a control technology, EPA might reasonably expect existing technology to do better than ever before. However, EPA should not be authorized to gamble on technologies have not yet been proven to work consistently in practice, since doing so might risk the ruin of an industry. EPA's CCS BSER determination resulted in the latter.

Other D.C. Circuit decisions further confirm the point. For example, in *Essex Chemical* the D.C. Circuit expressed approval for EPA's selection of dual absorption as the BSER for new elemental sulfuric acid plants, even though based on only three operating plants in the United States. EPA claimed in 2015 that *Essex Chemical* supports the selection of BSER that has only been applied to a small number of plants, but at the time *Essex Chemical* was decided there were already 76 dual absorption plants in operation worldwide.[50] Notably, the court also recognized EPA's determination that dual absorption technology was not the BSER for recycle sulfuric acid plants because there was no data available to demonstrate that dual absorption would perform efficiently at such plants.[51] Unlike the sulfuric acid dual absorption technology in *Essex Chemical*, there is no meaningful experience with CCS internationally, other than the solitary Boundary Dam facility described above, and the data available for evaluating whether the system at the lignite-fired Boundary Dam facility will work at all future coal-fired EGUs is highly

48 *Essex Chemical*, 486 F.2d at 433 (emphasis added).
49 *See, e.g., Nat'l Asphalt Pavement Ass'n v. Train*, 539 F.2d 775, (D.C. Cir. 1976) (quoting *Essex Chemical*).
50 *Essex Chemical*, 486 F.2d at 435, n.17.
51 *Essex Chemical*, 486 F.2d at 436, n.19.

questionable. Indeed, even the D.C. Circuit's opinion in *Portland Cement I* cautioned EPA against using "insufficient data," since it "may represent only part of a given industrial classification."[52] The many quotes EPA plucked from *Essex Chemical* as support for its 2015 standard thus ring hollow.

Likewise, in one of the D.C. Circuit's more recent cases, the court upheld SCRs as the BSER for NO_x emissions industrial boilers before any such boilers in the United States had installed an SCR. But at the time over 200 SCRs had been installed on electric utility boilers, and EPA explained that the technology works equally well on the exhaust from any type of coal-fired boiler, regardless of function, and the court found that conclusion to be well-supported and entirely reasonable.[53] Unlike the industrial boiler SCRs in *Lignite*, EPA failed to explain in 2015 how the individual components of CCS that have been combined into an integrated system only once (again, Boundary Dam) could be reliably "transferred" to all new coal-fired EGUs.

In 2015, EPA also relied upon heavily on *Sierra Club v. Costle*, but EPA entirely misread the case. In that 1981 decision, the D.C. Circuit recognized and agreed with EPA's decision that dry scrubbers were not "adequately demonstrated." Despite the promising benefits of the technology (*e.g.*, simplicity of design and water conservation), because no commercial scale applications were in operation (only three were under construction), and the only data available was from pilot testing on highly alkaline coals.[54] In contrast, wet scrubbers were "admittedly an adequately demonstrated technology" for all coal types,[55] and the ESPs and baghouses upon which EPA relied to set the PM standards were also sufficiently demonstrated to support a standard—ESPs were well-established, and baghouse were becoming "an increasingly popular

[52] *Portland Cement I*, 486 F.2d at 396.
[53] *Lignite Energy Council v EPA*, 198 F. 3d 930, 934 (D.C. Cir. 1999).
[54] *Sierra Club*, 657 F.2d at 341, n.157.
[55] *Sierra Club*, 657 F.2d at 348. *See also id.*, at 325 n.75

alternative to ESP's."[56] Thus, the primary dispute was not EPA's choice of technology and whether it was adequately demonstrated. Once again, much like *Portland Cement I*, the court's focus was only on the level of the standard that was achievable.

Nevertheless, EPA cited *Sierra Club* for its view of Section 111 as requiring a technology-forcing BSER, and strung together the following quotes:

> EPA must be mindful of the purposes of section 111, and the Court has identified those purposes as ... "reducing emissions as much as practicable[,]"... "forc[ing] the installation of all the control technology that will ever be necessary on new plants at the time of construction[,]..." and "forc[ing] the development of improved technology."[57]

The impression EPA intended to give with this grouping of quotes is that EPA can make a standard *more stringent* in order to encourage the development of a new technology.

However, a closer read of *Sierra Club* reveals the exact opposite because EPA had actually set a ***less stringent*** standard to encourage the development of dry scrubbers! Since dry scrubbers could not achieve the same percentage control as wet scrubbers, EPA set a variable limit that allowed 70% control instead of the 90% control achievable with wet scrubbers (the BSER), so long as overall emissions did not exceed a specified maximum limit.[58] With that approach, EPA was able to limit mass SO_2 emissions, but allow the development of dry scrubbers to continue at plants firing low-sulfur coal that could still stay below the mass limit. That is why the name of the case is "*Sierra Club*"—the environmentally-minded group intervened to argue that EPA should not be allowed to set a ***less stringent*** control requirement just to encourage the development of a promising new control technology. For EPA to say in 2015 that *Sierra Club* allows EPA to establish a *more stringent* limit to encourage technological development was thus highly unreasonable on several levels.

[56] *Sierra Club*, 657 F.2d at 374-75.
[57] 79 Fed. Reg. 1463.
[58] *Sierra Club*, 657 F.2d at 312 & 351-52.

In summary, although D.C. Circuit precedent recognizes that Section 111 can be "technology forcing" in the sense that EPA can push adequately demonstrated and available systems to higher performance levels, EPA cannot set standards that force new units to install systems that are not yet sufficiently demonstrated to be reliable. All of EPA's prior BSER determinations have been based on systems with more extensive track records than CCS, and if anything that statement is even more true today than when EPA established the current BSER of partial CCS.[59] Thus, in light of 50 years of precedent under Section 111, EPA has a sound legal and reasonable basis for changing its BSER determination, and NMA supports that effort.

3. Experience Has Confirmed that CCS Is Cost-Prohibitive.

CCS cannot be the BSER because Section 111 does not authorize EPA to impose "exorbitantly costly" control measures.[60] The most obvious sign that CCS is exorbitantly costly is that is has proven not to be economically viable—the only two projects current operating in the world needed hundreds of millions in government assistance, and even projects that received hundreds of millions in government assistance still failed. A technology cannot be considered the BSER if it is so costly that not even heavy government assistance can save it in most cases. With respect to the Petra Nova project in particular, that project received as much as $190

[59] *See* NMA 2014 Comments, at 83 ("EPA has **never** before adopted a performance standard where the standard had not been achieved by multiple commercial-scale facilities in the source category to which the standard applies. EPA's approach to its proposed CO2 NSPS for coal-fueled utility boilers and IGCC units thus is entirely unprecedented") (emphasis in original). *See also id.*, at 77-82 (noting that (i) EPA's prior BSER determinations for coal-fired EGUs were based on several thousand MW of installed and operating capacity, and (ii) CCS is currently at the same stage of development of several other technologies that EPA did not select as the BSER and that have since been abandoned, such as ESP pre-chargers, FGD packed bed absorbers, and aqueous NO_2 scrubbing).

[60] *Essex Chemical*, 486 F.2d at 433 ("An adequately demonstrated system is one which has been shown to be reasonably reliable, reasonably efficient, and which can reasonably be expected to serve the interests of pollution control *without becoming exorbitantly costly* in an economic or environmental way.") (emphasis added). *See also Portland Cement Assoc. v. Train*, 513 F.2d 506, 508 (D.C. Cir. 1975) ("Portland Cement II") (recognizing that "the Administrator should also consider contentions and presentations that the adopted standard unduly precludes the supply of cement, including whether it is unduly preclusive as to certain qualities, areas, or low-cost supplies," but upholding EPA's standards because "[t]he industry has not shown inability to adjust itself in a healthy economic fashion ….").

million dollars from the Department of Energy,[61] and therefore it should be precluded from consideration as a Section 111 BSER under the Energy Policy Act of 2005 (EPAct).[62] Although EPA has continued to claim that it may consider government funded projects so long as any other available evidence supports the ultimate conclusion, that reading of the EPAct would gut its restrictions to the point of absurdity. After all, the entire point of the funding cited in the EPAct is to encourage the development of emerging technologies that have not been demonstrated, which, almost by definition, confirms they are not ready to support a mandatory requirement under Section 111 of the CAA.

As identified in numerous comments submitted in 2014,[63] a more rational reading of the EPAct is required. EPA should not rely on any projects so heavily subsidized as evidence of an "adequate demonstration" of technology that was only economically viable at the taxpayers' expense. But, even if EPA continues to believe that the EPAct does not directly preclude the consideration of government subsidized projects in selected a BSER under Section 111, EPA should at least recognize that it would be unreasonable to do so (Comment C-11).

Even with government assistance, the costs associated with CCS would make coal-fired EGUs far more expensive than any other form of electricity generation. The illustration below, taken from the Energy Information Administration's Annual Energy Outlook for 2019, demonstrates how much more expensive coal-fired EGUs with CCS would be compared to other potential forms of new electricity generation capacity.[64]

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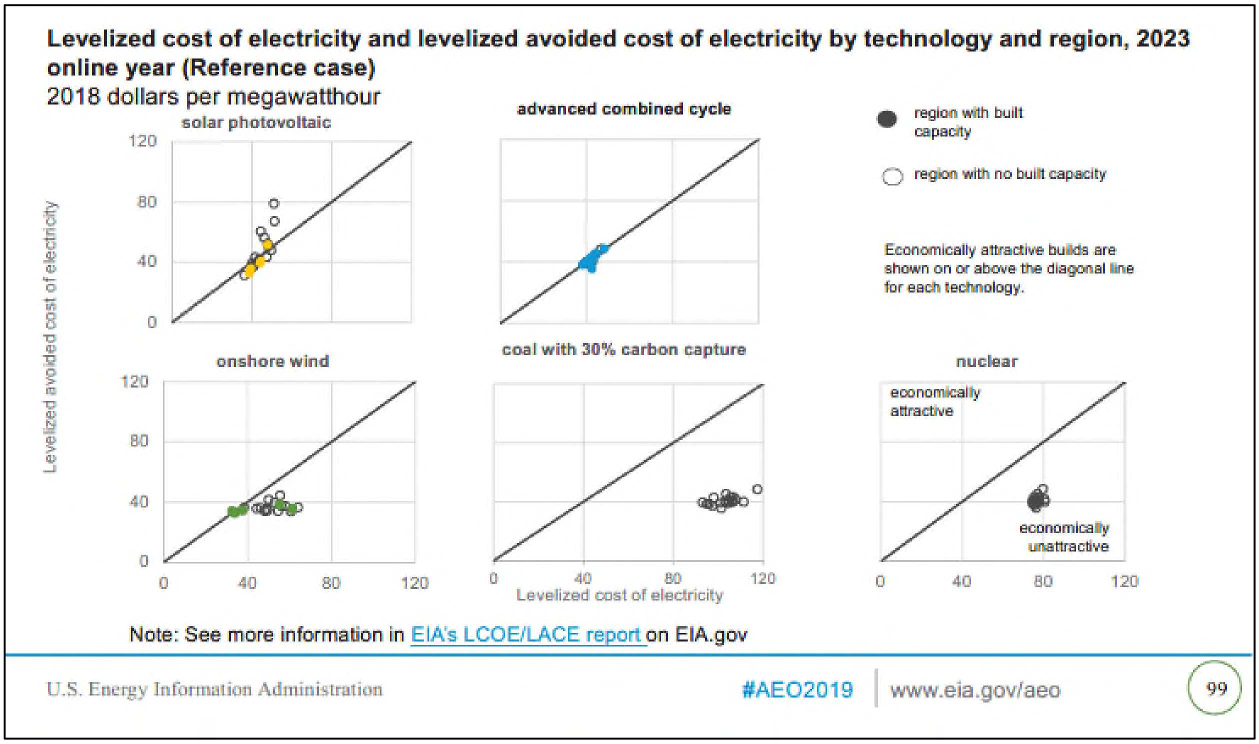
[61] *See* https://www.nrg.com/case-studies/petra-nova.html.
[62] 42 U.S.C. § 15962(i).
[63] *See, e.g.*, NMA 2014 Comments, at 102-108.
[64] EIA Annual Energy Outlook 2019, at 99.



Boundary Dam, the only fully integrated commercial scale CCS-equipped coal-fired EGU, proves these projections. That project cost $11,300/kW, an astronomical price when compared to $2,940/kW for supercritical coal-fired EGUs without CCS, and even when compared to higher cost IGCC plants ($3,590/kW).[65]

With these facts, it is difficult to understand how EPA could have claimed in 2015 that the cost of CCS was reasonable. That conclusion appears to have been the result of several erroneous assumptions, which EPA has now proposed to abandon or correct. First and foremost, EPA's 2015 determination was based on the claim that the cost of a coal-fired EGU with CCS would be the "in the same range" as cost of a new nuclear unit. At the time EPA was crafting its CCS-based standard for coal plants, several new coal units and new nuclear units were under development, and both represented the most reliable forms of dispatchable generation capacity available. Thus, EPA assumed that utility companies seeking to diversify their fleet of resources

[65] 83 Fed. Reg. at 65447 (Table 9).

would face a choice between new coal and new nuclear and, as a result, new coal would be viable so long as it was no more expensive than new nuclear.

This way of thinking was absurd in 2015 and is even more unreasonable now. While the cost of a new generating unit is certainly a critical factor for utilities seeking to expand their generation portfolio, many other factors must also be considered, including significant considerations such as fuel price and availability, startup and shutdown capability, operational flexibility, waste disposal challenges, public and private safety concerns, licensing and permitting requirements, ancillary environmental risks, and public perception. Therefore, EPA's comparison of coal with CCS to nuclear is far too simplistic to be meaningful. (Comment C-6 & Comment C-7).

More importantly, even if that comparison were apt, EPA's conclusion from that thought exercise was incorrect because the cost of new nuclear itself has proven to be unreasonable. For all the attention it received, the nuclear "renaissance" (as the new-found interest in nuclear was often called) has foundered due to cost. Of the four units that were under development in 2015, the two units in South Carolina were abandoned after being built half-way, while the other two in Georgia remain just half-way built (and way over-budget). None have produced any electric power to date, and both projects have significantly harmed the economic position of the companies that own them (despite federal government assistance). Notably, no other nuclear projects are expected in the near future, confirming that other utility companies have concluded that the technology is not economically feasible.[66] Since EPA concluded in 2015 that the cost of

[66] EIA Annual Energy Outlook 2019, at 105-06.

applying CCS to coal-fired EGUs would "in the same range" as the cost for a new nuclear generating unit,[67] that alone should be enough to prove the cost of CCS is unreasonable.

To make matters worse, in 2015 EPA also underestimated the cost of installing CCS on new coal-fired EGUs as a result of at least two other erroneous assumptions. Perhaps the most obvious error is EPA's assumption that CCS-equipped coal-fired EGUs would be able to operate at a high capacity factor of 85 percent. That assumption ignored the fact that the cost of the electricity generated by a CCS coal plant would be as much as 80 percent higher than even existing conventional coal plants,[68] which have lately struggled to compete for dispatch against gas-fired combined cycles buoyed by low market prices for natural gas. In reality, a coal plant burdened with the high cost of CCS would be expected to run rarely, if at all, because it could not possibly compete against cheaper sources of electricity, as EPA has noted.[69] Without the ability to operate at a high capacity factor to maximize potential revenues, the economics of CCS-equipped coal plants would look far worse than EPA assumed in 2015.

Another poor assumption made by EPA was to underestimate the cost of transporting and storing the CO_2 captured by a CCS system. In 2015, EPA assumed transporting and storing CO_2 would only cost $11/tonne, but EPA now more appropriately recognizes that the low value assumed in 2015 was based on economies of scale expected for the quantity of CO_2 that would be captured by a full CCS system.[70] Since EPA only imposed a standard based on partial CCS, EPA should have adjusted that value to recognize the lower capture level, and correspondingly

[67] 80 Fed. Reg. at 64596 ("The [partial CCS] technology adds cost to a new facility which the EPA has evaluated and finds to be reasonable because the costs are in the same range as those for new nuclear generating capacity—a competing non-NGCC, dispatchable technology that utilities and project developers are also considering for base load application.").
[68] *See* NMA 2014 Comments, at 49-50.
[69] 83 Fed. Reg. at 65439 ("[I]n an economic dispatch system, a new coal-fired EGU with partial CCS would dispatch after the majority of existing coal-fired EGUs.")
[70] 83 Fed. Reg. at 65438.

higher price per tonne, associated with disposing of the captured CO_2. Like EPA's 85% capacity factor assumption, once corrected, the higher than projected cost of CO_2 disposal compounds the economic challenges associated with CCS.

EPA indicates in its 2018 proposal that the correction of the capacity factor and the CO_2 disposal cost alone raise the cost of CCS from 18 percent higher than a non-CCS unit to 29 percent higher than a non-CCS unit—an overall increase in cost of 63 percent.[71] That increase makes CCS 10 percent more expensive than the new nuclear units that have already proven economically infeasible. And even those conclusions are based on a comparison of the "levelized cost of electricity," which fails to fully account high initial capital costs that drive investment and financing opportunities.[72] These facts confirm that EPA has clearly made the right decision in its 2018 proposal in concluding that CCS is not cost-effective and therefore not the BSER for coal-fired EGUs. NMA supports that decision.

4. CCS is Not Sufficiently Available to Be the BSER.

Even if CCS was adequately demonstrated (which it is not), and even if CCS was cost-effective (which it is not), CCS still would not qualify as the BSER because it is not sufficiently available. As noted above, the D.C. Circuit has made clear that standards of performance must be achievable by an "industry as a whole,"[73] and the court has noted that the data that EPA relies on to set a standard of performance must reflect "industry-wide" performance.[74] The D.C.

[71] 83 Fed. Reg. at 65440.
[72] NMA 2014 Comments, at 108.
[73] *Nat'l Lime Ass'n*, 627 F.2d at 437 ("For all we know, the six plants tested could be using kinds and sizes of feed which are representative of only a small segment of the industry spectrum. If that were true the plants may not be 'representative' and the regulation might not be 'achievable' by the industry as a whole.").
[74] *Sierra Club*, 657 F.2d at 377 ("Despite the presence of some evidence in the record that suggests that EPA's findings are reasonable, the agency's presentation of its own data on which it says it is relying does not provide the guarantee required by *National Lime* that the test results be representative of industry-wide performance.). *See also Portland Cement I*, 486 F.2d 396 ("Another outcome of basing emission limits on insufficient data is that the limit may represent only part of a given industrial classification.").

Circuit has also held that Section 111 standards of performance must be achievable under the "most adverse conditions which can reasonably be expected to recur,"[75] and standards should not be preclusive to certain portions of an industry,[76] further confirming that EPA must consider the nationwide implications of its Section 111 standards.

EPA's current CCS-based standard fails to meet these requirements. Since only one commercial grade integrated CCS facility has ever been built (Boundary Dam), EPA has absolutely no basis for asserting that a similar level of performance is achievable across the country for every type of coal-fired EGU that might be built in the future. Even the closest example within the United States (Petra Nova) has proven incapable of meeting EPA's partial-CCS based standard of performance. While EPA claimed in 2015 that gas co-firing might be enough to comply,[77] the inability of even partial CCS to achieve the standard belies that claim.

More than just sufficient capture of CO_2 to meet emission limitation itself, CCS requires a storage reservoir to function properly—otherwise the captured CO_2 would simply be released back into the air. The D.C. Circuit has made clear that EPA cannot ignore but rather must take into consideration the waste disposal issues created by the BSER it selects. For example, in *Essex Chemical*, the D.C. Circuit rejected EPA's attempt to demonstrate that a "lime slurry scrubbing system" was the BSER for coal-fired steam generators because EPA had failed to properly address the waste disposal problem associated with the sludge generated by the scrubbers. In much the same way, EPA's CCS-based standard must fail because it does not sufficiently account for the problems associated with CO_2 storage.

[75] *Nat'l Lime Ass'n*, 627 F.2d at 433, n.46.
[76] *Portland Cement II*, 513 F.2d at 508 ("[T]he Administrator should also consider contentions and presentations that the adopted standard unduly precludes the supply of cement, including whether it is unduly preclusive as to certain qualities, areas, or low-cost supplies.").
[77] 79 Fed. Reg. at 1471.

In 2015, EPA suggested that storage of CO_2 would be a simple exercise of locating nearby storage sites and sending the CO_2 via pipeline to those locations. EPA even included large maps in its preamble in an attempt to show both how broadly available CO_2 storage sites are and how many pipelines are available, even where storage sites are less common.[78] However, EPA fails to note that nearly all of the storage sites EPA claimed to exist have never been confirmed to be suitable for storing CO_2. Without any operational experience, save the two EOR operations associated with Boundary Dam in Canada and Petra Nova in Texas, EPA has no basis for asserting that the storage of CO_2 needed to make CCS is actually viable. And that storage concern is not a small problem—as noted in comments by the Utility Air Regulatory Group in 2014, "a 500 MW boiler firing bituminous coal at a gross heat rate of 8,500 Btu/kWh and an 80 percent capacity factor would need to separate almost 1.2 million tons of CO_2, which would produce approximately 1.5 million cubic meters of CO_2 at supercritical pressure annually for sequestration."[79] This problem is exacerbated by EPA's failure to account for other critical issues, such as the lack of proven methods for ensuring the stored CO_2 does not escape and contaminate drinking water sources or rush to the surface and endanger the public. EPA's 2018 proposal appropriately takes a harder look at many of these issues and necessarily concludes that the absence of available storage sites and mechanisms renders CCS itself too unavailable to be the BSER.

C. No Other Control Options Considered by EPA Qualify as the BSER.

As part of its proposed BSER determination, EPA has considered several other systems of reducing CO_2 emissions from new coal-fired EGUs, including (1) co-firing with, or switching entirely to natural gas fuel, (2) combined heat and power (CHP), and (3) hybrid concentrated

[78] 80 Fed. Reg. 64577-78.
[79] Comments of the Utility Air Regulatory Group, at 40 (May 9, 2014) ("UARG 2014 Comments").

solar. While all of these alternatives have been demonstrated on some level, NMA agrees with EPA that none qualify as the BSER. As with EPA's rejection of CCS, EPA's determination that these alternative systems are not the BSER represents a reasonable conclusion that is within EPA's authority under Section 111.

First, co-firing with natural gas cannot be the BSER because it would defeat the purpose of constructing a new coal fired-EGU, and switching entirely to natural gas cannot be the BSER because it would prohibit new coal-fired EGUs entirely. The latter would actually require one type of source to become a completed different type of source—in essence "redefining of the source"—which is inconsistent with the requirement for standards to be achievable by the source to which they apply. EPA should avoid "redefining the source," as it has in other contexts,[80] because utilities that might decide to construct a coal-fired EGU in the future for the very purpose of avoiding certain shortcomings of gas-fired generators. That is, they would likely choose coal over gas in order to take advantage of an energy resource that (unlike gas) can be stockpiled onsite and provide dispatchable electricity generation even in extreme weather conditions, when other resources might be interrupted (such as gas). If all new coal-fired EGUs are subject to a standard that requires the use of gas, then many of the benefits of coal would vanish—coal-fired EGUs would become just as vulnerable to gas curtailments as gas-fired EGUs themselves. And of course requiring a new coal-fired EGU to switch entirely to natural gas would serve as a complete bar to any new coal-fired EGUs.

In essence, a standard that would require gas co-firing or a complete switch to natural gas would inappropriately allow EPA standards to dictate utility company business decisions and

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[80] EPA PSD and Title V Permitting Guidance for Greenhouse Gases, at 26 (Mar. 2011) ("EPA has recognized that a Step 1 list of options [for determining "best available control technology"] need not necessarily include inherently lower polluting processes that would fundamentally redefine the nature of the source proposed by the permit applicant.") (citing *In re Prairie State Generating Company*, 13 E.A.D. 1, 23 (EAB 2006).

usurp the authority of state utility commissions to determine the appropriate mix of energy resources. Section 111 does not give EPA the authority to tell source owners what kind of resources to build or tell state commissions what kind of resources to approve. Rather, "standards of performance" under Section 111 must, by definition, allow "performance" of the regulated industrial activity. Both the statutory text and D.C. Circuit precedent confirm that Section 111 standards must be "achievable" by the industrial source category to which they apply, which at a minimum means the standards should not completely prohibit those sources or require them to partially or fully convert into a different type of industry altogether. Otherwise Section 111 would turn EPA into roving commission capable of outlawing entire categories of sources, something Congress certainly did not authorize when it adopted Section 111 to ensure new facilities incorporate the latest controls. Any sort of standard for coal-fired EGUs that would require co-firing natural gas would also require the use of the nation's natural gas resources in a highly inefficient way, since coal-fired EGUs cannot utilize gas as efficiently as an EGU designed solely for natural gas combustion, such as a natural gas-fired combined cycle unit that cannot burn any coal.

Co-firing and switching to natural gas would also raise significant availability concerns. Just as CCS is not available nationwide due to the lack of sufficient storage sites and pipelines, natural gas is not available in many locations due to the lack of pipeline infrastructure, and efforts to expand gas pipeline systems are often met with fierce opposition from local communities and environmental advocacy groups. In fact, new coal-fired EGUs could be an important energy resource particularly where access to natural gas is limited, but that option would be eliminated if EPA imposed a standard that required the use of gas at all new EGUs.

Many of the same concerns likewise confirm that CHP cannot be the BSER. Availability is likely to be the chief concern for CHP because it requires a thermal host to function, which would severely limit the locations where new coal-fired EGUs could be built—*i.e.*, only adjacent to other industrial facilities that have large (and currently unmet) steam demands. As such, a CHP-based standard would eliminate the possibility of building a new coal-fired EGU in remote areas where other industrial activity may be minimal but additional electricity supply is nevertheless needed—either to serve the local population or as transmission support between population centers—precisely the benefit coal-fired EGUs are best equipped to provide, given the ability of such units to store large quantities of reliable fuel onsite. A CHP-based standard would also serve as a cap on total future coal-fired EGU construction, since it would be bounded by the demand available for steam by other industries. At a minimum, EPA has certainly not provided sufficient information regarding the availability of CHP or the emission reductions it might achieve, and thus EPA cannot reasonably conclude that CHP is the BSER based on the administrative record before it.

Last, and likely least, hybrid concentrated solar does not appear to be a realistic option for reducing CO_2 emissions from a coal-fired EGU because it would in essence convert a single coal-fired EGU into two different operations—a smaller EGU operating solely on coal when the sun isn't shining, and a larger EGU with added energy from the solar component of the facility. But since steam turbines only operate most efficiently at specific operating levels, a hybrid solar facility would face a choice—either install two different size steam turbines, an expensive and likely cost-prohibitive option, or else purchase only the larger turbine that would be needed to serve the EGU when both coal and solar resources were engaged. However, the latter approach, while likely more economically viable, would require the larger turbine to operate at lower and less-efficient levels when solar energy is not available. Accordingly, the coal-only operating scenario for such an EGU would likely be far less efficient than it otherwise would be, which would substantially reduce the benefit of installing the hybrid solar process. Availability would also present a significant concern in areas that typically have a high number of cloudy days. At a minimum, like CHP, EPA has not provided nearly enough information to support a finding that hybrid concentrated solar could be the BSER for new coal-fired EGUs, and therefore it must be rejected on this administrative record.

In summary, EPA's proposal to determine that a highly efficient supercritical steam cycle is the BSER for new coal-fired EGUs (with an exception for smaller EGUs) is reasonable and consistent with law, and none of the other options considered by EPA could reasonably be considered a better alternative. This conclusion is fully confirmed by EPA's evaluation of numerous source-specific "best available control technology" determinations completed in recent years, which have invariably conclude that CCS is either unavailable or cost-prohibitive or both.[81] Since all of those state permitting authorities with occasion to consider whether CCS is appropriate for individual source have concluded CCS is not the best control, EPA cannot reasonably claim that CCS is the best control for every new sources. Thus NMA supports EPA's proposal to revise its BSER determination under Section 111 for new coal-fired EGUs from the undemonstrated, unavailable, and cost-prohibitive CCS technology to the cost-effective, proven, and reliable supercritical steam cycle.

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[81] EPA Memorandum, *Review of BACT Determinations for GHG Emissions* (December 2018) (available at www.regulations.gov Doc. ID EPA-HQ-OAR-2013-0495-11951 (summarizing review of "the rationale for 13 GHG BACT analyses submitted, reviewed, permitted and in some cases litigated from 2011 to 2017").

On the other hand, NMA also supports EPA's decision to allow any means of reducing CO_2 emissions at coal-fired EGUs, including CCS, to demonstrate compliance with the standards based on the BSER of supercritical technology. Section 111 is abundantly clear—

> nothing in this section shall be construed to require, or to authorize the Administrator to require, any new or modified source to install and operate any particular technological system of continuous emission reduction to comply with any new source standard of performance.

Accordingly, while EPA must set the standard based on the BSER, EPA must allow sources to use any means available to comply.

D. EPA Should Conduct a Proper Analysis of Whether GHG Emissions From New Coal-Fired EGUs Cause or Contribute to an Endangerment of Public Health or Welfare

For the reasons above, NMA supports EPA's proposed revision to the BSER for coal-fired EGUs and asks EPA to finalize it. However, EPA's preamble attempts to brush past a potential flaw underlying both its 2015 standards and this proposal. In a few short paragraphs and a long footnote, EPA recognizes that Section 111 requires two prerequisite findings—EPA must find that a source category (1) "causes or contributes significantly" to air pollution that may (2) "endanger the public health or welfare."[82] Moving quickly past the issue, however, EPA claims the statutory prerequisite is satisfied by its 1970's-vintage finding that the regulation of other emissions from "fossil fuel-fired steam generators" (not "EGUs") was warranted.

NMA finds EPA's attention to this important question insufficient and its answer lacking. Although EPA claims to have free reign to regulate any emissions from any source category once that category has already been regulated under Section 111 for any reason,[83] that theory

[82] 83 Fed. Reg. at 65431 ("This determination is commonly referred to as an 'endangerment finding' and that phrase encompasses both the 'causes or contributes significantly' component and the 'endanger public health and [sic] welfare' component of the determination.").
[83] 83 Fed. Reg. at 65432 ("[T]he Agency interprets the statute to require an endangerment finding to be made at the time the EPA lists the source category and to broadly concern emissions from the source category, and not to

seems illogical. EPA correctly points out that the statute does not expressly state in so many words that EPA must make new findings each time that it adopts standards for a new pollutant emitted by an already regulated source category. However, the ultimate implication of that reading of the statute is that Congress intended to authorize EPA to regulate even emissions that have no health or welfare impacts at all so long as other emissions do. Precisely worded or not, Congress likely did not intend Section 111 to contain such a disconnect between the powers it granted and the purposes it had in mind.

Perhaps feeling the discomfort of relying solely on its underwhelming 1971 finding[84] (which EPA does not even cite, perhaps because the source category is differently defined), EPA also points to the preambles of its 2014 proposal and 2015 final rule. In those notices, EPA provided a high-level discussion of the general concerns attributed to climate change and an overview of GHG emissions from the power generation sector as a whole, along with several references to EPA's 2009 endangerment finding for motor vehicles.[85] All told, these prior notices and actions amount to, at most, only one of the prerequisite findings—whether GHGs in general may reasonably be anticipated to "endanger the public health or welfare." None of EPA's prior notices, from 1971 to today, find that the CO_2 emissions from any new coal-fired EGUs will "cause or contribute significantly" to that concern.

To be clear, NMA is not claiming that the statute unambiguously requires EPA to make a new finding for every new pollutant regulated from every already regulated source category, nor is NMA expressing an opinion in these comments regarding the outcome of any of the analyses

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concern emissions of any particular pollutant that may be made subject to a revised or newly issued standard for a source category that has already been listed.").

[84] *Air Pollution Prevention and Control: List of Categories of Stationary Sources*, 36 Fed. Reg. 5931 (Mar. 31, 1971) (in a single sentence, without any discussion, stating that the Administrator has determined that five source categories meet the prerequisites for regulation under Section 111, including "fossil fuel fired steam generators.").

[85] *Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act*, 74 Fed. Reg. 66496 (Dec. 15, 2009).

that Section 111 requires. However, precisely because NMA supports the revisions that EPA has proposed, NMA asks EPA to conduct the analyses so that the absence of any prerequisite findings does not itself become a legal infirmity in the final rule.

If EPA believes the analyses required by Section 111 will take more time, and thus delay the correction of the unlawful 2015 rule based on partial CCS, NMA asks EPA to finalize its proposed rule revisions first, and then initiate a separate action to evaluate (1) whether (or not) new analyses are needed as a prerequisite to regulating CO_2 emissions from new coal-fired EGUs under Section 111, and (2) whether (or not) CO_2 from new coal-fired EGUs will cause or contribute significantly to the endangerment of public health or welfare. That approach would ensure that expectations of future regulatory requirements for new coal plants are corrected as soon as possible, while still allowing EPA the time needed to decide whether to issue new findings and take comment on its analysis and conclusions (which EPA has not yet proposed). That approach would also resemble the remand process that would likely follow if a court were to hold that EPA failed to issue a required finding[86] or under the reconsideration process that EPA may initiate after promulgation of new rules that may benefit from further review.[87]

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[86] *See, e.g.*, *Portland Cement I*, 486 F.2d at 402 (remanding the record for further proceedings on "a number of matters that require consideration and clarification on remand"). *Accord Michigan v. EPA*, 135 S.Ct. 2699, 2707 (2015) ("We hold that EPA interpreted § 7412(n)(1)(A) unreasonably when it deemed cost irrelevant to the decision to regulate power plants. We reverse the judgment of the Court of Appeals for the D.C. Circuit and remand the cases for further proceedings consistent with this opinion.") *and White Stallion Energy Center, LLC v. EPA*, No. 12-1100, 2015 WL 11051103, at *1 (Dec. 15, 2015) ("on remand from the U.S. Supreme Court … ORDERED that the proceeding be *remanded to EPA without vacatur* of the Mercury and Air Toxics Standards final rule") (emphasis added).

[87] *See, e.g.*, *National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters*, 78 Fed. Reg. 1378 (Jan. 31, 2013) ("On March 21, 2011, the EPA promulgated national emission standards for this source category. On that same day, the EPA also published a notice announcing its intent to reconsider certain provisions of the final rule.").

II. NMA Generally Supports the Standard Proposed by EPA But Asks EPA to Reconsider Certain Issues.

Overall, NMA approves of and supports EPA's effort to adopt a "standard of performance" for coal-fired EGUs that is actually achievable with an available and adequately demonstrated BSER. As noted above, NMA agrees that EPA has proposed to adopt an adequately demonstrated BSER. Thus, the question raised by the proposed standard based on that BSER is: Will the numeric emission limitations be achievable?

For the answer to that question to be yes, the D.C. Circuit has confirmed that the standard must meet certain criteria. First, although EPA may make reasonable extrapolations, the standard must not be based on "mere speculation or conjecture."[88] Second, while a shortage of data does not defeat EPA's ability to set a standard, EPA must rely on data that is representative of the industry as a whole.[89] And third, the standard set must be one that contemplates the most adverse conditions likely to recur at covered sources.[90]

EPA has several options for ensuring that its standards meet these criteria. For instance, if a standard is achievable for only part of an industry, Section 111 authorizes EPA to create subcategories so that the standards set are achievable by all members of an industry. Likewise, if a standard is only achievable during certain modes of operation, Section 111 authorizes EPA to create alternative standards so that the standards are continuously achievable under all operating

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[88] *Lignite*, 198 F.3d at 934 ("… EPA may not base its determination that a technology is adequately demonstrated or that a standard is achievable on mere speculation or conjecture …"). *See also Portland Cement I*, 486 F.2d at 391 ("The Administrator may make a projection based on existing technology, though that projection is subject to the restraints of reasonableness and cannot be based on 'crystal ball' inquiry.")

[89] *Portland Cement I*, 486 F.2d at 396 ("Another outcome of basing emission limits on insufficient data is that the limit may represent only part of a given industrial classification."). *See also Lignite*, 198 F.3d at 934 ("EPA was unable to collect emissions data for the application of SCR to these boilers, but this absence of data is not surprising for a new technology like SCR, nor does it in and of itself defeat EPA's standard. … EPA may compensate for a shortage of data through the use of other qualitative methods …").

[90] *Nat'l Lime Ass'n*, 627 F.2d at 433, n.46. ("a uniform standard must be capable of being met under most adverse conditions which can reasonably be expected to recur"). *See also Portland Cement Assoc. v. EPA*, 665 F.3d 177, 190 (D.C. Cir. 2011) ("Portland Cement III") (rejecting challenges to cement kiln standards because "EPA demonstrated how all regulated kilns could meet NSPS standards.").

scenarios. Finally, if a standard is generally achievable in the long run, but emission rates can vary somewhat in the short run, Section 111 authorizes EPA to allow sources to average their performance levels over time in demonstrating compliance.

Fortunately, EPA has already recognized many of these important flexibilities in the proposed standards it has crafted for coal-fired EGUs, including (i) a subcategory for small EGUs for which supercritical steam turbines are not available, (ii) a subcategory for coal refuse-fired EGUs that cannot achieve the same efficiency levels as virgin coal units, and (iii) annual averaging for all EGUs in light of the long-term nature of the climate change concerns the standards are designed to address. EPA has also requested comment on a variety of other flexibilities, including part-load limits, a low-duty cycle subcategory, and commercial demonstration permits. NMA supports all of these important points of flexibility—both those EPA has proposed and those upon which EPA has only sought comment—because they will help ensure that the standards EPA proposes will, in fact, be achievable.

However, even with these flexibilities in place, NMA is concerned that EPA has proposed standards that may be unachievable simply due to the level of the numeric emission limitation proposed. Unfortunately, no amount of flexibility can fully compensate for an emission limitation set too low. Thus, NMA asks EPA to reconsider the numeric limit it has proposed. And, even though EPA has not sought comment on higher levels (Comment C-16 through C-18 only seek comment on even lower standards), NMA nevertheless asks EPA to consider adopting a higher emission limitation to better ensure the achievability of the standard, particularly since doing so would sacrificing no or only negligible environmental benefits.

A. NMA Supports EPA's Effort to Ensure the Standard is Achievable But Asks for Additional Compliance Margin, Similar to the Margin for Gas EGUs.

In general, EPA's proposal has the right focus. Clearly it seeks to impose standards of performance that will be achievable by coal-fired EGUs of all types nationwide. Evidence of that intent is found EPA's decision to allow sources to demonstrate compliance via annual averages, since CO_2 has no direct short-term health implications.[91] However, the standards EPA has proposed—1,900 lb/MWh for large EGUs, 2,000 lb/MWh for small EGUs, and 2,200 lb/MWh for coal refuse EGUs—do not appear to provide sufficient compliance margin. While annual averaging can smooth out natural variability, no amount of averaging can rehabilitate a standard that is too low to achieve, or one that fails to account for natural degradation in performance over time. Thus, even if the standards are achievable at a single point in time, they are not likely to be achievable over the life of a new unit. At a minimum, the standards appear far more stringent, relative to the performance of existing units, than the other Section 111 standards that EPA has adopted in the past.

The best point of comparison is EPA's standards for CO_2 emissions from natural gas-fired EGUs, adopted at the same time EPA adopted the standards for coal-fired EGUs that it now seeks to revise. In setting the gas-fired EGU standard, EPA utilized a "robust data set" to make sure that the vast majority of units already employing the BSER of combined cycle technology, including a wide variety of such units, would be able to achieve the standards with current performance levels.[92] In fact, the standard that EPA set for natural gas-fired EGUs in 2015 of 1,000 lb/MWh (which EPA does not proposed to change) is 25 percent higher than the range of best-performers in the industry at the time, which were achieving 782-812 lb/MWh.[93] As such,

[91] 83 Fed. Reg. at 65458 ("Unlike most other air pollutants, GHG pollution has limited direct health impacts …").
[92] 79 Fed. Reg. at 1486.
[93] NMA 2014 Comments, at 21.

the vast majority of existing units utilizing the BSER are expected to meet the standard. EPA also set the level high enough to ensure that covered units would be able to comply over their entire lifespan, not just at a single instant in time.[94]

Neither that approach, nor the result is at all surprising. Since Section 111 standards apply during all possible operating scenarios and conditions and for the life of an affected facility, during which some degradation in performance will inevitably occur, some compliance margin is needed to ensure the standard will be achievable in the real world over time. In that way, the 2015 standard for natural gas-fired EGUs is also consistent with prior EPA practice in setting Section 111 standards.[95]

In contrast, the new standards that EPA has proposed for coal-fired EGUs, although finally based on the correct BSER, do not appear to provide the same compliance margin needed to ensure the standards are realistically achievable. For instance, according to EPA, the top 12 percent of best performing sources[96] achieve an emission rate of 1,832 lb/MWh on average,[97] but at that level the proposed standard of 1,900 lb/MWh provides compliance margin of only 4 percent—*even for the best performing sources.* If EPA were to apply the same 25 percent margin allowed for gas-fired EGUs, the standard would need to be well over 2,200 lb/MWh for

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[94] 79 Fed. Reg. at 1487 ("[B]ecause over 90 percent of small and large existing NGCC facilities are currently operating below the emission rates of 1,100 lb CO_2/MWh and 1,000 lb CO_2/MWh, respectively, these rates are considered BSER for new NGCC facilities in those respective subcategories. These values represent the emission rates that a modern high efficiency NGCC facility located in the U.S. would be able to maintain over its life.").

[95] "Since the 1990s, EPA has calculated statistically achievable emission limits for NSPS by allowing exceedance frequencies of either one percent, one per year, or one per ten years, which allows at least 99 percent of the units to comply. *See, e.g.*, 1997 Subpart Da TSD at Section 3.2.3 (Analysis of Long-Term Continuous Emission Monitoring Data) at 3-43, 3-49, 3-55." UARG 2014 Comments, at 94.

[96] The average of the top 12% of best performing sources is a metric endorsed by Congress in Section 112, which establishes "maximum achievable control technology" standards, which are intended to be more prescriptive than Section 111 new source performance standards, but that metric is utilized here as a basis of comparison.

[97] EPA BSER Memo, at 8, Figure 5.

all coal-fired EGUs (except those in subcategories for which an even higher standard would be needed).

At a minimum, since the standard proposed for coal-fired EGUs is based on fewer units and less data overall, EPA cannot assert with the same level of certainty that its standards for coal plants will be achievable, and thus an even greater compliance margin is warranted. EPA's new "normalizing" technique[98] exacerbates these concerns. That methodology focuses on theoretical assumptions applied to only one unit for each subcategory instead of actual measured data from multiple sources that is readily available. As such, the methodology needlessly approaches the realm of speculation that the D.C. Circuit has warned EPA to avoid.

The efficiency- and output-based nature of EPA's standards also demands greater flexibility. Unlike EPA's past Section 111 standards, which could be met so long as a single, back-end control device worked as expected, compliance with the proposed CO_2 standards requires efficient operation by every single component of an entire coal-fired EGU. If any component of the EGU begins to constrain efficiency by even a relatively small amount, the CO_2 emissions per unit of electricity will rise and compliance could quickly become impossible. Given the unavoidable natural variability in CO2 emission rates and the inevitable degradation in performance of new units over time, EPA must provide greater compliance margin.

NMA is aware that the Utility Air Regulatory Group (UARG) is planning to submit comments further detailing concerns regarding the achievability of the proposed standards, including a technical report critiquing EPA's "normalizing" methodology (noting, for example, EPA's failure to select a representative population, failure to justify its normalization factors, and failure to normalize for generating load), and NMA endorses those comments.

[98] EPA BSER Memo, at 7-15.

B. NMA Supports the Subcategories EPA Has Proposed But Asks EPA to Adopt Subcategories for Lignite-Fired and Low-Duty EGUs As Well.

In its proposal, EPA has appropriately recognized that not all coal-fired EGUs are capable of the same level of reduction in CO_2 emissions with the supercritical steam cycle technology that EPA has selected as BSER for the industry. First, small coal-fired EGUs need a higher standard to account for the fact that supercritical steam turbines are not commercially available, leaving subcritical design the only available BSER for such units. Second, for coal refuse units, which utilize leftover coal from the mining process that would otherwise become a waste, EPA has proposed a higher standard to account for the lower levels of efficiency associated with such units. For coal-refuse units in particular, EPA recognized the environmental benefits of using coal refuse that would otherwise present a waste management challenge.

In proposing to create these two subcategories, EPA has inherently recognized that some coal-fired EGUs need a separate standard in order for the standard to be achievable, and NMA supports that aspect of EPA's proposal. However, NMA also believes that two additional types of coal-fired EGUs will also need separate treatment—lignite-fired EGUs and low duty-cycle EGUs—since both with have inherently lower efficiency levels that will make compliance with the generic standard EPA has proposed extremely difficult, if not out-right impossible. To ensure its standards are achievable by the industry "as a whole," EPA must subcategorize lignite-fired and low duty-cycle EGUs and set more appropriate standards that reflect the level of performance those units can actually achieve.

1. EPA Should Adopt a Lignite-Fired EGU Subcategory.

As EPA explained in the preamble to its proposal, "25 existing EGUs have maintained annual emission rates of 1,900 lb CO2/MWh-gross over the past 10 years," including "a broad range of EGU types." In contrast, EPA recognizes that "[t]he lowest emitting lignite-fired EGU is emitting at approximately 2,000 lb CO_2/MWh-gross."[99] These statements confirm that lignite-fired EGUs are different from other coal-fired EGUs and unable to achieve the same levels of efficiency or CO_2 emissions per amount of electricity generated.

That conclusion is supported by the fundamental differences that define the classification, or "rank," of lignite coal. The U.S. Energy Information Administration (EIA) defines lignite as coal with "high inherent moisture content, sometimes as high as 45 percent" and a heat content average of "13 million Btu per ton [mmBtu/ton] on a moist, mineral-matter-free basis."[100] In contrast, EIA defines "subbituminous coal" as coal with 20 to 30 percent moisture content and an average heat content range of 17-18 mmBtu/ton, "bituminous coal" as coal with less than 20 percent moisture content and a heat content average of 24 mmBtu/ton, and "anthracite coal" as coal with less than 15 percent moisture content and an average heat content of 25 mmBtu/ton. All told, other coals have between 33-67 percent less moisture and between 30-92 percent greater heat content compared to lignite—substantial differences that directly impact the efficiency levels and emission profiles of power plants firing the different types of coal.

Despite these clear differences, EPA proposed the same efficiency-based CO_2 standard on all types of coal (other than coal refuse). EPA's justification for its one-size-fits-all CO_2 standard is poorly reasoned. In essence, EPA assumes that an "ultra-supercritical" steam cycle could potentially help lignite-fired units make up the inherent difference in efficiency between lignite-fired EGUs and other coal-fired EGUs.[101] But EPA makes no effort to explain why it

[99] 83 Fed. Reg. at 65451.

[100] *See* https://www.eia.gov/tools/glossary/?id=coal.

[101] 83 Fed. Reg. at 65451 ("The lowest emitting lignite-fired EGU is emitting at approximately 2,000 lb CO_2/MWh-gross, and the lowest emitting coal-fired EGU using dry cooling is emitting at approximately 2,100 lb CO_2/MWh-gross. However, no lignite-fired or coal-fired EGU using dry cooling is using ultra-supercritical steam conditions. The EPA has concluded that additional efficiency technologies could be incorporated into new units to allow a new EGU burning lignite with dry cooling to comply with the proposed standard.").

believes lignite-fired EGUs should be required to do something never done before, given that an "ultra-supercritical" steam cycle has never been applied to a lignite-fired plant (and only one "ultra-supercritical" coal-fired plant has ever been built) in the United States.[102] EPA's reference to the possibility of drying lignite to improve its heat content[103] likewise fails to support its proposed regulatory scheme. Although drying has been implemented at a lignite-fired facility in North Dakota (with the help of Department of Energy funding), the improvement in heat content associated with drying only reduces CO_2 emission rates by about 4 percent[104]—not nearly enough to overcome the inherent differences between lignite and other coals. Even if "ultra-supercritical" units with dryers could theoretically achieve the proposed standards, EPA nowhere explains why lignite-fired EGUs should bear a heavier and more uncertain regulatory burden just to match the performance of other coal-fired units that have inherently different moisture and heat content levels, and thus inherently different efficiency and CO_2 emission profiles.

EPA characterizes its decision to group all coal types into a single category as a "fuel neutral standard,"[105] but in fact it is quite the opposite—by setting a standard that would require lignite units to match the performance of units using a higher heat-content coal, EPA has proposed a higher hurdle for lignite than any other coal type. Although the D.C. Circuit has confirmed that technologies can be transferred between sufficiently similar sources if supported with a reasonable analysis,[106] EPA has not sufficiently analyzed the challenges that may await the nation's first attempt to apply an ultra-supercritical steam cycle to a lignite-fired EGU.

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[102] HELE Report, at 15, 22 (categorizing the supercritical units built in the United States, and summarizing the experience of the only "ultra-supercritical" unit—John W. Turk, Jr., a subbituminous coal-fired EGU).

[103] 83 Fed. Reg. at 65443, n.86 ("EPA now believes that it should have considered that for new lignite-fired power plants owners/operators would likely dry the lignite prior to combustion.").

[104] *See* https://greatriverenergy.com/we-provide-electricity/making-electricity/dryfining.

[105] 83 Fed. Reg. at 65456 ("The proposed fuel neutral standard is consistent with the emissions standards in the criteria pollutant NSPS and is achievable for all coal types.").

[106] *See Lignite*, 198 F.3d at 934 ("EPA has shown that SCR can be successfully applied to coal-fired utility boilers under a 'wide range of operating conditions' including those analogous to the load cycles of industrial boilers. …

EPA's one-size-fits-all proposal also differs from its prior rules, in which EPA subcategorized lignite-fired EGUs. Specifically, EPA's 2012 MATS rule imposed subcategorized mercury standards based on coal "rank," after recognizing that no power plants using "low rank" coal (*i.e.*, lignite[107]) were among the top 12 percent of best-performing sources upon which the standard was set.[108] To accommodate these fundamental differences, EPA set different standards for lignite EGUs (0.04 pounds per gigawatt hour (lb/GWh) for both new and existing units) that are much higher than the standards for non-lignite EGUs (0.003 lb/GWh for new units and 0.013 lb/GWh for existing units).[109] The same circumstances are presented in EPA's proposed revision to the CO_2 standards under Section 111. As noted above, EPA has recognized that no lignite-fired unit has ever achieved the proposed CO_2 standard, and thus a different standard is needed for those units. As EPA recognized in the MATS rule, the statute directs EPA to align the subcategories under Sections 111 and 112 where "practicable,"[110] and EPA has not identified a reasonable basis for failing to do so in this instance.

We think that it was reasonable for EPA to extrapolate from its studies of utility boilers in setting an SCR-based new source performance standard for coal-fired industrial boilers.").

[107] In MATS, low rank coal was defined as coal with less than 8,300 Btu/lb (*see* 40 C.F.R. § 63.9990), which is equivalent to 16.6 mmBtu/ton—a heat content level that is right in between the average heat content of lignite (13 mmBtu/ton) and subbituminous coal (17-18 mmBtu/lb), according to EIA. *See also* 40 C.F.R. § 60.5580 (referencing ASTM D388-9, Standard Classification of Coals by Rank, which identifies lignite as coal with a heat content of less than 8,300 Btu/lb).

[108] *See, e.g.*, *National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units*, 77 Fed. Reg. 9304, 9390 (Feb. 2012) ("*MATS Final Rule*") ("The proposed rule subcategorized EGUs burning coal into two subcategories: EGUs designed for coal ≥8,300 Btu/lb and EGUs designed for virgin coal <8,300 Btu/lb (low rank virgin coal). … When developing the proposed rule, we examined the EGUs in the top performing 12 percent of sources for Hg emissions. We determined that [t]here were no EGUs designed to burn a nonagglomerating virgin coal having a calorific value (moist, mineral matter-free basis) of 19,305 kJ/kg (8,300 Btu/lb) or less … among the top performing 12 percent of sources for Hg emissions, indicating a difference in the emissions for this HAP from these types of units. … After fully considering the available information, including the comments received, we have concluded that it is appropriate to continue to base the subcategory definitions, at least in part, on whether the EGUs were designed to burn and, in fact, did burn low rank-virgin coal.").

[109] 40 C.F.R. Part 63, Subpart UUUUU, Tables 1-2. MATS also includes alternative pound per trillion Btu limits for coal units, but those limits are likewise different for lignite and non-lignite units (4.0 and 1.2 lb/TBtu, respectively).

[110] *MATS Final Rule*, 77 Fed. Reg. at 9396 (citing "the CAA section 112(c)(l) directive that '[t]o the extent practicable, the categories and subcategories listed under this subsection shall be consistent * * * '").

Although EPA may have intended to avoid creating an unfair incentive to use a particular coal type just to qualify for a less stringent standard,[111] EPA has gone too far in the other direction, resulting in an unfair disincentive for a significant portion of the industry. In effect, EPA's decision to ignore the inherent differences in lignite will serve as an overwhelming disincentive to use lignite at all, which could have significant implications for the industry as a whole, given that the industry has relied on between 67 and 81 million tons of lignite per year over the last decade.[112] In fact, since most lignite-fired EGUs are mine-mouth plants that are constructed in areas with plentiful supplies of lignite,[113] setting an unachievable standard for lignite would force power plant owners in those areas to import other types of coal instead of using the abundant local resource of lignite, increasing transportation costs and air emissions while abandoning a valuable local energy resource. Instead of unnecessarily burdening one segment of the industry and accepting these unintended consequences, EPA should do what it has always done—even within this same proposal—when faced with different industry segments that have inherently different emission characteristics: develop separate standards for fundamentally different types of EGUs. Only through standards that recognize the inherent differences in lignite will EPA be able to create a truly "fuel-neutral" standard that is achievable by the entire industry, as required by Section 111.

2. EPA Should Adopt a Low Duty-Cycle EGU Subcategory.

Although NMA agrees with EPA that new supercritical coal-fired EGUs would likely operate at a relatively high and therefore efficient operating level, EPA should nevertheless

[111] 83 Fed. Reg. at 65456 ("The EPA is not proposing to subcategorize by fuel type for multiple reasons. Subcategorizing by fuel type could have the perverse impact of both increasing emissions and decreasing compliance options.").
[112] *See* EIA, Table ES1. Coal Production, 1949-2017 (available at https://www.eia.gov/coal/data.php).
[113] *See MATS Final Rule*, 77 Fed. Reg. at 9379 ("We determined that [EGUs combusting low rank virgin coal] are universally constructed 'at or near' a mine containing low rank virgin coal because it is not cost-effective to transport large quantities of such fuel long distances.").

account for unforeseen circumstances in which a new unit might consistently operate at a low operating level, which EPA has referred to as a "low duty-cycle" unit. Like lignite-fired units, low-duty cycle units cannot meet the same lb/MW emission rate as other coal-fired EGUs. (Comment C-32). If EPA fails to accommodate such circumstances, a new coal-fired EGU could find it difficult to comply with the standard at the same time that it might be facing economic pressures associated with running less than originally anticipated—essentially caught between the competing forces of economic dispatch and mandatory regulations. Such circumstances might be expected as additional renewable energy capacity is built to comply with state-based renewable energy portfolio standards, which will inevitably force fossil fuel-fired units to cycle with greater frequency to balance load when the wind stops blowing and the sun stops shining. And yet, a low duty-cycle subcategory would have no or negligible effect on the environmental implications of EPA's standards because a marginally higher standard (only 200 lb/MWh higher) would not be expected to have any real effect on the concentration of CO_2 in the atmosphere. (Comment C-33). With so little to lose, but so much to gain in flexibility and achievability, NMA asks EPA to take the highly reasonable step of adopting different standard for units that are meaningfully different from those upon which EPA designed the general standards.

C. EPA Should Also Provide Additional Flexibility to Ensure Its Standards Are Achievable in Practice and Make Several Other Important Clarifications.

In addition to increasing the compliance margin and subcategorizing lignite-fired and low-duty EGUs, NMA also asks EPA to consider four other flexibilities that would have no or only negligible effects on the emission reductions EPA is seeking to achieve, while significantly improving the achievability of the proposed standards. First, NMA asks EPA to remove the requirement for EPA approval to switch between a gross-generation standard and a net generation standard that EPA has already approved. NMA generally supports EPA's gross generation-based standards because it will avoid penalizing sources for conventional pollution control devices and allow sources to rely on existing monitoring systems, and NMA also supports EPA's alternative net generation-based standard because it will allow individual facilities to take advantage of opportunities to reduce parasitic load. However, since EPA has already required individual sources to get approval for a net generation-based standard, thus giving EPA an opportunity to confirm the standard is equivalent to the generic gross generation-based standard, further approvals should be unnecessary.

Second, in addition to the low duty-cycle subcategory above, NMA agrees that a low-load standard is needed. (Comment C-32). As noted above, even the most efficient units operate less efficiently at low loads, and thus a subcategory for units that consistently operate at low loads is needed, particularly given the expected increase in the use of coal plants to balance an increasing level of intermittent renewable generation. But even units that do not operate consistently enough at low loads to qualify as "low duty-cycle" may still find compliance difficult due to low-load operations that can drag down the annual average emission rate. EPA has already recognized that part load limits are appropriate for gas-fired turbines in Subpart KKKK, even though the pollutants regulated under that rule are known to have direct human health impacts.[114] If appropriate in that context, certainly a similar accommodation is warranted for CO_2—a pollutant that does not directly impact human health and that will likely remain at a consistent concentration worldwide regardless of the specific emission limits imposed by EPA's standards. Thus, NMA asks EPA to adopt a similar standard to cover low load operations, regardless of whether the unit in question qualifies for the low duty-cycle subcategory. With

[114] *See* 40 C.F.R. Part 60, Subpart KKKK, Table 1 (imposing a NO_x standard of 150 ppm for new natural gas units operating at less than 75% of peak load—between three to ten times higher than the standards for operation above 75% load, which range from 15 ppm to 42 depending on the size of the unit).

regard to the specifics of such a part-load standard, NMA agrees that a heat input-based standard would be appropriate (Comment C-34) but disagrees that EPA should assume the use of natural gas co-firing, for the same reasons that co-firing is not the BSER (Comment C-35 & C-36).[115]

Third, NMA supports the idea of a commercial demonstration permit for emerging technologies, such as CCS (Comment C-40). Although CCS and perhaps other promising control systems are not yet available or cost-effective, an accommodation should be made within EPA's standards to ensure the opportunities for adequately demonstrating those technologies remain open. However, NMA does not support the limits that EPA has indicated that it would impose on commercial demonstration permits. Specifically, NMA believes that such permits should be freely available to any type of control technology that might be able to reduce emissions (Comment C-41), and NMA believes that the number of permits should not be limited to a certain amount of electric generation capacity (Comment C-42). Those limits serve no purpose and would merely reduce the very incentive that the permits are intended to provide. A company seeking to spend millions, if not billions, on a new coal-fired EGU with as yet undemonstrated technology will not want to risk being subject to a standard it cannot achieve simply because another company was slightly faster to the table.

Instead, EPA should guarantee that all developers of new and emerging technologies will receive the same accommodation until a technology has been adequately demonstrated to the point that it is no longer new or emerging. If EPA continues to believe that a limit is needed, EPA should increase the limit significantly, since the 1,000 MW of capacity indicated in EPA's proposal would not even be enough for two large units, and certainly more than one unit would be needed to adequately demonstrate a new technology.

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[115] *See* Section I.C., *supra*.

Fourth, and finally, EPA should exclude all industrial units from the Section 111 standards for EGUs (Comment C-43 through C-45). EPA has not made any reasonable determination of the efficiency with which industrial units can use fuel in their processes, and EPA's proposed standard is based solely on EGUs that only produce electricity for sale. In most cases, industrial units that could potentially fall within EPA's proposed rule are those that have excess generation capacity that they would like to sell to the grid because otherwise it would be wasted. By subjecting such units to regulation as EGUs when in fact they are very different types of units, EPA would be discouraging the environmental benefits associated with making use of otherwise wasted resources. Unless and until EPA establishes a BSER for GHG emissions from industrial units and determines an appropriate CO_2 performance standard that is achievable for such units, EPA should unambiguously exclude all industrial units from standards not designed to cover them. Doing so would both dramatically simplify the applicability provisions of the rule and ensure that EPA is not imposing an unnecessary, unsupported, and unachievable burdens on industrial sources simply trying to manage their energy resources.

III. EPA Should Reconsider the Proposed Standards for Reconstructed EGUs and Should Not Propose a Standard for Small Modifications of Existing EGUs.

In general, NMA supports EPA's decision to realign the CO_2 standards for modified and reconstructed coal-fired EGUs with its corrected standards for new sources. However, NMA believes that EPA should regulate reconstructed units more like modified units (instead of like new units, as EPA has proposed), since both reconstructed and modified units begin as existing units before the standard-triggering project. In addition, EPA should not propose a standard for "small modifications" at all because doing so would unnecessarily generate significant compliance challenges but provide absolutely no environmental benefits.

A. Reconstructed EGUs, to the Extent Subject to CO_2 Standards at All, Should be Regulated Like Modified EGUs, Not New EGUs.

Before becoming subject to a Section 111(b) standard, "reconstructed" units are "existing" units. In that sense, they are far more similar to "modified" units—they were constructed prior to the adoption of EPA's standards and thus without those standards in mind. As such, compliance with the triggered standards will require a retrofit, which is almost always far more difficult than designing a standard-compliant source from the ground up. Therefore, although the definitions "reconstructions" and "modifications" are quite different (the former is based on a capital expense;[116] the latter on an emission rate increase[117]), the opportunities and challenges for reducing emissions will be largely the same because both constitute a change to an existing unit, not the construction of a new unit.

Nevertheless, in its proposal, EPA has decided that reconstructed units should be regulated like new units. However, since the BSER is the steam cycle, EPA's approach would have the effect of requiring any reconstructed units to convert to an entirely new and more advanced steam cycle that it was never designed to accommodate—a daunting task given that the steam cycle chosen can dramatically affect the specifications of nearly every component of the unit. Since more advanced steam cycles utilize higher temperatures and pressures than less advanced steam cycles, changing the steam cycle could mean replacing every component of the boiler with new components capable of withstanding those high temperatures and pressures.

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[116] 40 C.F.R. § 60.15 ("'Reconstruction' means the replacement of components of an existing facility to such an extent that: (1) The *fixed capital cost of the new components exceeds 50 percent* of the fixed capital cost that would be required to construct a comparable entirely new facility, and (2) It is technologically and economically feasible to meet the applicable standards set forth in this part.") (emphasis added).

[117] 40 C.F.R. § 60.14 ("any physical or operational change to an existing facility *which results in an increase in the emission rate* to the atmosphere of any pollutant to which a standard applies shall be considered a modification within the meaning of section 111 of the Act.") (emphasis added).

Such a change could also require an entirely new steam turbine at massive expense. Given the design challenges and potential cost, the standard would be infeasible.

EPA's support for its decision to regulate "reconstructed" units like new units is thin. EPA can point to only a single example worldwide in which an existing coal-fired EGU was converted to a more advanced steam cycle, and there is no evidence to suggest a similar conversion would be possible at all units. Thinner still is EPA's support for the need to regulate "reconstructed" units in this way. As an initial matter, nothing in the CAA references "reconstructions" at all—in the statute, the universe of units is divided only in to "new sources," "existing sources," and "modifications." The concept of an intermediate type of source that is "reconstructed" is a creature only of EPA's regulations, and EPA has not provided any rational basis for doing so in the proposed rule. On the contrary, EPA's decision to craft a separate "reconstructed" unit standard appears grounded only in regulatory inertia—it's just how EPA has always done it before—but that wisp of a reason does not constitute reasoned rulemaking.

More importantly, EPA's proposal is entirely bereft of any indication that regulating reconstructed units as proposed would provide any benefit to the environment. EPA admits that few if any reconstructions are expected, and EPA even admits that reconstructed units that find compliance unachievable will not be deemed reconstructed units at all (a conclusion NMA supports). (Comment C-20). NMA agrees with those assertions, and agrees they prove no environmental benefit will come from EPA's "reconstructed" unit standard.

However, what EPA fails to note (but should) is that reconstructed units, by virtue of beginning life as an existing unit, will already be regulated under EPA's Section 111(d) emission guidelines. That means, under the Section 111(d) rule that EPA has proposed in a separate rulemaking,[118] those units will already be subject to a requirement to install all cost-effective efficiency improvements. Accordingly, the only potential difference between regulating an EGU as "existing" under Section 111(d) or as "reconstructed" under Section 111(b) is that, under EPA's proposal, a "reconstructed" unit would have to convert the unit to a more advanced steam cycle *regardless of whether it was cost-effective* (assuming such a conversion would even be possible). But that result is directly inconsistent with Section 111(b), which requires EPA to consider cost. Thus, when properly applied, EPA's efficiency-based Section 111(b) rule should impose nothing more on "reconstructed" units than the very same cost-effective measures to which they would already be subject as "existing" units under EPA's proposal for an efficiency-based Section 111(d) rule.

For all of these reasons, NMA objects to EPA's proposal to require reconstructed units to achieve the same level of performance as new sources. To the extent EPA adopts a reconstruction standard at all, it should more closely mirror the standard that EPA has developed for modified units, since both reconstructed and modified units are similarly situated with respect to the availability and cost-effectiveness of measures for reducing CO_2 emissions.

B. EPA Should Not Propose a Standard for Small Modifications

Even in 2015, when the political pressure to reduce CO_2 emissions via Section 111 was so great that EPA found a way to claim CCS was adequately demonstrated and cost-effective, EPA concluded that it did not have enough information to craft a standard of performance for EGUs that increase hourly CO_2 emission rates by less than 10 percent. On that point, at least, nothing has changed. EPA continues to recognize, as it must, that it does not have enough

[118] *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. 44746 (Aug. 31, 2018).

information to develop a reasonable "small modification" standard. Nevertheless, EPA has asked for comment on whether it should try to develop a "small modifications" standard and now seeks from the public the necessary information that it admits it still does not have.

Like reconstructed units, modified units begin as existing units before they trigger EPA's Section 111(b) standards, and thus they would already be subject to EPA's Section 111(d) emission guidelines. Since both EPA's Section 111(b) standards and Section 111(d) emission guidelines will be based on efficiency improvements, the requirements imposed under either program should be essentially the same, eliminating any need for EPA to craft a new "small modifications" standard. At a minimum, such a duplicative standard could not possibly be expected to return meaningful environmental benefits.

Although the same might be said for EPA's "large modifications" standard as well, NMA is not asking EPA to revise or repeal that standard, and NMA supports EPA's decision to align the "maximally stringent" component of the "large modifications" standard with the proposed standard for new units. NMA agrees with EPA that the regulation of some modifications is appropriate and consistent with the statute. NMA also agrees that, given past experience, modifications capable of increasing a unit's hourly emission rate by more than 10 percent are likely to be extremely rare, and also unlikely to be inadvertent—EGU owners will almost certainly know well in advance if a proposed project has the potential to increase a unit's hourly emission rate by that much, and EPA's standard of site-specific efficiency improvements up to but not exceeding the level expected of new unit is appropriate for large modifications.

"Small modifications," on the other hand, could easily be inadvertent. Vendors of EGU components are often conservative in their performance guarantees, which can lead to unexpected and unintended—albeit very small—changes in emission rates, as new components are installed to replace obsolete or worn-out ones. Because small modifications are likely to be inadvertent and (by definition) small, they will be difficult to identify. Whether a particular project has the potential to slightly affect efficiency or capacity may be next to impossible to discern before the project is completed, and even after the project small changes are likely to be hidden in the noise of the thousands of other factors and individual components that can influence hourly emission rates. Worse, small coincidental degradations in efficiency could give the appearance that a project caused an increase in the emission rate, even if that degradation was completely unrelated to the project and the project itself had no real impact on emissions or efficiency levels at all. The threat of this compliance uncertainty will be compounded by the risk of after-the-fact enforcement actions, which could result in significant civil penalties.[119]

In the past, EPA has allowed insignificant modifications to occur without triggering Section 111(b) standards through the exercise of its "*de minimis*" authority—*i.e.*, the authority, inherent in a statutory scheme, to overlook circumstances that in context fairly may be considered "*de minimis*."[120] For example, EPA's general definition of modification already excludes several categories of projects, including routine maintenance, repair, and replacement, increases in production rate without a capital expense, increases in the hours of operation, the use of alternative fuels, and pollution control projects.[121] EPA's authority to create exceptions has been upheld in court, and the exceptions themselves have also been upheld, so long as EPA

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[119] EPA recently increased the maximum civil penalty for CAA violations to $99,681 per violation per day. *Civil Monetary Penalty Inflation Adjustment Rule*, 84 Fed. Reg. 2056, 2059 (Feb. 6, 2019).

[120] *Alabama Power Co v. Costle*, 606 F.2d 1068, 1076 (D.C. Cir. 1979) ("Alabama Power I"). *See also Alabama Power Co. v. Costle*, 636 F.2d 323, 360 (D.C. Cir. 1980) ("*Alabama Power II*") ("It is commonplace, of course, that the law does not concern itself with trifling matters,87 and this principle has often found application in the administrative context.88 Courts should be reluctant to apply the literal terms of a statute to mandate pointless expenditures of effort.").

[121] 40 C.F.R. § 60.14(e)(1)-(5).

provides a sufficient justification.[122] Under the CAA in particular, "exemptions must be formulated with reasoned consideration for their context, with attention to the nature of the pollutant involved,"[123] and are not authorized where the statute is rigidly clear.[124]

The Supreme Court has already confirmed that the statutory definition of "modification" is anything but rigid,[125] and thus amenable to EPA's *de minimis* authority. In addition, support for a *de minimis* exemption for "small modifications" seems readily available for several reasons. First, as EPA has noted, very few modifications have occurred even under other standards that do not have a *de minimis* exemption, including the other standards for EGUs, so there is no reason to believe that an exemption would apply to a large number of projects. The vast majority would not really need the exemption at all, although the exemption would provide needed regulatory certainty. Second, even if a project does constitute a modification, the triggering unit would simply shift from being regulated as an existing unit under Section 111(d) to a modified unit under Section 111(b). As noted above, since the efficiency-based regulatory requirements under both programs will likely be highly similar, if not identical, the level of CO_2 emissions allowed at a unit under either program are likely to be essentially the same regardless of whether it performs a "modification" or not.

[122] *See New York v. EPA*, 443 F.2d 880, 884 (D.C. Cir. 2006) ("Consistent with [*Alabama Power II*], which recognized EPA's discretion to exempt from NSR 'some emission increases on grounds of de minimis or administrative necessity,' [ ] EPA has for over two decades defined the [routine maintenance] exclusion as limited to 'de minimis circumstances.'") (internal citations omitted). *See also Alabama Power II*, 636 F.2d at 400, 405.("EPA does have discretion, in administering the statute's 'modification' provision, to exempt from PSD review some emission increases on grounds of de minimis or administrative necessity. The exemption in question, however, has not been so justified, and thus cannot stand. … We do not hold that 100 tons per year necessarily exceeds a permissible de minimis level; only that the Agency must follow a rational approach to determine what level of emission is a de minimis amount.").
[123] *Alabama Power I*, 606 F.2d at 1086.
[124] *Sierra Club v. EPA*, 705 F.3d 458, 468 (D.C. Cir. 2013) (noting that EPA has no de minimis authority to override "plain requirements" or "extraordinarily rigid" statutory provisions and vacating an EPA exemption from pre-construction monitoring requirements because of "the rigidity of the statute.").
[125] *Environmental Defense v. EPA*, 549 U.S. 561 (2007) (holding that EPA has the authority to interpret the term "modification" differently under different CAA programs)

Third, and most importantly, a *de minimis* exemption is particularly appropriate for small increases in CO_2 due to the nature of the pollutant—a globally well-mixed atmospheric gas ubiquitously emitted by natural and man-made forces that does not have any direct or immediate human health or environmental impacts. For such a pollutant, the rare and small changes in emissions that regulating small modifications would generate could not possibly make any real difference in worldwide atmospheric concentrations of CO_2 that present the concern EPA seeks to regulate with its Section 111(b) standards. Especially since EPA has already admitted that even all of its proposed Section 111(b) standards for CO_2 emissions combined—for new, reconstructed, and large modified units—will have no or negligible impacts on emissions, EPA should have no trouble justifying a *de minimis* exemption for "small modifications." Therefore, NMA asks EPA to exchange its information deficit excuse for a well-supported *de minimis* exemption based on the absence of any impacts from small modifications, which is precisely why EPA has so little information about them. (Comment C-21 through C-23).

On the other hand, if EPA decides not to adopt a *de minimis* exemption for small modifications in the final rule, EPA should at a minimum avoid imposing a standard on small modifications that resembles the standard for large modifications. That standard requires development of a source-specific standard of performance "determined by the unit's best historical annual emission rate (from 2002 to the date of modification)."[126] Particularly for units undertaking small modifications that are unlikely to have any real significant effect on a unit's operating or emission characteristics, a standard based on the best year of historical performance is almost certain to be unachievable, since that best year of performance is likely the result of highly consistent, high-level "baseload" operations that facility owners will be powerless to

[126] *See* 83 Fed. Reg. at 64431, Table 3.

replicate. The circumstances enabling "baseload" operations are also likely to become more infrequent in the future as new intermittent renewable resources are installed, requiring fossil fuel-fired units to cycle up and down to balance load as the renewable energy available ebbs and flows. Since the duty-cycle of a unit will likely be the determining factor in annual emission rates, and unit owners cannot control the consistency or level of demand for their units, any standard for small modifications should not be based on best historical performance.

IV. Although EPA's Economic Analysis May Be Correct in the Short-Term, EPA Has Underestimated the Potential Competitiveness of New Coal-Fired EGUs.

Based on what it knows today, EPA has projected that no or very few coal-fired EGUs will be built in the next few decades:

> As discussed in the economic impact analysis accompanying this action, substantial new construction of coal-fired steam units is not anticipated under existing prevailing and anticipated future conditions.[127]

In general, NMA agrees. NMA is not aware of any plans for the installation of new coal-fired generation capacity in the near future. Accordingly, NMA also agrees with EPA's projection that the proposed revisions to its Section 111(b) standards "will not result in any significant [CO_2] emission changes or costs."[128] (Comment C-28).

However, in the real world, things can and do change. NMA appreciates EPA's recognition that those projections "are not a prediction of what will happen, but rather a projection describing how this proposed regulatory action may affect electricity sector outcomes *in the absence of unexpected shocks*."[129] That recognition is particularly important because four unexpected shocks drove the "existing prevailing and anticipated future conditions" underlying EPA's projection of no new coal plants. Since more unexpected shocks in the future are

[127] 83 Fed. Reg. at 65455.
[128] 83 Fed. Reg. at 65427.
[129] 83 Fed. Reg. at 65427.

inevitable and, by definition, impossible to predict, the future is likely to be quite different from EPA's projections. Thus, removing the artificial barrier EPA unlawfully erected against new coal plants in 2015 remains critical.

Just a few years ago, new coal plants were competitive. They were viewed by many utilities as a viable option for capacity expansions because they provide reliable, dispatchable electricity generation at low operating and fuel cost. As noted above, new coal plants were still being developed up until 2012. At that time, there were 15 different plants in various stages of construction, according to the preamble of EPA's first proposal for a GHG standard of performance for fossil fuel-fired EGUs. But then four unexpected shocks occurred almost simultaneously.

One of those shocks was EPA's 2012 proposal itself. Although not officially published until April of that year, the expectation leading up to the rule had begun building months earlier. Later, that shock was reinforced by the President's 2013 Climate Action Plan, which led to the re-proposal of the standards in 2014 and the finalization of them in 2015. Given that those standards demanded CCS for coal-fired EGUs but allowed gas-fired EGUs to continue with business-as-usual, the shock of EPA's standards was catastrophic for coal—it amounted to both an absolute prohibition on coal, due to the insurmountable challenges of CCS, and a heavy endorsement of natural gas, coal's chief competitor.

Separately, but simultaneously, EPA also hit coal with another blow—the MATS rule. The United States Supreme Court would later rule that EPA erred by adopting MATS without considering the high cost of the rule compared to its benefits,[130] but those costs forced all utilities

[130] *Michigan v. EPA*, 135 S.Ct. 2699, 2707 (2015) ("[A]gencies must operate within the bounds of reasonable interpretation. … EPA strayed far beyond those bounds when it read [the CAA] to mean that it could ignore cost when deciding whether to regulate power plants. … One would not say that it is even rational, never mind

to reevaluate the viability of their existing coal fleet. The 2011 proposal of the MATS rule was particularly devastating to plans for new coal-fired EGUs because it included several limitations applicable to new units that would have been unachievable.[131] Although EPA corrected some of the mistakes in its proposal,[132] the damage had largely been done. The Supreme Court's scathing review likewise came too late to dampen the shock—it did not render its decision until June 2015, just weeks after the MATS rule took effect for most sources (and long after the decisions had been made to retire many existing coal-fired EGUs or abandon plans for new ones).

The third and fourth shocks were the Great Recession in 2008 and the development of hydraulic fracturing—"fracking"—which together led to a crash in the price of natural gas.[133] Although the Great Recession may have helped initiate the plunge in gas prices, the dramatic increase in gas production through fracking intensified and sustained the trend. By the end of 2011, the combined effect of those two unexpected shocks had quite suddenly put natural gas combined cycle generators on par with coal plants in marginal price, which fundamentally altered the economic viability of both existing and proposed new coal-fired EGUs.

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appropriate, to impose billions of dollars in economic costs in return for a few dollars in health or environmental benefits. … . No regulation is appropriate if it does significantly more harm than good.") (internal citations omitted).

[131] *MATS Final Rule*, 77 Fed. Reg. at 9390 ("Several commenters stated that the proposed limits set for new EGUs do not represent the best performing EGU. The commenters state that the EPA has chosen the strictest limit irrespective of the EGU and that limits for new EGUs should be achievable. According to the commenters, no existing EGU is currently meeting the proposed limits, which will result in a moratorium on the construction of new coal-fired EGUs.").

[132] *MATS Final Rule*, 77 Fed. Reg. at 9390 ("As a result of comments received on the full body of data, the EPA has re-ranked the best performing EGUs and reviewed the new source limits based on the re-ranking where appropriate. Based on the revised ranking, the best performing source for PM has changed and that source now forms the basis for the new source filterable PM limit in the final rule.").

[133] EIA, Henry Hub Natural Gas Spot Price, https://www.eia.gov/dnav/ng/hist/rngwhhdD.htm. ***See also*** EIA*, 2011 Brief: Henry Hub natural gas spot prices fell about 9% in 2011* (Jan 10, 2012) ("Prices at the Henry Hub, a key benchmark location for [natural gas] pricing throughout the United States, fell 9% to about $4 per million British thermal units in 2011, the second lowest annual average price since 2002.) (available at https://www.eia.gov/todayinenergy/detail.php?id=4510#); EIA, 2011 Brief: Energy commodity price trends varied widely during 2011 (Jan. 9, 2012) ("Crude oil and petroleum products led energy commodity price increases during 2011, but natural gas prices declined sharply. … In 2011, prices fell for most commodities from the start of the year to the end of the year, but the average price … for all commodities rose in 2011 compared to 2010 except for natural gas.") (available at https://www.eia.gov/todayinenergy/detail.php?id=4490).

EPA's projection of no new coal plants is no surprise in light of this maelstrom—these two largely prohibitive regulations and two overpowering economic forces brought to an immediate halt all plans for new coal-fired EGUs. However, just as these shocks could not have been predicted before 2012, today's projections cannot possibly account for all that will happen between now and 2025. Indeed, as NMA has noted in previous comments to EPA, the EIA's predictions of natural gas supply and price, upon which EPA's economic impact analysis relies, are systemically biased.[134]

In spite of the shocks of recent past and those to come, and regardless of current projections, the fundamentals of coal power remain solid. Coal is the only energy resource capable of providing dispatchable electricity generation under all conditions from a fuel source that can be stored onsite anywhere in the country. Gas generators rely on just-in-time receipt of natural gas from a pipeline subject to a variety of constraints, particular at times when the need for electrical power is critical, and the environmental impacts of gathering and transporting the gas can be significant, such as methane leaks.[135] Renewable generators typically rely on a variable and unpredictable energy source—the wind or the sun—and can also negatively impact the environmental characteristics of vast areas of land in otherwise pristine places.[136] And nuclear generators, while reliable, dispatchable, and capable of storing their fuel onsite, present

[134] NMA 2014 Comments, at 154-58. ("It has become increasingly apparent for some time that EIA forecasts for natural gas differ substantially from outcomes. … the forecasts contain evidence of systematic bias, either arising from a fixed, linear bias or from a systematic error coming from the NEMS model. These biases emerge over a much shorter period (4-year horizons) than the 10-year plus scenarios that EPA is conducting for this rulemaking.") (citing Considine and Clemente, "Betting on Bad Numbers," p. 55, Public Utilities Fortnightly (July 2007) available at http://www.fortnightly.com/fortnightly/2007/07/gas-market-forecasts-betting-bad-numbers)

[135] *See, e.g.*, NMA 2014 Comments, at 129 (noting that even a 2% methane leak from natural gas systems can erase any perceived climate advantage of gas over coal on a 20-year time scale, and reports confirm that methane leaks can often be higher than 2%).

[136] *See, e.g., El Nino's Taking the Wind out of Sales of U.S. Power Generators*, Bloomberg Environment Reporter (Feb. 22, 2019) ("Calm winds are hurting U.S. wind power producers. Unusually still weather in the upper Midwest and Great Plains in late 2018 has already taken a bite out of earnings at NextEra Energy Inc. and Avangrid Inc., which both operate large wind farms.").

waste management concerns,[137] and are unlikely to provide significant capacity expansions in light of the high cost of initial construction of new reactors. In short, no power source is free, or free of environmental impacts. Thus, the best mix of energy resources requires diversity, and coal has an important role to play.

Unfortunately, the same shocks that have depressed the viability of new coal-fired EGUs have forced many existing coal-fired EGUs to retire. Total coal-fired EGU capacity in the United States has dwindled from 282 GW to 238 GW, a drop of 15% since 2000, and most of the remaining capacity is already more than 40 years old.[138] As the existing fleet continues to age and eventually retire, new coal units will eventually be needed, and it seems inevitable that many of the trends that have depressed the demand for coal will eventually abate. In fact, even within current projections, there signs that suggest new coal units could become competitive once more relatively soon. For instance, according to EIA's Annual Energy Outlook for 2019, liquified natural gas export capacity is expected to increase significantly over the next decade, which could put upward pressure on gas prices.[139] EIA projects prices will remain low, but that depends in part on the assumption that other countries will also enter the liquified natural gas market, a projection that likely carries significant uncertainty. EIA also notes that gas price projections remain highly dependent on resource and technology assumptions, as increased demand pushes production efforts into more expensive to produce areas.[140]

[137] *See, e.g.*, https://www.eia.gov/energyexplained/index.php?page=nuclear_environment ("A major environmental concern related to nuclear power is the creation of radioactive wastes such as uranium mill tailings, spent (used) reactor fuel, and other radioactive wastes. These materials can remain radioactive and dangerous to human health for thousands of years. Radioactive wastes are subject to special regulations that govern their handling, transportation, storage, and disposal to protect human health and the environment.").
[138] NMA 2014 Comments, at 151-152.
[139] EIA Annual Energy Outlook 2019, at 20.
[140] EIA Annual Energy Outlook 2019, at 37.

In spite of those pressures and uncertainties, EIA projects that gas will continue to dominate coal through 2050. However, that projection is based on current laws[141]—*including EPA's current CCS standard for new coal-fired EGUs*.[142] As a result, EPA appears to be relying on projections that assume the CCS standard is in place even as it evaluates the potential impacts of removing that standard, which would be circular and unreasonable. Because EIA's projection that coal is not viable assumes the existence of the very requirement EPA has proposed to eliminate, EPA should not take EIA's projections at face value. Instead, EPA must confirm that its impacts evaluation does not blindly follow projections that are based on future circumstances that EPA is in the process of changing.

Although perhaps an unfair means of evaluating the potential impacts of EPA's proposal, the EIA projections that assume CCS will be required on future coal-fired EGUs do make one point abundantly clear—no new coal-fired EGUs will be built with EPA's CCS requirement in place. That is why NMA asserted in 2014 that EPA's proposal to require CCS would amount to a complete prohibition on coal—NMA believes that was EPA's original intent with the rule, and now EIA's current projections confirm that is and will be its ultimate effect. Thus, NMA supports EPA's effort to revise its Section 111(b) standards for coal-fired EGUs and return to a more reasonable application of its authority under the CAA.

[141] EIA Annual Energy Outlook 2019, at 57 ("EIA's Reference case only incorporates policies that are current laws (including tax credits and air regulations").

[142] EIA Annual Energy Outlook 2019, at 99 (comparing the levelized cost of electricity of various energy resources, and only evaluating coal with 30% carbon capture).