October 31, 2018

EPA Docket Center
U.S. EPA
Mail Code 28221T
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Attn: Docket No. ID EPA–HQ–OAR–2017– 0355

Re: Proposed Rule on Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units; Revisions to Emission Guideline Implementing Regulations; Revisions to New Source Review Program (August 31, 2018) (ACE Rule)

The Institute of Clean Air Companies (ICAC) appreciates the opportunity to offer comments in response to EPA's Proposed Rule on Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units; Revisions to Emission Guideline Implementing Regulations; Revisions to New Source Review Program (EPA–HQ–OAR–2017– 0355).

ICAC is the national trade association of companies that supply air pollution control and monitoring systems, equipment and, services for stationary sources. For 60 years, ICAC member companies have helped to clean the air by developing and installing reliable, cost effective control and monitoring systems. We believe that improved air quality and industrial growth best occur when achievable cost-effective policies are paired with innovative technologies.

Our comments will focus on the following areas: 1) proposed changes to New Source Review (NSR), 2) the list of candidate technologies for heat rate improvements, 3) work practice standards, 4) the suggested inclusion of upstream sources as 'inside the fenceline', and 5) cost figures used in the proposed rule.

Again, ICAC appreciates the opportunity to offer comments on this proposed rule, and we look forward to answering any further questions should EPA seek additional information.

Sincerely,

Clare Schulzki
ICAC Executive Director

I. Background

The Institute of Clean Air Companies (ICAC) provides the following specific comments in response to EPA's Proposed Rule on Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units; Revisions to Emission Guideline Implementing Regulations; Revisions to New Source Review Program (EPA–HQ–OAR–2017– 0355).

In February 2018, ICAC submitted comments on the Advance Notice of Proposed Rulemaking (ANPR) for State Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units (Docket No. ID EPA–HQ–OAR–2017–0545) with a focus on the need to review NSR in order to ensure that the program is not an impediment to any required heat rate improvements at existing facilities in any future rules. ICAC appreciates EPA's decision to provide clarity to the NSR program in the proposed Affordable Clean Energy (ACE) rule.

In addition to NSR, EPA specifically asked for comment on a number of topics within the proposed rule. Of these topics, below ICAC has addressed those in which our members have a technical expertise.

II. New Source Review (NSR), C-26

As noted above, ICAC has previously commented on the need for further examination of the NSR program's impact on potential efficiency improvements. See ICAC comments regarding the proposed EPA Clean Power Plan dated December 1, 2014 and ICAC comments regarding the December 2017 ANPR as attachments. We appreciate EPA's attention to the NSR program in the draft ACE rule. ICAC believes that further clarification of the NSR program in the context of heat rate improvements may be useful and could lead to efficiency improvements coupled with equivalent or reduced emissions.

ICAC examined the NSR program in light of EPA's consideration of the extent to which affected EGU's could implement heat rate improvements. In order to trigger NSR, an existing source would have to implement a "Major Modification", which is defined as any physical or operational change of an existing major source that would result in a significant net emissions increase of any pollutant subject to regulation under the Clean Air Act (CAA). In most cases, a major modification must cause two emission increases; a significant emission increase and a significant net increase. A physical/operational change excludes routine maintenance, repair and replacement (RMR&R).

NSR court cases have been inconsistent in defining "routine maintenance." Burns & McDonnell compiled a summary of historical NSR violations and then compared this list with the heat rate improvements as presented in the Sargent & Lundy NETL reports used by EPA to examine this issue in the context of the Clean Power Plan. This summary clearly shows that clarification could be provided to give EGUs certainty before committing to heat rate upgrades.

Activity	Assumed Heat Rate Improvement S&L (Btu/kWh)	Assumed Heat Rate Improvement NETL (percent)	NSR NOV Project Identified by EPA*	Potential Non-NSR Heat Rate Improvement S&L (Btu/kWh)	Potential Non-NSR Heat Rate Improvement NETL (percent)
Economizer Replacement	50 - 100	2.1	Yes	0	0
Neural Network	50 - 100	0.2 - 2.0	No	50 - 100	0.2 - 2.0
Intelligent Sootblowers	30 - 90	0.1 - 0.65	No	30 - 90	0.1 - 0.65
Air Heater/Duct Leakage	10 - 40	0.16 - 1.5	Yes	0	0
Lower Acid Dewpoint (Trona)	50 - 120	Not listed	No	50 - 120	Not listed
Steam Turbine Upgrades	100 - 300	0.84 - 2.6	Yes	0	0
Clean Condenser	30 - 70	0.7 - 2.4	No	30 - 70	0.7 - 2.4
Boiler Feed Pump	25 - 50	Not listed	No	25 - 50	Not listed
Fan replacement/VFD	30 - 150	Not listed	No	30 - 150	Not listed
Misc. AQCS upgrades	0 - 65	Not listed	Yes	0	Not listed
Cooling Tower	0 - 70	0.2 - 1.0	No	0 - 70	0.2 - 1.0
Other	0 - 20	Not listed	No	0 - 20	Not listed
Ash Removal System	Not listed	0.1	No	Not listed	0.1
Combustion system optimization	Not listed	0.15 - 0.84	No	Not listed	0.15 - 0.84
Feedwater heaters	Not listed	0.2 - 2	Yes	Not listed	0
Flue Gas Moisture Recovery	Not listed	0.3 - 0.65	No	Not listed	0.3 - 0.65
Coal Drying	Not listed	0.1 - 1.7	No	Not listed	0.1 - 1.7
Reduce slagging	Not listed	0.4	No	Not listed	0.4
Steam Leaks	Not listed	1.1	No	Not listed	1.1
Total	375 - 1,175	6.95 - 20.54		215 - 670	3.55 - 12.84

*Some additional activities not specifically flagged in this column to trigger NSR could still trigger NSR. For example, for steam leaks that are significant enough that require significant replacement of parts could trigger NSR.

Whether these heat rate modifications can be implemented without triggering NSR is as important as the practical engineering or economic concerns. Both owners of EGUs and regulators should be able to know with certainty whether a specific change will trigger NSR.

Additionally, NSR is triggered on a tons/year basis. So, a facility could have a reduction in pounds/hour of a pollutant, but operate the unit more, resulting in a ton(s)/year increase. There could be some credit given to the pounds/hour decrease of a pollutant, whether as an exemption from NSR or some other means, such as putting pollution control projects in a special category. Another odd result of the NSR actual- to future- projected actuals is that there is an incentive to operate units at higher capacity factors prior to the physical or operational change in order to give the unit a higher baseline emissions level. This "use it or lose it" mentality needs reexamination.

In the past, EPA itself has acknowledged problems associated with NSR, stating that:

> *"As applied to existing power plants and refineries, EPA concludes that the NSR program has impeded or resulted in the cancellation of projects which would maintain and improve reliability, efficiency and safety of existing energy capacity. Such discouragement results in lost capacity, as well as lost opportunities to improve energy efficiency and reduce air pollution."*[1]

Increased use of an efficient unit will result in decreased use of less efficient units. Hence, current NSR rules could result in higher national emissions and continued degradation of efficiency within the existing coal fleet. Of course, a power plant owner could accept the additional requirements that come with NSR and make the efficiency improvement, but as stated by EPA:

> *"The costs associated with NSR, particularly the costs to retrofit pollution controls, can render these projects uneconomical. Thus, the EPA finds that NSR discourages some types of energy efficiency improvements when the benefit to the company of performing such improvements is*

[1] U.S. Environmental Protection Agency, New Source Review: Report to the President, June 2002.

outweighed by the costs to retrofit pollution controls or to take measures necessary to avoid a significant net emissions increase."[2]

In summary, EPA's application of NSR rules may have presented a significant regulatory barrier to projects at existing sources that would otherwise be undertaken to improve availability and efficiency. The National Coal Council has recommended that the Department of Energy work with EPA to revise NSR regulations to make clear that power plant operators can undertake routine reliability, efficiency and safety improvement projects without subjecting these plants to NSR requirements, so long as there is no increase in emissions.[3] A more reasonable application of even the existing program would allow such projects to proceed consistent with the best interest of the U.S., encouraging the development and deployment of new technologies that can prospectively improve regional manufacturing and labor economics, as well as electricity efficiency, availability and reliability. This will be even more strongly the case if heat rate improvements are required as part of a section 111(d) emission guidelines program.

It is also worth noting that with the low price of natural gas, coal units are retiring at unprecedented rates and the economics of maintaining and upgrading coal fired power plants are very different than they were in the past. Capturing low-hanging efficiency upgrades is a critical element of emissions reductions and should not be ignored just because a facility cannot currently economically justify the significant capital investment of an entire suite of environmental upgrades to ensure a facility is truly compliant with all NSR requirements. There are certainly issues that have been raised about unit aggregation in the NSR context and we believe it may be appropriate to consider the merits of these issues as EPA looks at NSR with an eye toward current market contexts.

The adoption of renewable energy will continue to be a large part of the power infrastructure investments for the foreseeable future. However, on the path to a future power grid largely supported by renewable energy, the existing utility coal-fired fleet will still continue to be necessary to sustain a reliable electric grid. So, it is imperative that we ensure their use is as sustainable, clean, and efficient as possible. Many of the current coal-fired boilers can be made to lower greenhouse gases, reduce coal consumption/improve heat rate, and lower overall energy costs if the current NSR standards are revised to allow investments in these much-needed upgrades. These investments will also mean job opportunities for the technology companies that maintain these boilers.

ICAC believes that the NSR program continues to pose significant uncertainty regarding efficiency improvements and that further examination of this issue is worthwhile, so long as it also leads to long-term improvements in air quality.

III. List of Candidate Technologies for Heat Rate Improvement, C-6 & C-7

Improving the heat rate (or efficiency) of the existing coal-fired generating units must be approached pragmatically, rationally and analytically. For coal-fired power plants, coal is burned to release energy in the form of heat, which is then converted to mechanical energy by various means to turn a generator to produce electricity. In a coal-fired steam generating power plant, the energy from burning coal is used to heat water to steam that then powers a turbine. The turbine mobilizes a generator to produce electricity. As with all existing mechanical systems, not all of the energy produced by the combustion of coal translates to the production of electricity. Much of the input energy is lost after combustion to waste heat,

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[2] Ibid.

[3] National Coal Council, Reliable & Resilient - The Value of Our Existing Coal Fleet: An Assessment of Measures to Improve Reliability & Efficiency While Reducing Emissions, May, 2014

friction, etc. in and by other various parts of the generating process. Losses impact the overall efficiency of the plant. Power plant operators are intrinsically motivated to improve efficiency (i.e. lower heat rate) because it ultimately lowers the cost of producing electricity. EPA should not limit heat rate improvements (HRIs) to a static list since it could limit innovative technologies. EPA's Table 1 is not complete, and it should include subsystems on the list rather than single pieces of equipment.

Efficiency is not a constant. Therefore, heat rate of a generating unit is not a constant value. Heat rate varies considerably due to operating factors applied. Everything from basic unit design, input fuel characteristics, operating load conditions, age/condition of equipment, maintenance and cleanliness of components, ambient conditions can all impact the realized heat rate of a unit. The efficiency realized by operating a coal-fired power plant in either full-load, steady-state condition versus cycling loads up and down, is analogous to comparing automobile fuel efficiency in highway versus city driving. While driving, cycling travel speeds (excessively low speed, rapid acceleration and braking, etc.) decreases fuel efficiency by roughly 15% to 30% at highway speeds and 10% to 40% in stop-and-go traffic.[4,5] While each vehicle in production today reaches its optimal fuel economy at a different nominal speed, fuel efficiency is generally lower for travel speed below and above the design optimum.[6]

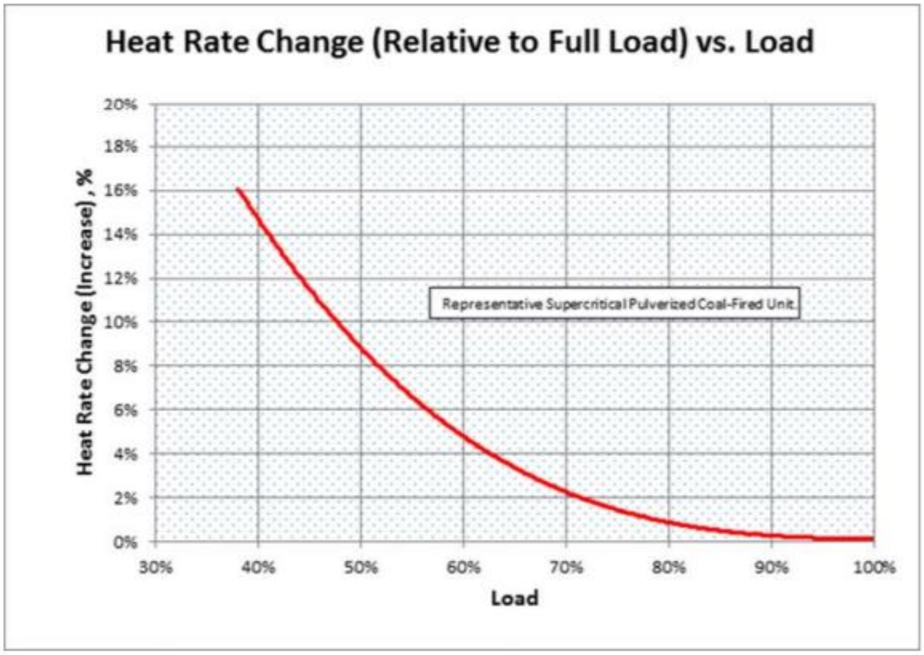
Much like driving a car, cycling coal-fired power plant loads up and down or running at minimum loads for extended period has a negative impact on heat rate. Currently, there are many viable coal-fired generating units in the country that are, in many cases, operating at 30% to over 40% less efficient condition than the initial design optimum. While different factors influence the dispatched level of these otherwise viable units, the most prominent negative impact is diminished efficiency to the generation (energy, capacity or reactive power) supplied. The relationship of unit load to heat rate is shown for a typical unit in the graph immediately below.[7]

[4] Thomas, J., S. Huff, B. West and P. Chambon. 2017. Fuel Consumption Sensitivity of Conventional and Hybrid Electric Light-Duty Gasoline Vehicles to Driving Style, *SAE Int. J. Fuels Lubr.* 10(3):2017, doi:10.4271/2017-01-9379.

[5] Oak Ridge National Laboratory. 2017. Sensible driving saves more gas than drivers think.

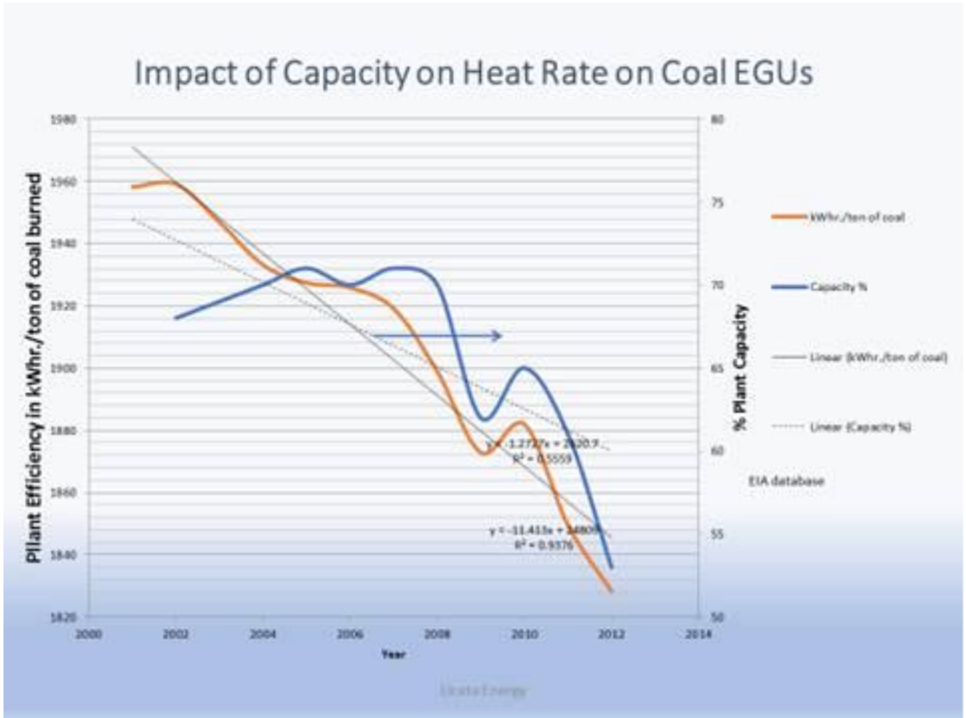
[6] Estimates for the effect of speed on MPG are based on a study by Oak Ridge National Laboratory (ORNL): *Predicting Light-Duty Vehicle Fuel Economy as a Function of Highway Speed*, SAE 2013-01-1113.

[7] https://www.adeq.state.ar.us/air/planning/cpp/pdfs/issue_paper_on_building_block_1-heat_rate_improvements_for_adeq.pdf



Beyond operating level or level of dispatch, a power plant's heat rate can be impacted by process design, equipment selection, maintenance, readiness status of critical components, changes in fuel energy content or fuel delivery, changes in process water and cooling water, parasitic equipment loads, etc. These are the more tangible factors affecting efficiency, but no more relevant than attention to the degree of unit cycling.

The following graph illustrates the relationship between capacity factor and heat rate. The data used to develop this graph was obtained from EPA's Clean Air Marketing Data and Energy Information Agency's database. With the low price of natural gas and as more wind and solar come on line, there will be an increase in cycling coal-fired EGUs and operations at low load conditions. As a result, the heat rate of coal-fired EGUs will increase.



Energy efficiency is the least expensive way for the power generating industry to meet the demand for cleaner energy. Energy efficiency measures are the most important of all the carbon dioxide mitigation approaches for process industries, contributing to almost half of the impact on emissions[8].

Efficiency is a measure of how effectively an input is converted to an output. In power generation, efficiency is typically expressed as unit heat rate, that is, the amount of energy generated (kWh) per unit of fuel heating value applied. In actual practice, heat rate is expressed as the inverse of efficiency, or the amount of heat input required to generate one kWh. Therefore, a reduction in heat rate is an improvement in efficiency. Efficiency programs that include heat rate improvements become the obvious first-step to reduce carbon dioxide emission, as well as emissions of other criteria pollutants from coal fired power plants, because they allow for more energy to be generated with less fuel heating value applied.

a. Net vs. Gross Heat Rate, C-16

If EPA chooses a gross basis for reporting heat rate, then they lose HRI improvements such as the use of VFD, improvements to boiler feed pumps, and enhancements to air pollution control equipment. If the gross heat rate is used for a unit that is required to add new air pollution control equipment, then the unit will not be penalized in HRI.

b. Coal Plant Low-Load Operation and Cycling

It is worth noting that coal plant low-load operation and cycling is negatively impacting heat rate in a very significant manner. The impact of operating at these low and rapidly changing loads can be 30-40% less efficient than full-load operating conditions. While coal plant operators work extremely hard to minimize the cycling impacts on their units, they still have equipment limitations at low-load, including running at inefficient temperatures to maintaining SCR inlet temperatures (allowing catalysts to work) and back-pass

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[8] Martin, Bob. “Energy Technology Investment Trends.” Rational Energy Network. October 2004. http://www.rationalenergy.net/pdf/energy_trends.pdf.

acid dew point temperatures to avoid ductwork corrosion, etc. VFDs are of some assistance in gaining efficiency of plant cycling, but the cost to implement such plant modifications are significantly outside of the current economic thresholds. ICAC notes that if actions could be taken with regard to low-load operation and cycling, many of which fall outside EPA's jurisdiction and relate to FERC or other entities, HRI's might be more economically justifiable.

c. Air Pre-Heater Systems

Air pre-heater systems provide physical structures for heat recovery within the generating unit by reducing the flue gas temperature counter, currently using cool incoming pre-combustion air. Raising the temperature of the combustion air through heat recovered from the flue gas improves combustion, as well as minimizes moisture in the coal prior to combustion contributing to overall unit efficiency. Air pre-heaters are an important component to advancing efficiency at power plants and achieving reduced carbon dioxide emission. Decreases of 40°F in air pre-heater outlet temperature can typically increase boiler efficiency by approximately 1%.[9,10]

Combustion of coal and the associated sulfur content of the fuel generates sulfur dioxide (SO_2) and lesser levels of sulfur trioxide (SO_3) in the flue gas. Furnace generated SO_3 ahead of a catalyst-based NOx control (DeNOx) system will be compounded as sulfur dioxide in the flue gas, is oxidized and additional SO_3 is generated within the DeNOx system. As the SO_3 travels from the furnace through the DeNOx system, it cools and mixes with flue gas moisture and other elements (notably ammonia and/or sodium) to form sulfuric acid and its derivative condensables (ammonium bisulfate, sodium bisulfate, vanadium bisulfate, etc.). These acid gas species are present in various forms from the boiler to the stack exit. Of significance to heat rate, when these condensable vapors in the flue gas pass through the air pre-heater, the rapid drop in temperature can lead to air heater fouling and increased pressure drop. Current industry trends toward fuels with higher sulfur content are a magnifying issue.

The air pre-heater outlet temperature is typically controlled through the use of auxiliary heating on the air inlet side of the process to an operationally manageable marginal temperature in excess of the dew point of the most sensitive condensable species present in the flue gas. Controlling air pre-heater outlet temperature in such a manner minimizes condensation, deposition and corrosion of cold-end metal structures, while mitigating the need for unplanned outage to wash the air pre-heater surfaces of deposited solids. However, the added auxiliary heat and the resulting increase in air pre-heater outlet gas temperatures result in heat rate penalties to the plant. By way of illustration, one typical North-Central US generating station requires an average of 120 MMB/Hr to artificially heat the inlet combustion air during the winter months. This figure alone is over 2% of the total heat input to the plant at full load.

Installation of commercially available Dry Sorbent Injection (DSI) systems in advance of the air heater (or in advance of the DeNOx system) will remove SO_3 and lower the acid condensable dew point temperature, both eliminating the need for auxiliary air heating and permitting lower pre-heater cold end outlet temperatures. Combined heat rate improvements in excess of 2% (depending on seasonal variations) have been demonstrated in several full-scale commercial implementations.

Lowering air pre-heater outlet temperatures by controlling acid dew point allows for recovery of additional heat into the combustion air. Without controlling the acid dew point, lower air pre-heater outlet

[9] Hasler, D.; COAL-FIRED POWER PLANT HEAT RATE REDUCTIONS; PROJECT 12301-001, SL-009597 FINAL REPORT Sargent & Lundy LLC, JANUARY 22, 2009.
[10] Babcock & Wilcox. Steam - its generation and use. 41. Edited by J.B. Kitto and S.C.Stultz. 2005

temperatures are impracticable due to the chemical and physical properties inherent to the condensable species in the flue gas of coal combustion processes.

IV. Work Practice Standards, C-51

In the proposal, EPA discusses the definition of work practice standards under both the EPA implementing regulations and the statutory language of the Clean Air Act. EPA states that:

> *EPA is further proposing to incorporate into a definition of standard of performance CAA section 111(h)'s allowance for design, equipment, work practice, or operational standards as alternative standards of performance under the statutorily prescribed circumstances. Currently, the existing implanting [sic] regulations allow for state plans to prescribe equipment specifications when emission rates are ''clearly impracticable'' as determined by EPA. CAA section 111(h)(1) by contrast allows for alternative standards such as equipment standards to be promulgated when standards of performance are ''not feasible to prescribe or enforce,'' as those terms are defined under CAA section 111(h)(2). Given the potential discrepancy between the conditions under which alternative standards may be established based on the different terminology used by the statute and existing implementing regulations, EPA proposes to use the ''not feasible to prescribe or enforce'' language as the condition for the new implementing regulations under which alternative standards may be established.*

48 Fed Reg. 44746, 44743 (August 31, 2018).

ICAC believes that this is an important issue to consider since in general it appears that the Clean Air Act placed limits on the ability of EPA to use work practice standards in lieu of a more specific performance standard or numeric limit. In general, the statutory language should be adhered to and a more, rather than less, restrictive interpretation of when it is appropriate to use a work practice standard should be used. However, ICAC also notes that in the area of efficiency and heat rate improvements designed to lower CO2 emissions, work practice standards may play a larger role than with conventional pollutant controls designed to capture or control a particular specific emission stream or pollutant. Therefore, careful attention should be paid to work practice standards and whether or not it is "feasible to prescribe or enforce" a specific emission limitation.

V. Broadening the Definition of 'Inside the Fenceline', C-38

ICAC members are fully supportive of the "all-of-the-above" approach for our energy future, where fossil fuels and renewables both play important roles. The prudent approach to preserving such a scenario is to be sure that we take advantage of every opportunity to make the supply of fossil fuels as energy and carbon efficient as possible.

The proposed ACE rule as currently drafted limits carbon reductions to within the fence line, but that obviates what upstream energy suppliers can do within their own supply chain to achieve greater impact of CO2 reductions.

ICAC supports broadening that fence line to include the entire supply chain delivering energy, from the mine or well head to the point of use. Many ICAC members have already developed technologies ready for deployment to monitor, verify, and reduce CO2 equivalents at the mine or well head, thereby allowing the fossil fuel companies to contribute to the sustainability of the industry. By broadening the fence line to include the entire supply chain, utilities can look for other opportunities within their supply of electricity that may be more affordable, easily adopted, and sustainable. States will also have greater flexibility and more options to achieve a sustainable energy portfolio.

Thus, a re-imagined fence line will allow the industry to grow with more options for supplying reliable power, making use of the energy services that are needed. This requires the development of an industry to generate technologies focused on making fossil energy more sustainable with carbon removal units. ICAC members throughout the years have made substantial investments in making power plants efficient and have led the development of carbon capture/ destruction /use technologies. However, because of a lack of market drivers, many of these investments are stranded or have languished.

The EPA, through the proposed ACE rule, now has the opportunity to bring together technology providers, regulators, and the power industry to jointly develop a path for continued fossil energy production with innovative market mechanisms that will provide a profitable and sustainable path. ICAC members are prepared to design, develop and deploy technologies to enhance not only power plant heat rate, but also carbon equivalent reduction/monitoring technologies for a sustainable fossil energy system.

VI. Cost Analysis, C-58, C-59, C-60

As EPA has noted in the RIA:

> *The cost, suitability, and potential improvement for any of these HRI technologies is dependent on a range of unit-specific factors such as the size, age, fuel use, and the operating and maintenance history of the unit. As such, the HRI potential can vary significantly from unit to unit. EPA does not have sufficient information to assess HRI potential on a unit-by-unit basis*

EPA-452/R-18-006, August 2018 Regulatory Impact Analysis for the Proposed Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units; Revisions to Emission Guideline Implementing Regulations; Revisions to New Source Review Program at ES-2.

https://www.epa.gov/sites/production/files/2018-08/documents/utilities_ria_proposed_ace_2018-08.pdf

In addition, according to EPA:

> *CAA 111(d) also provides States with the responsibility to establish standards of performance and provides considerable flexibility in applying those emission standards. States may take many factors into consideration – including the remaining useful life of the affected source – when applying the standards of performance.*

Id.

As a result, EPA concludes that: "Therefore, any analysis of the proposed rule must be highly illustrative." Id.

EPA also notes that:

> *For many years, industry has indicated to the Agency that many sources have not implemented certain HRI projects because the burdensome costs of NSR cause such projects to not be viable. Thus, absent NSR reform, HRI at affected units might be expected to be modest.*

Id. As a result, EPA has estimated that without NSR reform, the expected amount of HRI reductions would be approximately 2% at a cost of $50/kW. According to EPA:

Based on numerous studies and statistical analysis, the Agency believes that the HRI potential for coal-fired EGUs will, on average, range from one to three percent at a cost of $30 to $60 per kilowatt (kW) of EGU generating capacity. The Agency believes that this scenario (2 percent HRI at $50/kW) reasonably represents that range of HRI and cost.

Id.

ICAC agrees that due to concern about NSR, many plants have not implemented certain HRI projects. As a result, there is relatively little concrete data available in order to determine costs on a unit specific basis and, therefore, that estimation, such as EPA has used in the proposal, is perhaps the best currently available method for assessing costs.

EPA goes on to assess costs under a "low cost" scenario that includes NSR reform:

This illustrative scenario represents a policy case that includes benefits from the proposed revisions to NSR, with the HRI modeled at a low cost. As mentioned earlier, the Agency is proposing revisions to the NSR program that will provide owners and operators of existing EGUs greater ability to make efficiency improvements without triggering provisions of NSR. This scenario is informative in that it represents the ability of all coal-fired EGUs to obtain greater improvements in heat rate because of NSR reform at the $50/kW cost identified earlier. EPA believes this higher heat rate improvement potential is possible because without NSR a greater number of units may have the opportunity to make cost effective heat rate improvements such as turbine upgrades that have the potential to offer greater heat rate improvement opportunities.

Id.

On the other hand, EPA also considers the variability in units and that some will incur higher costs:

Particularly for lower capacity units or those with limited remaining useful life, this could ultimately translate into HRI projects with higher costs. Combined, the 4.5 percent HRI at $50/kW scenario and the 4.5 percent HRI at $100/kW scenario represent a range of potential costs for the proposed policy option that couples HRI with NSR reform. Modeling this at $50/kW and $100/kW provides a sensitivity analysis on the cost of the proposed policy including NSR reform. The $50/kW cost represents an optimistic bounding where NSR reform unleashes significant new opportunity for low-cost heat rate improvements. The $100/kW cost scenario represents higher costs.

Id.

ICAC believes these bounding efforts can be useful and agrees that relatively little actual data is due to the lack of HRI improvements during the past decade or so. It is possible that some units that unavoidably triggered NSR in the past may have conducted HRI projects. Some data may be available in such cases and may be included in comments to be received by EPA. We suggest that you view the recent report from Sargent & Lundy LLC, *Heat Rate Improvement Case Studies on Coal-Fired Power Plants* (Sargent & Lundy, 2018), presented at the 2018 MEGA Symposium, where S&L review HRI technologies that are available to existing EGUs and identify applicability limitations, based on audit experience.

VII. Conclusion

ICAC appreciates the opportunity to provide comments on EPA's proposed ACE rule. ICAC is ready to assist and provide further technical information should any questions arise from these comments.