INSTITUTE OF CLEAN AIR COMPANIES

April 17, 2019

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

Attn: Docket No. ID EPA-HQ-OAR-2018-0794

Re: Proposed Rule on National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units-Reconsideration of Supplemental Finding and Residual Risk and Technology Review

The Institute of Clean Air Companies (ICAC) appreciates the opportunity to offer comments in response to EPA's Proposed Rule on National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units-Reconsideration of Supplemental Finding and Residual Risk and Technology Review (EPA-HQ-OAR-2018-0794).

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) actual cost of MATS compliance and 2) development procedures for future rules.

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

Clare Schulzki
ICAC Executive Director

Background

The Mercury and Air Toxics Standard (MATS) established a clear market need for mercury control equipment, chemicals, and supporting measurements. ICAC member companies responded to this market need and invested in technology development specific to coal-fired power plants and other dilute, mercury-containing gas streams over many years, transferring applicability from sources such as municipal solid waste combustion gases. ICAC members developed technologies that worked under a wide range of mercury concentrations and chloride contents. The cost reductions and improvements in technology have enabled coal-fired power generators to operate their plants with flexibility and cleaner emissions while keeping costs of compliance low.

MATS was a transformative regulatory event that that irrevocably changed the entire power sector, with implementation and compliance largely completed by April 2016 through a wide variety of techniques. Although MATS was nominally aimed at mercury emissions from power plants, its impact went well beyond the public health benefits to be obtained from preventing exposure of children to mercury from recreationally caught freshwater fish. The high-end Regulatory Impact Analysis (RIA) estimate of $90 billion of benefits reflects the enormous conventional pollutant reductions produced by MATS. However, the level of monetized benefits from toxic reductions, amounting to $4-6 million, is a small fraction of that level and is also a very small fraction of the $9.6 billion annual cost presented by EPA in the RIA.

There can be little doubt that MATS, taken together with the low price of natural gas and other environmental rules aimed at powerplants, played a major role in widespread retirement of coal-fired units. In hindsight, the decreases in natural gas pricing during the implementation timeframe put enormous economic pressure on already-marginal coal-fired units. Along with the economic burden of increasing compliance costs due to MATS, these two factors helped drive retirement decisions. While EPA predicted that MATS would cause retirements, and this proved to be correct, it had been substantially understated. Table 1 below shows the retirement of coal EGUs by year (EIA data). There is a significant increase in retirements when MATS is implemented. Gas prices increased in 2013 and 2014, however, EGU retirements were significant. The assumptions that EPA made with respect to natural gas pricing in the competitive power market are provided below.

Following MATS finalization in 2012, there was a large spike in retirements, which was exceeded only by an even larger spike in retirements in the first MATS compliance year of 2015 as confirmed by the Energy Information Agency (EIA). Unit retirement costs are the result of a complex analysis, but this is not included in the EPA cost benefit analysis, based on the controversial position that retirement of a unit cannot be considered a compliance cost of the regulation.

Table 1. Retirement of Coal EGUs By Year (EIA data)

Year	MW	No. Units	Nat Gas* $/Mcf
2018	8,000	14	$3.67
2017	6,948	30	$ 3.52
2016	8,646	62	$ 2.99
2015	16,621	112	$ 3.38
2014	4,652	51	$ 5.19
2013	6,714	60	$ 4.49
2012	11,406	91	$ 3.54
2011	2,926	38	$ 4.89
2010	1,256	31	$ 5.27
2009	567	13	$ 4.93
2008	834	29	$ 9.26
2007	1,316	25	$ 7.31
2006	672	22	$ 7.11
2005	330	13	$ 8.47
2004	6,424	13	$ 6.11
2003	6,948	16	$ 5.57
2002	1,114	33	$ 3.68

**Natural Gas price shown is the Electric Power sector national annual average price*

Table 2 below provides the EIA history of the installation of air pollution equipment. The market impact of various rules can be seen in this table. In 2014-15 there is a significant increase in activated carbon and sorbent injection technology related to MATS compliance. If we assume that all the equipment installed from 2012 to 2016 was installed just for MATS, we can establish an upper ceiling estimate of the MATS-attributable equipment, as delineated in Table 3 below. In this time period, 5,066 MW of new coal-fired EGUs came on line, while 39,028 MW of MATS EGUs >25 MW were retired. All of the new EGUs had flue gas desulfurization (FGD) technology, so the increase in FGDs installed on existing units were 8,983- 5,066 = 3,917 MW. This number is the maximum amount that may have been driven by MATS, but likely other emissions limits contributed to a given unit's decision to retrofit FGD. Of the 5,066 MW of new capacity that came on line during this period, 3,300 MW had baghouses. This level means that 7,688 MW of baghouses were likely installed on existing units due to MATS. Table 4 below provides a summary comparing EPA's projected air pollution control requirements for MATS with Dr. Staudt's analysis and ICAC's evaluation based on EIA actual data.

Table 2. Quantity and Net Summer Capacity of Operable Environmental Equipment, 2007 - 2017

	Flue Gas Desulfurization Systems		Electrostatic Precipitators		Baghouses		Select Catalytic and Non-Catalytic Reduction Systems		Activated Carbon Injection Systems		Direct Sorbent Injection Systems	
Year	Quantity	Associated Net Summer Capacity (MW)	Quantity	Associated Net Summer Capacity (MW)	Quantity	Associated Net Summer Capacity (MW)	Quantity	Associated Net Summer Capacity (MW)	Quantity	Associated Net Summer Capacity (MW)	Quantity	Associated Net Summer Capacity (MW)
2007	590	131,499	1,496	317,751	556	65,672	1,197	266,397	141	7,735	59	7,602
2008	637	151,520	1,471	316,810	576	68,442	1,250	277,576	169	17,391	62	7,701
2009	677	174,774	1,456	314,356	597	73,863	1,323	300,007	227	39,546	65	8,242
2010	716	201,052	1,410	310,486	610	83,407	1,360	315,222	262	54,183	66	8,721
2011	730	211,754	1,368	307,043	633	98,507	1,408	331,242	274	59,057	75	8,977
2012	726	219,317	1,291	298,425	629	101,593	1,451	344,811	287	63,709	83	10,618
2013	704	219,317	1,218	289,182	637	104,331	1,457	351,217	260	61,160	97	12,985
2014	701	223,793	1,172	283,940	621	105,990	1,471	358,410	278	69,232	104	16,777
2015	692	224,101	1,037	264,905	623	110,820	1,479	359,869	362	106,395	122	23,307
2016	693	228,300	943	252,904	613	112,581	1,479	360,907	479	153,130	125	26,679
2017	676	221,441	886	244,087	601	109,495	1,480	362,591	475	151,153	126	25,762

Table 3. Potential Equipment Install Due to MATS

Potential Equipment Install Due to MATS												
	Flue Gas Desulfurization Systems		Electrostatic Precipitators		Baghouses		Select Catalytic and Non-Catalytic Reduction Systems		Activated Carbon Injection Systems		Direct Sorbent Injection Systems	
Year	Quantity	Associated Net Summer Capacity (MW)	Quantity	Associated Net Summer Capacity (MW)	Quantity	Associate d Net Summer Capacity (MW)	Quantity	Associate d Net Summer Capacity (MW)	Quantity	Associate d Net Summer Capacity (MW)	Quantity	Associate d Net Summer Capacity (MW)
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2016	693	228,300	943	252,904	613	112,581	1,479	360,907	479	153,130	125	26,679
MATS		8,983		-45,521		10,988	28	16,096	192	89,421	42	16,061

Table 4. Table 4 Comparison with EPA Projection with Staudt and EIA Installations Due to MATS

Technology	EPA Cost Analysis for Proposed Rule	Staudt 2014 Analysis	EIA Potential Data
Baghouse	100 GW	8.7 GW	7.7 GW
Dry FGD	51 GW	33 GW	-
Wet FGD	63 GW	2 GW	-
EIA only shows total FGD (Dry + Wet)	114 GW	35 GW	3.9 GW

Cost Information

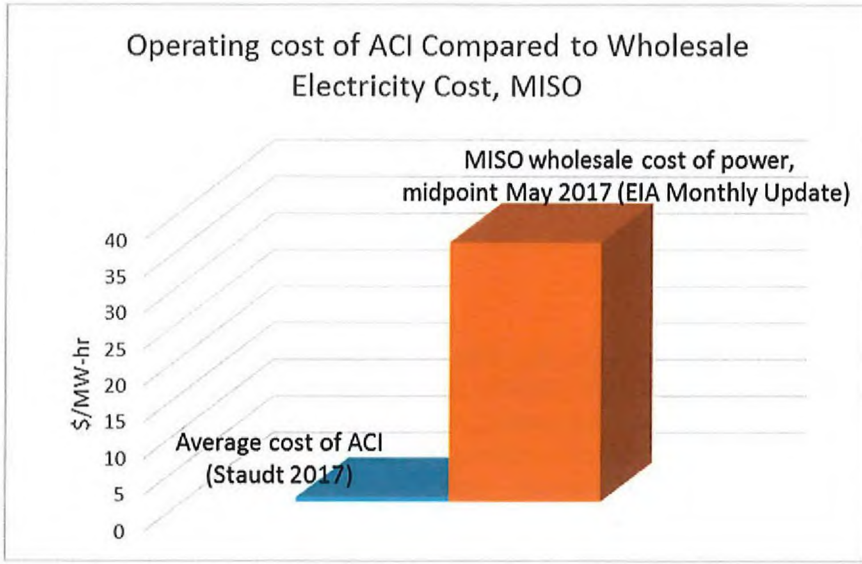
When it came time to fully commercialize and scale-up the equipment and chemical supplies that the MATS rule compliance required, the air pollution control industry invested in new production facilities here in the U.S. to provide the needed equipment, measurements, reagents and sorbents. ICAC members also continued to innovate other technical solutions, including fuel blending and existing control optimization, non-carbon sorbents for mercury, improvements to carbon-based sorbents for mercury, improvements to dry alkaline sorbents for acid gases, wet and dry scrubber additives, and oxidizing coal additives. Having multiple options in place, as well as a robust industry of suppliers that drove innovation through internal research and development, dramatically reduced the costs of compliance for end users over time.

Activated carbon, for example, which is the dominant chemical used for control of mercury from coal-fired flue gases, is manufactured domestically and supplied by several ICAC-members. Collectively, these manufacturers invested at least $750 million in manufacturing and logistics facilities and opened two new coal mines (in Texas and Louisiana) to supply the raw material for activated carbon production. States like Louisiana, Texas, Oklahoma, Mississippi, Wyoming, Kentucky, Virginia, West Virginia, Ohio and Pennsylvania all benefit from well-paying jobs at ICAC member company facilities and in related industries like coal mining, which is important for both energy use and as a source of consumable product. The benefits to the local and state economies from these operating facilities and mines, as well as the transportation and distribution of products, are significant. In addition, the activated carbon industry has continued to invest in research and development, making improvements and reducing the costs of compliance.

In addition to capital expenditures for new activated carbon production, lime companies also made significant investments in developing new products and installing new capacity to produce enhanced hydrates, and the manufactures of sodium-based sorbents invested in new terminals and grinding facilities.

The cost reductions and improvements in technology have had the material benefit of enabling coal-fired power generators to operate their plants with flexibility and cleaner emissions while keeping costs of compliance low. Further information regarding costs, which vary depending on the technology, can be found attached to these comments (see Attachment 1). Figure 1 below shows the average operating cost of activated carbon injection (ACI) in comparison with the midpoint of wholesale electricity pricing in MISO from May 2017.

Figure 1. Operating Cost of Activated Carbon Injection (ACI) Compared to Wholesale Electricity Cost, MISO 2017 (EIA data)



ACI is one of several technologies used to control mercury from coal-fired power plants. Alternatives have continued to evolve as well, with suppliers optimizing their chemicals and controls. The availability of ICAC-supported technologies for mercury control allows ever-improving mercury compliance options. These technologies support clean coal power generation.

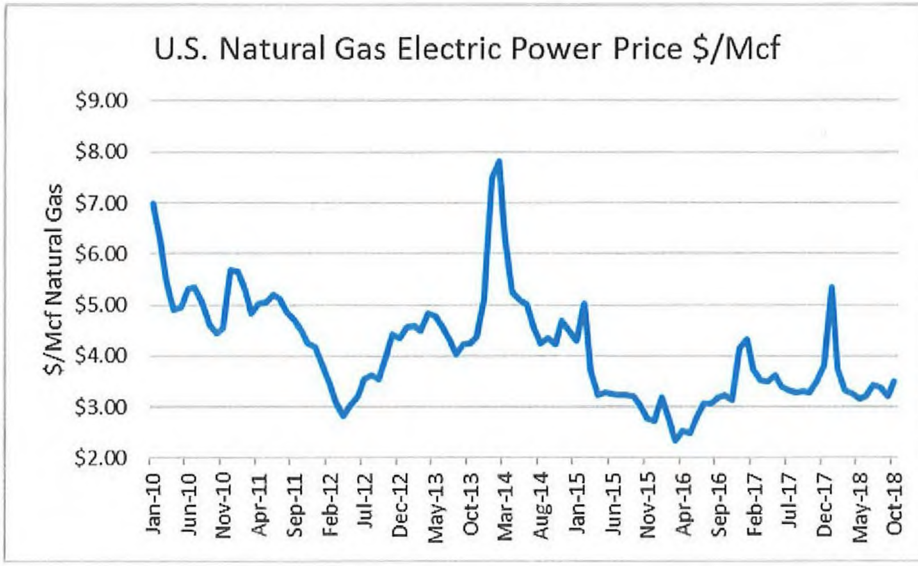
According to James Staudt, an engineer and Chartered Financial Analyst with decades of experience in the energy and air pollution control industry, in *White Stallion Energy Center, LLC, et al. v. U.S. EPA*, the 2014-estimated cost of MATS compliance was already $7 billion per year less than EPA's original estimates. Therefore, the "true cost of the [MATS]" totaled approximately $2 billion – less than one quarter of EPA's estimates.[1]

With the closure of 39,000 MW in total (due to MATS and other factors), the addition of new transmission lines may have also been required. ICAC was concerned that we could not find detailed operating and maintenance cost analysis that EPA used in their evaluations. If this analysis was available, ICAC could provide additional details, including input on the validity of the assumptions used.

In its RIA conducted in 2011, EPA over-estimated the cost of natural gas used in power generation. EPA's forecast Policy Case projected a cost of natural gas in 2015 of $5.66/MMBtu versus $5.40/MMBtu in its Base Case. Actual cost dropped below $4/MMBtu in early 2015 and has stayed at this level with only a couple of weather-driven winter spikes, as shown in Figure 2 below.

[1] Declaration of James E. Staudt, Ph. D., CFA. *White Stallion Energy Center, LLC, et al., v. U.S. EPA.* April 15, 2014.

Figure 2. U.S. Natural Gas Electric Power Price, 2010-2018 (EIA data)



The implication of higher assumed natural gas prices is that even many older, less-efficient coal-fired units were projected to be competitive and able to remain operational. As utilities' financial projections shifted in response to the market conditions, many older coal-fired units became not viable and deemed unworthy of further investment. These same units would have required the most investment to meet MATS emissions levels and their costs were never realized, resulting in lower overall costs of compliance.

Why were the projected costs so high and what technologies were developed to reduce costs?

1. Improvements in dry sorbent injection (DSI), halogens, and activated carbon injection (ACI) technologies have significantly lowered the costs of those pollution control systems. The use of computational fluid dynamics (CFD) and physical modeling also was shown to improve pollutant capture and reduce sorbent consumption.
2. Natural gas prices have been significantly lower than those upon which EPA's estimates were premised.
3. EPA overestimated the generation capacity that would require installation of fabric filters (also known as baghouses), dry flue gas desulfurization ("FGD") systems and wet FGD upgrades.
4. The use of halogen additives to assist in Hg capture.
5. The development of selective catalytic reduction (SCR) catalysts that are optimized for Hg oxidation and used as an explicit Hg control strategy.
6. Co-benefits in Hg capture with systems including SCRs and FGD systems. 34% of all the coal-fired plants have reported using no Hg control technologies.
7. Development of enhanced hydrated lime products for SO_3, SO_2 and HCl capture.
8. Refinements in the use of sodium sorbents that reduced consumption.
9. Development of enhanced and impregnated activated carbons that reduced consumption.
10. Development of sorbents specifically used in either existing or new wet FGD systems for Hg capture.

11. The closure of 39,000 MW of EGUs. Many of the closed plants did not have SCRs or FGD systems – leaving the better controlled EGUs with SCRs and FGD operating and many of these units did not require incremental Hg control.
12. The development of coal additives (refined coal).
13. DSI and ACI systems operate more reliably and many utilize technology to improve dispersion of sorbents in flue gas for better performance.

See Attachment 2: Declaration from James Staudt. *White Stallion v. U.S. EPA.* May 25, 2017.

New Source Emission Standards for EGUs

ICAC is confident that the EGU's emission limits for existing units for total particulate matter (PM), hydrogen chloride (HCl) and mercury (Hg) are being met reliably and economically on a 30-day rolling average. **We believe that the MATS emission limits should be retained for existing units.**

However, ICAC has concerns regarding the emission limits for new EGUs and the development of potential new rules. When the EPA sets an emission limit, all EGUs establish operating levels below the EPA or permit levels, to some extent, to compensate for operational variability, fuel changes, and startup and shut down times that occur during normal plant operations, and in order to remain in compliance over the averaging period. Therefore, emission limits need to be established within the capabilities of available technology and the accuracy of monitoring systems. Also, when owners/operators purchase control equipment, they may add an operational margin in their specification and request for performance guarantees. EPA should verify that performance guarantees are commercially available when setting new rules.

Monitoring systems must be capable of accurately measuring emissions below the limits established by the EPA and in practice emission control technologies must be able to provide long term control at emission levels below the proposed limits.

The new unit limitations would have a major impact on the future of coal generation, and therefore, it is critical for these limitations to be correct. ICAC is particularly concerned about the mercury, HCl and total PM limitations on new units, as these limits may be at levels that approach the "noise" of practical measurement methods. For this reason, ICAC urges the EPA to verify the following:

- That the reported performance for the best performing unit that is the basis of the limit is, in fact, correct. The owners of the selected facility have questioned the validity of the test data EPA used in their evaluations. This re-evaluation should be done through thorough re-examination of the test reports and procedures. We urge the EPA to validate the ICR test data using the ASME program ReMap and ASME's 19.1 Test Uncertainty. We also recommend re-testing of these units under the same conditions to verify if these emissions measurements are, in fact, repeatable and sustainable over an operating period that includes periods of start-up and shutdown.

- That the measurements of flue gas using practical methods for performance testing are, in fact, repeatable and reliable at the concentrations associated with the proposed new unit limits. For example, while mercury measurement methods have been developed rapidly over the past decade, there is insufficient experience measuring mercury in flue gas at concentrations equivalent to the proposed new unit limits to understand the detection limitations and quantitative accuracy at such low mercury concentrations for either of the two continuous methods – sorbent traps or continuous analyzers. Without better information on the limitations of these measurement methods at such low mercury concentrations, it is difficult to have confidence in measurements taken at these low concentrations.

- Furthermore, ICAC believes that continuous monitoring is best done with methods that provide "real time" monitoring that can alert operators to changes in conditions that affect emission rates. Sorbent traps, while a valid continuous measurement method for mercury emissions, do not provide adequate response time to be useful for control and achievement of compliance at the new unit limits due to the long time necessary for sampling and the difficulty of making up for periods of above-limit emission in a 30-day averaging period including startup and shutdown periods.

Conclusion

ICAC appreciates the opportunity to provide comments on EPA's *Proposed Rule on National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units-Reconsideration of Supplemental Finding and Residual Risk and Technology Review.* ICAC is prepared to provide additional technical information or answer any questions that arise from these comments.

Clare Schulzki
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References

1. Sloss, Lesley and Peter Nelson. "Mercury Control from Coal Combustion." UN Environment. United Nations, n.d. Web. 25 July 2017 <http://www.unep.org/chemicalsandwaste/global-mercury-partnership/mercury-control-coal-combustion>.
2. Staudt, J.E., "Update of the Cost of Compliance with MATS – Ongoing Cost of Controls," White Paper by Andover Technology Partners, May 2017.
3. Hazardous Air Pollutants from Coal-Fired Power Plants. Boston: NESCAUM, 2011. Web. 6 July 2017 <www.nescaum.org/documents/coal-control-technology-nescaum-report-20110330.pdf>.
4. THE INSTITUTE OF CLEAN AIR COMPANIES (ICAC) DOMESTIC CONVENTIONAL POLLUTANTS DIVISION AND EMISSIONS MEASUREMENT DIVISION, Issue Brief for United States Environmental Protection Agency, Administrator E. Scott Pruitt, Aug. 2007
5. Declaration of James Staudt. White Stallion vs. U.S. EPA. Dec. 10, 2013

Attachments

1. The Institute of Clean Air Companies (ICAC), Domestic Conventional Pollutants Division and Emissions Measurement Division. Issue Brief for United States Environmental Protection Agency, Administrator E. Scott Pruitt, August 2017.
2. Declaration of James Staudt. White Stallion vs. U.S. EPA. Dec. 10, 2013