



EPA's Boiler MACT: Controlling Emissions of Hazardous Air Pollutants

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Summary

On June 4, 2010, the U.S. Environmental Protection Agency (EPA) proposed Maximum Achievable Control Technology standards for boilers (the “boiler MACT”), as Congress required in the 1990 amendments to Section 112 of the Clean Air Act. Boilers are used as power sources throughout industry and for power or heat by large commercial and industrial establishments as well. Thus, there is widespread interest in the proposed rule’s requirements and their potential effects.

EPA proposed the regulations because it has found, based on emissions data, that boilers (including coal-fired and biomass-fired boilers) are major sources of hazardous air pollutants (HAPs). The Clean Air Act defines a major source as any facility that emits 10 tons or more of a single listed HAP or 25 tons of any combination of HAPs annually. The HAPs themselves (187 substances) were listed by Congress in the 1990 Clean Air Act Amendments.

The proposed rule would replace a rule promulgated September 13, 2004, and subsequently vacated and remanded to the agency by the D.C. Circuit Court of Appeals. EPA is under a court order to promulgate a replacement rule by January 16, 2011. Existing facilities would then have three years to comply with the standards, unless the courts intervene again.

EPA estimates that the rule would affect 13,555 boilers and process heaters, with capital costs of \$9.5 billion; annualized costs, which spread the costs of capital over the expected life of the equipment and include operating and maintenance costs as well, are estimated at \$2.9 billion per year. A majority of these costs would be borne by coal-fired and biomass-fired boilers, which together account for only 7.4% of all the existing units covered by the rule. In order to comply, the coal-fired and biomass-fired units may need to install fabric filters (also known as baghouses) to achieve control of mercury and particulate matter; wet scrubbers to meet limits on hydrogen chloride and other acid gases; replacement burners, tune-ups, and combustion controls for carbon monoxide and organic HAPs; and carbon injection for mercury, dioxins, and furans. Most boilers – 85% of those affected by the rule—are fueled by natural gas. Natural-gas-powered boilers would experience cost savings under the rule, according to the agency.

EPA estimates that the benefits – including the avoidance of 1,900 to 4,800 premature deaths – would outweigh the costs by at least \$14 billion annually. Nevertheless, the affected industries have raised a number of objections to the proposal. Besides the potential economic impacts, one issue is whether EPA should have identified additional subcategories of the boiler universe, giving it greater flexibility to set less stringent standards. Others maintain that the agency should have exercised its authority to set less stringent standards for hydrogen chloride and other acid gases (which make up 61% of the total emissions of HAPs) under a subsection of the statute that gives the Administrator flexibility to set less stringent standards for HAPs that have a health threshold (i.e., substances that are not harmful if emitted in amounts below some threshold). Another issue is whether EPA’s method of identifying the emissions of the best performing existing units correctly interprets the agency’s authority under the statute. Each of these issues is discussed in this report.

Numerous congressional offices have written the EPA Administrator concerning the proposed rule. EPA must address these and other public comments when it promulgates the final version, expected in January. Following promulgation, interested parties have 60 days to file a petition for court review.

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Introduction

This report provides information concerning EPA's proposed Maximum Achievable Control Technology standards for boilers (the Boiler MACT, as proposed June 4, 2010).¹ Boilers are used as power sources throughout industry and for power or heat by large commercial establishments and institutions as well. Thus, there is widespread interest in the proposed rule's requirements and their potential effects.

EPA estimates that the proposed rule would affect 13,555 boilers and process heaters.² In order to reduce emissions of a wide array of hazardous air pollutants, about 2,000 of the units would be required to install pollution control equipment. The agency estimates the capital costs associated with the rule at \$9.5 billion to meet the compliance deadline in 2014; annualized costs, which spread the costs of capital over the expected life of the equipment and include operating and maintenance costs as well, are estimated at \$2.9 billion per year. A majority of these costs would be borne by coal-fired and biomass-fired boilers, which together account for only 7.4% of all the existing units.

Most boilers—85% of those affected by the rule—are fueled by natural gas, according to EPA. Natural-gas-powered boilers would incur capital costs averaging a little less than \$7,000, according to the agency; through fuel savings, the agency expects a reduction in operating costs to more than compensate for the capital expenditures of natural gas-powered units.

Why Is EPA Regulating These Sources?

EPA is regulating boilers because it has found, based on emissions data, that the coal-fired and biomass-fired units and some units that fire liquids or process gases are major sources of hazardous air pollutants (HAPs). Section 112 of the Clean Air Act, which requires controls on major sources of HAPs, defines a major source as any facility that emits 10 tons or more of a single listed HAP or 25 tons of any combination of HAPs annually. The HAPs themselves (187 substances) were listed by Congress in the 1990 Clean Air Act Amendments.

Boilers emit at least 20 of the listed HAPs, including mercury, arsenic, chromium, cadmium, selenium, nickel, lead, manganese, phosphorous, antimony, beryllium, polycyclic organic matter, benzene, formaldehyde, acetaldehyde, dioxins, furans, hydrogen chloride, hydrogen cyanide, and hydrogen fluoride. Six of these 20 are classified as known or probable human carcinogens. Others affect the lungs, skin, central nervous system (including adverse developmental effects), and/or kidneys.³ By controlling emissions of these substances, EPA expects to avoid 1,900 to 4,800

¹ The proposal (hereafter referred to as the "Boiler MACT proposal") can be found at 75 *Federal Register* 32006, June 4, 2010.

² The data in this paragraph are from RTI International, for U.S. EPA, *Regulatory Impact Analysis: National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters*, Draft Report, April 2010, pp. 3-1 and 3-2, at <http://www.epa.gov/airquality/combustion/docs/boilerria20100429.pdf>. Hereafter, "Regulatory Impact Analysis."

³ Boiler MACT proposal, p. 32048. Also, see Comments of Clean Air Task Force, Earthjustice, Natural Resources Defense Council, and the Sierra Club on National Emission Standards for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters: Proposed Rule, Docket ID No. EPA-HQ-OAR-2002-0058, August 23, 2010, (continued...)

premature deaths annually, as well as many other health effects, including 1.5 million cases of acute respiratory symptoms.⁴

The proposed rule would replace a rule promulgated on September 13, 2004, and subsequently vacated and remanded to the agency by the D.C. Circuit Court of Appeals.⁵ The court vacated the rule in 2007, saying EPA had wrongly excluded many industrial boilers from the definition of solid waste incinerators, which have more stringent emissions requirements under the Clean Air Act. EPA is under a court order to promulgate a replacement rule by January 16, 2011. Existing facilities would then have three years following promulgation to comply with the standards—unless the courts intervene again.

The Proposed Standards

Standards for Existing Coal-Fired and Biomass-Fired Units

In proposing the standards, EPA divided boilers into 11 subcategories, with separate emission limits for new and existing units in nine of the 11. The nine subcategories include three types of coal-fired boilers and four types of biomass-fired boilers.⁶

The emission limits would cover five substances (or groups of substances): mercury; dioxins/furans; particulate matter (as a surrogate for non-mercury metals); hydrogen chloride (as a surrogate for all acid gases); and carbon monoxide (as a surrogate for non-dioxin organic air toxics, including formaldehyde).⁷

The Clean Air Act requires that MACT emission standards be based on the emission control achieved by the best controlled similar sources. Thus, the emission limits proposed for the five groups of pollutants are based on monitoring data obtained from facilities in each of the nine subcategories of existing boilers.⁸

(...continued)

p. 3.

⁴ U.S. EPA, “Proposed Air Toxics Standards for Industrial, Commercial, and Institutional Boilers at Area Source, Facilities,” Fact Sheet, pp. 2-3, at <http://www.epa.gov/airquality/combustion/docs/fsboilersarea20100429.pdf>. Hereafter, “EPA Fact Sheet.”

⁵ *Natural Resources Defense Council v. EPA*, 489 F. 3d 1250, 1257–61 (DC Cir. 2007).

⁶ The three types of coal-fired boiler are coal stoker, coal fluidized bed, and pulverized coal. The four types of biomass-fired boilers are biomass stoker, biomass fluidized bed, biomass suspension burner/Dutch oven, and biomass fuel cells. In addition, the agency proposed emission limits for liquid-fueled boilers, and gas-fired boilers using “other process gases.”

⁷ Hydrogen chloride is often referred to as hydrochloric acid, because when the gas encounters water in the atmosphere it forms an acidic solution of hydrochloric acid. The specific emission limits EPA has proposed for each of the five pollutants can be found in the June 4, 2010 *Federal Register* at p. 32012, Table 1. EPA provides a link to the *Federal Register* notice as well as much explanatory material at <http://www.epa.gov/airquality/combustion/actions.html>.

⁸ EPA has acknowledged that it did not have as much data as it might have wished to use in establishing the boiler subcategories and the proposed MACT standards. In a September 28, 2010 letter, the Administrator states: “In an effort to establish subcategories wherever appropriate, and to calculate accurately the standards for each subcategory, EPA asked the affected companies and institutions for technical data about their facilities long before the court-ordered deadline for publishing a proposal. As is often the case in Section 112 rulemaking efforts, however, EPA did not receive many data. While the agency was not left entirely lacking in relevant information, the limited response from (continued...)”

- For new sources, the statute requires (in Section 112(d)(3)) that standards be based on the emission control achieved by the best controlled similar source.
- For existing sources, on the other hand, the same subsection of the statute requires standards no less stringent than the average emission limitation achieved by the best performing 12% of existing sources. The performance of the best 12% is generally referred to as the “MACT floor,” since it sets the minimum requirements for MACT standards. The MACT floor is based solely on the performance of existing facilities in the category or subcategory of sources, with no consideration of the cost or economic impacts thereof. The Administrator is only allowed to take costs, health, energy, and environmental factors into consideration to the extent that she considers setting standards that go beyond the floor.

Given the required methodology for identifying the MACT floor, the number of subcategories the agency identifies is an important factor in determining how stringent the standards will be: the more subcategories EPA identifies, the more variation there will be in the MACT floor for each, and thus the more flexibility the agency will have in setting different, potentially less stringent emission standards for different boiler types. If, because of subcategorization, the Administrator decided that a subcategory’s MACT floor did not provide sufficient protection for human health or the environment, she would still have the authority to set “beyond the floor” standards for a subcategory: in doing so, however, she could consider the cost of the standards and other factors. Thus, one issue raised by commenters has been whether EPA’s subcategorization of the boiler universe appropriately considers the differences in size, fuels, etc., or whether the subcategories should be modified from those proposed.

A second issue raised by critics of the agency’s proposal has to do with the nine subcategories that EPA did identify: this issue is whether EPA followed the requirements of the statute in setting standards for the nine. As it has done previously for other categories of sources, EPA averaged the emissions performance of the top 12% of existing units separately for each of the five pollutants subject to emission limits. Critics who believe the standards are too stringent argue that by considering the pollutants separately, the agency is, in effect, cherry-picking the best performers and setting a combined standard for the five pollutants that no existing facility may actually meet.

This question—whether one identifies the best-performing sources pollutant-by-pollutant or for all the pollutants as a group—is being litigated in regard to another standard, the Hospital/Medical/Infectious Waste Incinerator rule, which EPA promulgated in October 2009. In promulgating that rule, the agency stated:

There is no reason not to consider emissions data and controls in use at sources that may be the best performers from some pollutants but not for other pollutants. The MACT floor controls applicable for one pollutant do not preclude the use of MACT floor controls for

(...continued)

affected businesses and institutions did make it difficult for EPA to delineate subcategories and calculate standards that fully reflected operational reality. The agency nevertheless was legally required to publish proposed subcategories and standards based on the information it had at the time.” Letter of EPA Administrator Lisa P. Jackson to Senator Mary L. Landrieu, September 28, 2010, p. 2.

another pollutant. Therefore, it is appropriate to consider controls at sources employing MACT controls for some pollutants, but not all.⁹

EPA acknowledges that “there appears ... to be a substantial ambiguity in the statutory language about whether the MACT floor is to be based on the performance of an entire source or on the performance achieved in controlling particular hazardous air pollutants.”¹⁰ But the agency notes that commenters in the past have not objected to the use of the pollutant-by-pollutant approach. They also note that the D.C. Circuit Court of Appeals has reviewed MACT floor determinations made on a pollutant-by-pollutant basis without finding error in the approach.¹¹ Thus, unless the D.C. Circuit finds otherwise in pending or future litigation, the agency believes the best reading of the act is that the standards are to be set on a pollutant-by-pollutant basis, the only exception being if there is reason to believe that control of one pollutant will lead to increased emissions of another.

Standards for Existing Natural Gas-Fired Units

For the two subcategories not subject to emissions limits (natural gas/refinery gas and metal process furnaces), the agency set only a work practice standard: the Administrator has authority to substitute a work practice standard for emission standards when, in her judgment, it is not feasible to prescribe or enforce an emission standard. The proposed work practice would require that boilers be tuned up and that the owner submit an annual report to EPA setting forth specific information from the tune-up procedure. As noted earlier, 85% of existing boilers fall into the natural gas/refinery gas subcategory, and thus are only subject to the tune-up requirements.

All boilers would also be required to perform a one-time energy assessment to identify cost-effective energy conservation measures.

Standards for New Boilers

EPA also proposed MACT standards for new (as opposed to existing) major source boilers. These standards are substantially more stringent than the standards for existing units.¹² The agency assumes, however, that no new coal or biomass boilers (and very few boilers of any kind) will be built at major sources in the next three years. The agency states that the projected number of new boilers comes from the Energy Information Administration at the Department of Energy and is not based on the Boiler MACT.¹³

Of the estimated 46 new units, the agency expects 33 to be powered by natural gas, with annualized costs of \$303 apiece.¹⁴

⁹ U.S. EPA, “Standards of Performance for New Stationary Sources and Emissions Guidelines for Existing Sources: Hospital/Medical/Infectious Waste Incinerators; Final Rule,” October 6, 2009, 74 *Federal Register* 51381.

¹⁰ *Ibid.*

¹¹ *Ibid.* The case in question was *Sierra Club v. EPA*, 167 F.3d 658, 660 (D.C.Cir. 1999).

¹² 75 *Federal Register* 32012, Table 1.

¹³ Letter of EPA Administrator Lisa P. Jackson to Senator Mary L. Landrieu, September 28, 2010, p. 2.

¹⁴ Boiler MACT Proposal, Table 11, p. 32038.

Costs and Benefits of the Proposed Regulations

Among the boilers affected by the Boiler MACT rule, there are an estimated 420 biomass-fueled and 578 coal-fired boilers. The rule also applies to other types of boilers, but much of the discussion of the rule's impacts has focused on these two groups.

In general, the proposed emission limits apply to boilers that have a designed heat input capacity of 10 million Btu per hour or greater. How big is this? A coal-fired boiler subject to the MACT would be one that is capable of burning roughly 1,000 pounds (a half-ton) of coal per hour.¹⁵ Wood has less energy per pound than coal: a biomass-fired boiler burning wood might require as much as 1,500 pounds of wood per hour to produce 10 million Btus. Many of the boilers to be regulated are substantially larger, however. An analysis released by the Council of Industrial Boiler Owners (CIBO), for example, used a 250 million Btu/hour boiler as the base for its cost estimates.¹⁶

In order to comply with the rule's emission limits, these facilities may need to install fabric filters (also known as baghouses) to achieve PM and mercury control; wet scrubbers to meet the hydrochloric acid limits; replacement burners, tune-ups, and combustion controls for carbon monoxide and organic HAPs; and carbon injection for mercury, dioxins and furans.

EPA's Projected Costs

As shown in **Table 1**, EPA estimates the capital costs of this equipment for the 420 biomass-powered units to be \$2.0 billion, with annualized costs of \$609 million per year. These costs are not as high as those faced by coal-fired units: the 578 coal units face nearly \$4.5 billion in capital costs (more than \$1.6 billion per year in annualized costs). On a per unit basis, "other gas" units (i.e., those powered by gas other than natural gas or refinery gas) face costs almost as high as those of coal-powered units, but there are fewer of them: they make up only 1.5% of the major source boiler universe. Most boilers, which are fueled by natural gas, will experience a reduction in operating costs that more than compensates for any capital costs, according to EPA.

Despite the clear advantage that the proposed rule would give to natural-gas-fired boilers, EPA did not consider fuel-switching as a potential compliance strategy for a variety of reasons. The agency stated: "This decision was based on the overall effect of fuel switching on HAP emissions, technical and design considerations discussed previously in this preamble, and concerns about fuel availability."¹⁷ Although switching from solid to gaseous fuels "would decrease PM and some metals emissions, emissions of some organic HAP (e.g., formaldehyde) would increase,"¹⁸ according to the agency's analysis. Further, the agency maintained, natural gas may be unavailable:

¹⁵ A rough rule of thumb for coal is that it contains about 10,000 Btus of energy per pound. To be more precise, the heating value ranges from 6,500 to 13,000 Btus per pound, depending on rank, with bituminous coal containing more than 10,000 and subbituminous and lignite less.

¹⁶ IHS Global Insight for CIBO, *The Economic Impact of Proposed EPA Boiler/Process Heater MACT Rule on Industrial, Commercial, and Institutional Boiler and Process Heater Operators*, August 2010, Appendix A, p. 28. Hereafter, "CIBO Study."

¹⁷ 75 *Federal Register* 32019.

¹⁸ *Ibid.*

Natural gas pipelines are not available in all regions of the U.S., and natural gas is simply not available as a fuel for many industrial, commercial, and institutional boilers and process heaters. Moreover, even where pipelines provide access to natural gas, supplies of natural gas may not be adequate.¹⁹

Table I. Estimated Costs to Existing Boilers for Compliance with EPA's Proposed Boiler MACT

Subcategory	Estimated Number of Affected Units	Capital Costs (\$ million)	Annualized Cost (\$ million)	Annualized Cost per Unit (\$ thousand)
Coal units	578	\$4,468	\$1,619	\$2,801
Biomass units	420	\$2,003	\$609	\$1,450
Liquid units	826	\$1,389	\$419	\$507
Natural gas / refinery gas units	11,532	\$75	(\$260)	(\$23)
Gas (other) units	199	\$1,554	\$459	\$2,307

Source: U.S. EPA, Preamble to Boiler MACT Proposal, Table 11, 75 *Federal Register* 32038.

Notes: a. Parentheses indicate cost savings, resulting from fuel savings. b. Per unit cost was calculated by CRS. Some of the difference in unit costs could be accounted for by differences in boiler size.

Nevertheless, if the cost of compliance is sufficiently great, the incentive to explore fuel-switching would seem substantial, particularly for facilities not burning a byproduct of the plant's operation. Recent accounts of the substantial increases in gas reserves as shale gas resources are developed could ease some of the natural gas availability concerns, and might bear further analysis.²⁰

Estimated Benefits

EPA estimates that implementation of the boiler MACT, as proposed, would reduce nationwide emissions from major source boilers and process heaters by:

- 15,000 pounds per year of mercury,
- 3,200 tons per year (tpy) of non-mercury metals,
- 37,000 tpy of hydrogen chloride,
- 50,000 tpy of particulate matter (PM),

¹⁹ Ibid.

²⁰ See, for example, the U.S. Energy Information Administration's *Annual Energy Outlook 2010 with Projections to 2035*, at <http://www.eia.doe.gov/oiaf/aeo/gas.html>: "A 4-fold increase in shale gas production from 2008 to 2035 more than offsets a 31-percent decline in other lower 48 onshore natural gas production in the AEO2010 Reference case. Significant increases in shale gas production are expected in the Northeast, Gulf Coast, and Midcontinent regions...."

- 1,800 tpy of volatile organic compounds,
- 340,000 tpy of sulfur dioxide, and
- 722 grams per year of dioxin.²¹

Several of these reductions are substantial. For example, total U.S. emissions of mercury, according to EPA, were 113.9 tons (227,800 pounds) in 2005; at 15,000 pounds of annual reduction, the Boiler MACT rule would reduce national emissions by more than 6%. Electric generating units are by far the largest source of mercury emissions, accounting for nearly half of all emissions; boilers appear to be the fourth largest source.²²

The sulfur dioxide (SO₂) emission reductions account for a smaller percent of the national inventory. Total U.S. emissions of SO₂ were 11.4 million tons in 2008. As with mercury, electric generating units are by far the largest source of these emissions, accounting for 66% of the total. At 340,000 tons per year of emission reductions, the boiler MACT would account for nearly 10% of the remainder.²³

Boilers also appear to be among the largest sources of dioxin and particulate matter, although it is difficult to find national data to which to compare them.

According to EPA, beginning in 2013, these emission reductions would lead to the annual avoidance of:

- 1,900 to 4,800 premature deaths,
- 1,300 cases of chronic bronchitis,
- 3,000 nonfatal heart attacks,
- 3,200 hospital and emergency room visits,
- 3,000 cases of acute bronchitis,
- 250,000 days when people miss work,
- 33,000 cases of aggravated asthma, and
- 1,500,000 acute respiratory symptoms.²⁴

EPA estimates the value of these benefits to range from \$17 billion to \$41 billion in 2013—outweighing the annualized costs by at least \$14 billion. In its Regulatory Impact Analysis, the agency also states that this is only a partial estimate of the value of the proposed rule's benefits:

The monetized benefits estimated in this RIA only reflect the portion of benefits attributable to the health effect reductions associated with ambient fine particles. Data, resource, and methodological limitations prevented EPA from quantifying or monetizing the benefits from

²¹ EPA Fact Sheet, p. 2.

²² EPA National Emissions Inventory, "Trends in Mercury Air Emissions Between 1990 and 2005," November 24, 2008.

²³ EPA, "National Emissions Inventory (NEI) Air Pollutant Emissions Trends Data, 1970-2008," at <http://www.epa.gov/ttn/chief/trends/>.

²⁴ EPA Fact Sheet, pp. 2-3.

several important benefit categories, including benefits from reducing toxic emissions, ecosystem effects, and visibility impairment. The health benefits from reducing thousands of tons of hazardous air pollutants (HAPs) and millions of tons of carbon monoxide each year have not been monetized in this analysis. In addition to being a PM_{2.5} precursor, SO₂ emissions also contribute to adverse effects from acidic deposition in aquatic and terrestrial ecosystems, increase mercury methylation, as well as visibility impairment.²⁵

Industry Cost Estimates

Not surprisingly for a rule of this size, EPA's cost estimate is not the only one available. Industry-funded studies place the costs of the rule substantially higher than EPA's estimate.

Two reports that have been widely cited are a report funded by the Council of Industrial Boiler Owners (CIBO) and one by the American Forest & Paper Association. CIBO's study concludes that capital costs of the Boiler MACT will be \$20.7 billion, more than double EPA's estimate.²⁶ CIBO estimated the cost of carbon monoxide controls at \$2.7 billion, 200 times EPA's estimate; and the report estimates the cost of carbon injection at \$1.7 billion, 180 times the EPA amount. CIBO's estimate for hydrogen chloride controls was only three times as expensive as EPA's estimate; but, because EPA's estimate was already more than \$3 billion, the difference would add \$6 billion to the total cost of the rule.

CIBO identifies six factors that account for most of the difference. According to the CIBO study:

- EPA has used outdated control cost estimates;
- to achieve the carbon monoxide (CO) limits, it will be necessary to implement combustion controls, fuel feed system improvements, or install a CO catalyst, at far greater cost than EPA's conclusion that a tune-up or burner replacement would be adequate to achieve the CO limits;
- activated carbon injection, in addition to fabric filters, will be required to achieve the proposed rule's mercury limits at a far higher number of boilers, and EPA has underestimated the cost of this technology by a factor of 15;
- PM emission controls will require fabric filters, which are more expensive than EPA's assumption that electrostatic precipitators (ESP) will be adequate to meet the standard;
- more expensive scrubbers than EPA identified will be required for hydrogen chloride control; and
- more facilities than EPA estimates will need to control dioxin/furan emissions.

The American Forest and Paper Association also sponsored a report on the rule's potential impacts, although they combined the potential impacts of the Boiler MACT with those of three other pending air rules.²⁷ The AF&PA study concluded that the Boiler MACT alone would cost

²⁵ Regulatory Impact Analysis, p. 6-12. Methylation is the chemical process that makes mercury more "bioavailable," and therefore more toxic.

²⁶ CIBO Study, pp. 29-30.

²⁷ Fisher International Inc. for the American Forest and Paper Association, "Economic Impact of Pending Air Regulations on the U.S. Pulp and Paper Industry," August 2010, 8 p. Hereafter, "AF&PA Study."

pulp and paper mills \$4.6 billion in capital costs, plus \$560 million in operating costs, and would place 30 mills with 16,888 employees at risk of closure.

In general, over the last 40 years, Clean Air Act rules have proven less expensive than both EPA and industry estimates have projected before they were promulgated. As the EPA Administrator noted in a recent speech, after recounting examples of exaggerated projections of the consequences of proposed rules, "... the Clean Air Act has not only reduced harmful pollution—it has also been particularly effective at proving lobbyists wrong."²⁸ More to the point, as noted earlier, EPA legally cannot take cost or economic impact into consideration in identifying the MACT floor, and the standards for 9 of the 11 identified subcategories are based on the MACT floors for each.

But the agency can distinguish among classes, types, and sizes of sources within categories or subcategories. This could lead to less stringent standards if the agency identifies additional subcategories from within the boiler universe. This appears to be the agency's intent. In response to a September 24 letter sent by 41 Senators, the Administrator stated that it is the agency's intent to "... focus on making the regulatory subcategories appropriately reflect industrial variation in the real world, and on aligning the standards in each subcategory with the performance that real-world conditions prove are already achievable."²⁹ The Administrator explained that this would be possible because the affected companies and institutions have provided additional information in response to the EPA proposal.

She also addressed the concerns that many have raised regarding biomass-fueled boilers:

Businesses that burn biomass in their boilers and process heaters are particularly worried that the limited information underlying EPA's proposed subcategories and standards might cause many boilers that currently burn renewable biomass to shut down entirely or to convert to burning non-renewable fossil fuels. Please know that EPA is paying particular attention to the subject of biomass-fired boilers and process heaters as the agency works to develop final standards.³⁰

The agency should not expect an entirely free hand in setting additional subcategories (or perhaps, even, in promulgating standards based on the many subcategories it has already proposed). In their comments on the proposed rule, a group of four environmental organizations that frequently have challenged EPA regulations, objected to EPA's proposed subcategorization, calling it "unlawful, arbitrary, and unsupported by the record."³¹ They note that while the act provides that the Administrator *may* distinguish among classes, types, and sizes of sources within a category, such subcategorization is not *required*: "... the plain text of the Act demonstrates that Congress intended EPA to create [sic] categories and subcategories as a step towards establishing

²⁸ Administrator Lisa P. Jackson, "Remarks on the 40th Anniversary of the Clean Air Act, As Prepared," September 14, 2010, at <http://yosemite.epa.gov/opa/admpress.nsf/8d49f7ad4bbcf4ef852573590040b7f6/7769a6b1f0a5bc9a8525779e005ade13!OpenDocument>.

²⁹ Letter of EPA Administrator Lisa P. Jackson to Senator Mary L. Landrieu, September 28, 2010, p. 3.

³⁰ *Ibid.*, p. 2.

³¹ Comments of Clean Air Task Force, Earthjustice, Natural Resources Defense Council, and the Sierra Club on National Emission Standards for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters: Proposed Rule, Docket ID No. EPA-HQ-OAR-2002-0058, August 23, 2010, p. 3.

emissions standards, ... not as part of a scheme to provide incentives for existing sources to avoid standards. And yet, that is the effect of EPA's subcategorization scheme."³²

Should EPA Have Set Health-Based Standards Under Section 112(d)(4)?

According to EPA, "... emissions data collected during development of the proposed rule show that hydrogen chloride [HCl] emissions represent the predominant HAP emitted by industrial, commercial, and institutional (ICI) boilers, accounting for 61 percent of the total HAP emissions."³³ Given the importance of HCl emissions, one of the key issues in considering EPA's proposal is whether the agency should have exercised its authority to set standards for HCl and other acid gases under Section 112(d)(4), which gives the Administrator flexibility to set standards less stringent than MACT for HAPs that have a health threshold (i.e., substances that are not harmful if emitted in amounts below some threshold).

In developing and promulgating other regulations, including the vacated 2004 MACT standard for boilers, EPA established that HCl has a health threshold, that it is not classified as a human carcinogen, and that there is limited health risk associated with HCl emissions from discrete units. Nevertheless, in the June 2010 proposal, the Administrator decided not to exercise her discretion to set less stringent standards for HCl emissions for several reasons, including:

1. the agency lacks information on the peak short-term emissions of HCl from boilers and thus cannot determine whether acute exposures will pose health concerns;
2. HCl emissions from boilers mix with other emissions that are respiratory irritants, and EPA has no studies explicitly addressing the toxicity of these mixtures;
3. in considering whether to exercise her discretion under Section 112(d)(4), the Administrator must determine that a health-based standard in lieu of a MACT will not result in adverse environmental effects. HCl gas forms an acidic solution in the atmosphere and could exacerbate the impacts of acid deposition from sulfur and nitrogen oxides;
4. the agency has limited information on facility-specific emissions that it would need to set a health-based standard;
5. the agency would need to decide whether it would be appropriate to set 112(d)(4) standards for each acid gas emitted by boilers, or a single standard as a surrogate for them all; and
6. as proposed, the MACT standard would result in significant reductions in emissions of other pollutants, most notably sulfur dioxide, particulate matter, other acid gases, mercury, and other metals. These reductions would provide

³² Ibid.

³³ Boiler MACT proposal, p. 32011.

substantial public health benefits that would be foregone if the agency set a less stringent standard.³⁴

Whether the agency should have set standards for HCl under Section 112(d)(4) has been one of the key points raised in comments, including those submitted by 41 Senators in a letter to the Administrator, on September 24, and by 105 Members of the House in a letter submitted August 2. As the Senate letter stated:

To help reduce the burden of the rule in a manner that does not compromise public health and safety, ... we ask that you carefully consider the extensive record that supported the Agency's determination to include health-based emissions limitations for hydrogen chloride and manganese in the previous Boiler MACT rulemaking that was set aside by the reviewing court on wholly unrelated grounds.³⁵

Given EPA's explanation of its stance in the proposal's *Federal Register* notice, however, it would seem unlikely that the agency would change its mind, unless new data addressed the issues raised above.

Smaller (Area) Sources

Smaller boilers (those at facilities that emit less than 10 tons of an individual HAP and less than 25 tons of all HAPS combined) face proposed regulations as well, but for the most part the Clean Air Act allows them to meet a less stringent standard, termed "Generally Available Control Technology" (GACT). A separate rule setting standards for these "area sources" was proposed the same day as the MACT standards.³⁶

The area source rule distinguishes boilers that have a heat input capacity of 10 million Btu per hour or more from those that are smaller. The smaller units make up the overwhelming majority of the units covered by the area source rule; they would be subject to GACT. Under GACT, these units would not be required to meet emission limits. Rather, they would be required to meet a work practice standard by performing a boiler tune-up every two years. According to EPA, "By improving the combustion efficiency of the boiler, fuel usage can be reduced and losses from combustion imperfections can be minimized. Minimizing and optimizing fuel use will reduce emissions of mercury and all other air toxics."³⁷

Some units under the area source rule would be subject to MACT for at least some pollutants. These are the units that have a heat input capacity of 10 million Btu per hour or more, but are at *facilities* that don't meet the major source definition because, even counting their boiler emissions, they emit less than 10 tons of any individual HAP and less than 25 tons of any combination of them. According to the agency, these larger boiler units at area sources would need to meet standards based on MACT for some of the pollutants they emit: "The proposed standards for existing coal-fired boilers and all new boilers are based on MACT for mercury and

³⁴ For more information on the 112(d)(4) issue, see the discussion in the Boiler MACT proposal on pp. 32030-32033.

³⁵ Letter of Senator Mary L. Landrieu et al. to EPA Administrator Lisa Jackson, September 24, 2010, p. 2.

³⁶ The area source proposal is at 75 *Federal Register* 31896, June 4, 2010.

³⁷ U.S. EPA, "Proposed Air Toxics Standards for Industrial, Commercial, and Institutional Boilers at Area Source, Facilities," Fact Sheet, p. 2, at <http://www.epa.gov/airquality/combustion/docs/fsboilersarea20100429.pdf>.

CO, and on GACT for PM. The proposed standards for existing biomass and oil-fired boilers are based on MACT for CO, and on GACT for mercury and PM.”³⁸

The area source rule would affect approximately 183,000 existing boilers powered by oil, biomass, and coal, located at 92,000 facilities. It would impose annualized costs of \$696 million in 2013, according to EPA's Regulatory Impact Analysis. After considering fuel savings from efficiency improvements that would result from the tune-ups required by the rule, the estimated annualized cost is reduced by 60%, to \$279 million.³⁹ EPA also estimates that 6,779 new boilers will be constructed at area sources in the next three years: net costs for meeting the area source standards at these facilities are estimated by EPA to be \$260 million annually. EPA's estimate of costs is summarized in **Table 2**.

Gas-fired boilers, of which EPA estimates there are 1.3 million, would not be affected by the area source rule. According to the agency, “Natural gas-fired area source boilers do not emit any of the urban air toxic pollutants for which area source boilers were listed”

Because the costs of compliance are substantially less than for the MACT rule, the area source rule has not been particularly controversial to date.

Table 2. Annual Compliance Costs for Area Source Boiler Rule

Source	Subcategory	Estimated Number of Affected Units	Annualized Cost (\$ million)	Annualized Cost per Unit (\$ thousand)
Existing Units	Coal	3,710	\$160	\$43
	Biomass	10,958	\$47	\$4
	Oil	168,003	\$436	\$3
New Units	Coal	155	\$54	\$348
	Biomass	200	\$13	\$65
	Oil	6,424	\$244	\$38
Facility Energy Audit	All	189,450	\$52	\$0.3

Source: RTI International for U.S. EPA, *Regulatory Impact Analysis*, Table 3-2.

Notes: Does not include fuel savings from improving combustion efficiency. Per unit cost was calculated by CRS.

³⁸ Ibid., p. 4. The actual standards can be found at 75 *Federal Register* 31901, Table 1. These standards do not address most of the pollutants covered by the major source MACT. Compared to the major source MACT, they are also less stringent for the pollutants that they do address.

³⁹ Regulatory Impact Analysis, pp. 3-2 and 3-3.

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