



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

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January 24, 2011

Congressional Research Service

7-5700

www.crs.gov

R41459

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 establishments and institutions. 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 February 21, 2011. In order to revise the proposal based on new information it has received, the agency asked in early December that the deadline be postponed to April 2012, but the court refused EPA’s request. Following promulgation, existing facilities would normally have three years to comply with the standards, but EPA has now indicated that it intends to grant requests to reconsider the rules following promulgation, potentially delaying implementation beyond three years.

The rule as proposed in June 2010 would affect 13,555 boilers and process heaters, with capital costs of \$9.5 billion, according to the agency; annualized costs, which spread the costs of capital over the expected life of the equipment and include operating and maintenance expenses 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 units covered by the rule. In order to comply, the coal-fired and biomass-fired units might need to install fabric filters 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 annually—would outweigh the costs by at least \$14 billion per year. The affected industries have raised a number of objections to the proposal. Besides potential economic impacts, one issue is whether EPA should have identified additional subcategories within the boiler universe, giving it greater flexibility to set standards. Others maintain that the agency should have used its authority to set less stringent standards for hydrogen chloride and other acid gases (which make up 61% of the total HAP emissions). Another issue is whether EPA’s method of identifying the emissions of the best performing existing units correctly interprets the agency’s statutory authority.

Numerous congressional offices have written the EPA Administrator concerning the proposed rule. EPA’s response has been to indicate that the final rule will “most assuredly” differ from the proposal. This report also briefly discusses three related rules that EPA proposed at the same time as the Boiler MACT, dealing with smaller “area source” boilers and with commercial and industrial boilers that burn solid waste (the “CISWI Rule”).

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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 and three related rules. 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 rules' requirements and their potential effects.

As of this writing, these rules are not final. EPA took public comment on the proposals until late August, 2010, and the agency's Administrator later stated (as discussed further below) that the comment period produced a substantial amount of new data that the agency will use to review the proposals. In a letter responding to the concerns of 41 Senators, the Administrator said: "... the final standards will most assuredly differ from the proposed ones."²

Nevertheless, given the proposals' potential impacts, there continues to be concern among stakeholders as to the final requirements. EPA estimated that the proposed Boiler MACT would affect 13,555 boilers and process heaters.³ 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 estimated 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, were 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.

¹ U.S. EPA, "National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters; Proposed Rule," 75 *Federal Register* 32006, June 4, 2010.

² Letter of EPA Administrator Lisa P. Jackson to Senator Mary L. Landrieu, September 28, 2010, p. 3.

³ 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."

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.⁴ By controlling emissions of these substances, EPA expects to avoid 1,900 to 4,800 premature deaths annually, as well as many other health effects, including 1.5 million cases of acute respiratory symptoms.⁵

The proposed Boiler MACT 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.⁶ 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 replacement rules by February 21, 2011.

In early December 2010, the agency petitioned the District Court for the District of Columbia for up to 15 months of additional time to complete the rulemaking. The agency argued that in light of the extensive comments it received on the proposed rules, “EPA believes that the overall public interest is best served by allowing EPA to re-propose the rules so that [it] will be able to issue emission standards that are based upon a thorough consideration of all available data and reduce potential litigation risks.”⁷ The court had issued a summary judgment against the agency in 2006 for failure to discharge fully its duty to promulgate standards for emissions of hazardous air pollutants.⁸ On March 31, 2006, the court imposed a schedule under which EPA was to have discharged all of the statutory duties at issue by June 15, 2009. That deadline has already been extended by more than a year and a half.

On January 20, 2011, the court denied EPA’s request for a further 15-month extension, concluding that EPA has engaged in discretionary delay in the face of a congressional directive (i.e., the 1990 Clean Air Act Amendments, under which the rules were to have been promulgated by November 2000); the court gave the agency one month to issue final rules.⁹ Having been denied the extension it sought, the agency issued a statement saying, “The standards will be significantly different than what EPA proposed.... The agency believes these changes still deserve further public review and comment and expects to solicit further comment through a reconsideration of the rules.”¹⁰

⁴ 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, p. 3.

⁵ U.S. EPA, “Proposed Air Toxics Standards for Industrial, Commercial, and Institutional Boilers and Process Heaters at Major Source Facilities,” Fact Sheet, pp. 2-3, at <http://www.epa.gov/airquality/combustion/docs/fsboilersmajor20100429.pdf>. Hereafter, “EPA Fact Sheet.”

⁶ Natural Resources Defense Council v. EPA, 489 F. 3d 1250, 1257–61 (DC Cir. 2007).

⁷ Sierra Club v. Jackson, No. 01-1537, 2001 Westlaw 181097, at *7 (D.D.C. Jan. 20, 2011).

⁸ Sierra Club v. Johnson, 444 F. Supp. 2d 46, 47 (D.D.C. 2006).

⁹ *Sierra Club*, 2001 Westlaw 181097.

¹⁰ U.S. EPA, “EPA Announces Next Steps on Emissions Standards for Boilers, Certain Incinerators,” Press Release, January 20, 2011, at <http://yosemite.epa.gov/opa/advpress.nsf/6424ac1caa800aab85257359003f5337/58f5bee5e13c61228525781e007e9881!OpenDocument>.

Following promulgation, existing facilities would normally have three years to comply with the standards, but if the agency grants requests to reconsider the rules following their promulgation, implementation could be delayed beyond the usual three years.

The Proposed Standards

Standards for Existing Coal-Fired and Biomass-Fired Units

In its June 4, 2010 proposal, 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.¹¹

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).¹²

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.¹³

- 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

¹¹ 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.”

¹² 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>.

¹³ 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 stated: “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 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.

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 another pollutant. Therefore, it is appropriate to consider controls at sources employing MACT controls for some pollutants, but not all.¹⁴

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."¹⁵ 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.¹⁶ 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

¹⁴ 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.

¹⁵ *Ibid.*

¹⁶ *Ibid.* The case in question was *Sierra Club v. EPA*, 167 F.3d 658, 660 (D.C.Cir. 1999).

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.¹⁷ 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.¹⁸

Of the estimated 46 new units, the agency expects 33 to be powered by natural gas, with annualized costs of \$303 apiece.¹⁹

EPA's Estimates of the Boiler MACT's Costs and Benefits

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.²⁰

¹⁷ 75 *Federal Register* 32012, Table 1.

¹⁸ Letter of EPA Administrator Lisa P. Jackson to Senator Mary L. Landrieu, September 28, 2010, p. 2.

¹⁹ Boiler MACT Proposal, Table 11, p. 32038. The other 13 units would be powered by liquids or other gases, according to EPA, and would face annualized costs of \$555,000 (liquids-powered units) or \$850,000 (other gas-powered).

²⁰ 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 (i.e., type of coal), with bituminous coal (continued...)

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.²¹

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."²² Although switching from solid to gaseous fuels "would decrease PM and some metals emissions, emissions of some organic HAP (e.g., formaldehyde) would increase,"²³ according to the agency's analysis. Further, the agency maintained, natural gas may be unavailable:

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.²⁴

(...continued)

containing more than 10,000 and subbituminous and lignite less.

²¹ 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."

²² 75 *Federal Register* 32019.

²³ *Ibid.*

²⁴ *Ibid.*

Table 1. 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.²⁵

EPA's Projected 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),
- 1,800 tpy of volatile organic compounds,
- 340,000 tpy of sulfur dioxide, and
- 722 grams per year of dioxin.²⁶

Several of these reductions are substantial. For example, total U.S. emissions of mercury, according to EPA, were 102.7 tons (205,400 pounds) in 2005; at 15,000 pounds of annual

²⁵ 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...."

²⁶ EPA Fact Sheet, p. 2.

reduction, the Boiler MACT rule would reduce national emissions by more than 7%. Electric generating units are by far the largest source of mercury emissions, accounting for half of all emissions; boilers were the second largest source.²⁷

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.²⁸

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.²⁹

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 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.³⁰

²⁷ EPA National Emissions Inventory, "Trends in Mercury Air Emissions Between 1990 and 2005," June 28, 2010.

²⁸ EPA, "National Emissions Inventory (NEI) Air Pollutant Emissions Trends Data, 1970-2008," at <http://www.epa.gov/ttn/chief/trends/>.

²⁹ EPA Fact Sheet, pp. 2-3.

³⁰ Regulatory Impact Analysis, p. 6-12. Methylation is the chemical process that makes mercury more "bioavailable," and therefore more toxic.

Other 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, while an analysis by the National Association of Clean Air Agencies concludes that the principal industry study exaggerates the potential costs.

Two industry 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.

The CIBO Study

CIBO's study concludes that capital costs of the Boiler MACT will be \$20.7 billion, more than double EPA's estimate.³¹ 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.

Using an estimate of 16,000 jobs "at risk" of being eliminated for each billion dollars of cost, CIBO concludes that 337,702 jobs would be at risk from implementation of the proposed rule.³² Nearly 70,000 of these would be in the directly affected industries; the rest would be in supplier industries or spread across local economies through reductions in spending by workers directly and indirectly affected.

³¹ CIBO Study, pp. 29-30.

³² CIBO Study, pp. 9-10. The "at risk" jobs include direct impacts on jobs at the facilities that have to install pollution controls, indirect impacts on jobs at suppliers of those firms, and induced impacts due to reductions in spending by employees in the direct and indirect categories.

Like the cost estimates, CIBO's jobs "at risk" are much higher than EPA's estimates. EPA found that the employment impact of the proposed rule would range from a loss of 6,000 jobs to a gain of 12,000.³³

Several factors help explain the difference. The most important is the choice of model used to estimate the economic impacts. CIBO uses an input-output (I-O) model. I-O models are deterministic, in the sense that they start with an assumption regarding a change in one industry's output and track the effect of the change on other industries' output and employment. An assumed loss in one industry translates directly to bigger losses in the economy as a whole.

In the CIBO study, the assumption was that the expenditure of \$20.7 billion on pollution controls would be equivalent to a reduction of output by that amount.³⁴ In fact, spending on pollution control does not cause an equal reduction in output. Rather, changes in output caused by pollution control expenditures would include increases in some industries along with declines in others.

- Output declines occur in cases where industries increase prices to cover their higher costs, and consumers respond by demanding less of the affected product. In these cases, the higher costs would generally reflect "annualized costs," not the full capital cost used by CIBO.
- Meanwhile, output in other industries will increase. As EPA noted, in the Administrator's September 28 letter to Senator Landrieu, expenditures on pollution control are not simply a loss to the economy: they stimulate demand and provide jobs in the pollution control sector.³⁵

Thus, the assumption that output declines by \$20.7 billion at the base of CIBO's analysis is flawed. As a result, little credence can be placed in CIBO's estimate of job losses.

The NACAA Critique

An analysis by the National Association of Clean Air Agencies (NACAA),³⁶ the association that represents state and local air pollution control agencies, cites other flaws in the CIBO study. In addition to echoing the critiques above—that CIBO included no estimates of economic or health benefits and treated one-time costs as recurring expenses—NACAA raises two other major points. First, NACAA maintains, CIBO exaggerated the cost of the proposed rules by overestimating the number of sources that must be controlled: CIBO's estimate of the number of sources that must be controlled is "grossly in error,"³⁷ according to NACAA, because CIBO assumed that any source for which there were no emissions data would have to install controls.

³³ Regulatory Impact Analysis, pp. 1-2 and 4-6 to 4-9.

³⁴ CIBO study, p. 11.

³⁵ Letter of EPA Administrator Lisa P. Jackson to Senator Mary L. Landrieu, September 28, 2010, p. 3. Others have also discussed the CIBO study's failure to account for the increased output in the pollution control industry, along with other criticisms of the study. See, for example, Laurie Johnson, "Boiler Industry's Junk Economic Analysis of Proposed EPA Toxic Emission Standards for Industrial Boilers," NRDC Switchboard, http://switchboard.nrdc.org/blogs/ljohnson/boiler_industrys_junk_analysis.html.

³⁶ National Association of Clean Air Agencies, *EPA's Proposed Regulations on Hazardous Air Pollutants from Boilers*, December 8, 2010 (hereafter "NACAA study"), at <http://www.4cleanair.org/Documents/EVALUATIONOFCIBOSTUDYFINAL12082010.pdf>.

³⁷ NACAA study, p. 5.

NACAA collected stack test data for boilers in 2008 in order to develop a model Boiler MACT permit for use by the states, and thus is the source of much of the existing emissions information. Using the existing data sets, NACAA looked at coal-fired boilers and found that 87% of the 39 units for which there were emissions data already meet EPA's proposed standard for carbon monoxide. In developing its cost estimates for the coal-fired units, however, CIBO assumed that none of the remaining 146 (untested) units in the subcategory would meet the proposed standard, and thus they would all have to install additional controls. Second, NACAA concluded that the available data "reveal a continuum of emissions performance where there are substantial numbers of units whose emissions are within 10 to 40 percent of the proposed standard...." For many of these units "it should be anticipated that minor changes, such as blending in small amounts of clean fuel, will suffice in lieu of major capital projects."³⁸

Furthermore, according to NACAA, EPA data show a large number of sources that are capable of burning a variety of fuels. This creates "significant opportunities to reduce capital costs by shifting the mix of fuels combusted," according to NACAA, a lower-cost compliance strategy that both CIBO and EPA did not consider. NACAA provides numerous examples of how such strategies might be used by different types of boilers.³⁹

The AF&PA Study

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.⁴⁰ The AF&PA study concluded that the Boiler MACT alone would cost 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.

Some General Thoughts on Cost and Economic Impact

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 September 2010 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."⁴¹ The National Association of Clean Air Agencies reached the same conclusion: "Pre-regulation estimates by industry sources have historically overstated the cost of compliance with proposed regulations, often by substantial amounts." The NACAA report cites the Clean Air Act's acid rain program, catalytic converters on automobiles, the removal of lead additives from gasoline, the replacement of ozone-depleting substances in air conditioners, and the impacts of the 1997 National Ambient Air Quality

³⁸ Ibid.

³⁹ Ibid., pp. 9-10.

⁴⁰ 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."

⁴¹ 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>.

Standards for ozone and particulate matter as examples of major regulatory programs whose costs were overestimated.⁴²

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."⁴³ 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.⁴⁴

As noted earlier, the Administrator concluded that the agency's final standards "will most assuredly differ from the proposed ones." She went on to state: "The Clean Air Act does not place our need to increase employment in conflict with our need to protect public health. EPA's final standards will not either."⁴⁵

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."⁴⁶ 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 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."⁴⁷

⁴² NACAA study, p. 4.

⁴³ Letter of EPA Administrator Lisa P. Jackson to Senator Mary L. Landrieu, September 28, 2010, p. 3.

⁴⁴ *Ibid.*, p. 2.

⁴⁵ Letter of EPA Administrator Lisa P. Jackson to Senator Mary L. Landrieu, September 28, 2010, p. 3.

⁴⁶ 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.

⁴⁷ *Ibid.*

NACAA's comments also argue that EPA set several of the standards at levels that are more lenient than the MACT floor. The NACAA study provides details on two of these, the carbon monoxide and mercury standards for coal-fired boilers.⁴⁸

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."⁴⁹ 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 to people exposed to levels 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

⁴⁸ NACAA study, pp. 5-8.

⁴⁹ Boiler MACT proposal, p. 32011.

substantial public health benefits that would be foregone if the agency set a less stringent standard.⁵⁰

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.⁵¹

Given EPA's explanation of its stance in the proposal's *Federal Register* notice, however, it would be difficult for the agency to 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.⁵²

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."⁵³

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

⁵⁰ For more information on the 112(d)(4) issue, see the discussion in the Boiler MACT proposal at 75 Federal Register 32030-32033, June 4, 2010.

⁵¹ Letter of Senator Mary L. Landrieu at al. to EPA Administrator Lisa Jackson, September 24, 2010, p. 2.

⁵² The area source proposal is at 75 *Federal Register* 31896, June 4, 2010.

⁵³ 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.”⁵⁴

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.⁵⁵ 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 at area source boilers is summarized in **Table 2**.

Table 2. Annualized 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.

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.

Related Rules on Solid Waste Incineration

The Boiler MACT and the Area Source Rule were two of four related rules that EPA proposed the same day. The other two rules are projected to have far less impact than the Boiler MACT, but they address the issues that were at the heart of the court decision that overturned and remanded the boiler rules in 2007. As noted earlier, the U.S. Court of Appeals for the D.C. Circuit, in

⁵⁴ 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.

⁵⁵ Regulatory Impact Analysis, pp. 3-2 and 3-3.

Natural Resources Defense Council v. EPA, found that EPA had wrongly excluded many industrial boilers from the definition of solid waste incinerators, which have more stringent emissions requirements under Section 129 of the Clean Air Act.⁵⁶ Thus, the agency proposed two rules on June 4 dealing with incineration of solid waste in boilers, in addition to the Boiler MACT and Area Source rules: first, a rule on the Identification of Non-Hazardous Secondary Materials that Are Solid Waste,⁵⁷ and second, a rule that would set emission standards for Commercial/Industrial Solid Waste Incinerators (the “CISWI Rule”). The first rule identifies solid waste, and the second sets emission standards for the facilities that burn it.

Defining Solid Waste

The purpose of this rule is to clarify which materials are considered solid waste when burned in combustion units and which are not. To be considered solid waste, the basic criterion is whether the material has been discarded. Discarded materials are generally considered solid waste; other materials are not. But some discarded materials can still avoid classification as waste if they meet a number of what EPA calls “legitimacy criteria”:

1. if the material is managed as a valuable commodity;
2. if the material has meaningful heating value (or, for a material considered an ingredient, if it makes a useful contribution to the production or manufacturing process); and
3. if the material contains contaminants at levels comparable to or lower than traditional fuels or ingredients.

Non-hazardous secondary materials that meet the legitimacy criteria, such as the following, would not be considered solid waste under the proposal :

- material used as a fuel that remains within the control of the generator (whether at the site of generation or another site the generator has control over);
- material used as an ingredient in a manufacturing process (whether by the generator or a third party);
- material that has been sufficiently processed to produce a fuel or ingredient product; and
- material that has been determined through a case-by-case petition process to not have been discarded and to be indistinguishable in all relevant aspects from a fuel product.

Controversy over this rule has centered on how EPA would interpret these criteria for certain recovered materials that are commonly used as fuel, particularly “off-spec” used oil and whole scrap tires. The proposed rule does not specifically identify these materials as solid waste. However, in the preamble to the proposal, EPA does identify these materials as solid waste even when they are used as fuel.

⁵⁶ *Natural Resources Defense Council v. EPA*, 489 F. 3d 1250, 1257–61 (DC Cir. 2007).

⁵⁷ 75 *Federal Register* 31844, June 4, 2010.

Used Oil

EPA defines used oil as either complying with limits for contaminants of concern (“on-spec”) or not (“off-spec”). On-spec oil is exempt from waste management regulations, because the contaminants in it are either at the same concentration or at a lower concentration than in virgin refined fuel oil. Off-spec used oil, on the other hand, even if it is managed within the control of the generator, contains contaminants at levels that are not comparable to traditional fuels, and thus would not be considered a non-waste fuel under the legitimacy criteria described above.

Under previous regulations promulgated under the Resource Conservation and Recovery Act (RCRA, 40 CFR part 279), off-spec used oil could be burned in used oil-fired space heaters, provided that, in EPA’s words:

(1) The heater burns only used oil that the owner or operator generates or used oil received from household do-it-yourself used oil generators; (2) the heater is designed to have a maximum capacity of not more than 0.5 million Btu per hour; and (3) the combustion gases from the heater are vented to the ambient air. The RCRA used oil regulations base this provision on a finding that uncontrolled emissions from these sources do not pose a significant threat to human health and the environment. (Used Oil Final Rule, 50 FR 49194 (November 29, 1985).) However, consistent with our determination that off-spec used oil be considered a solid waste when burned as a fuel, we believe that off-spec used oil managed within the control of the generator would not qualify for the generator controlled exclusion when burned in a used oil fired-space heater, since contaminant levels are not comparable to traditional fuels. Therefore, we are proposing that off-spec used oil combusted at a unit that is within the control of the generator would be solid waste.⁵⁸

If the used oil is classified as solid waste, then the space heater would have to meet the “CISWT” incinerator standards described below, which no space heater is likely to meet.

Most used oil is considered on-spec, but unless there is a general exclusion such as that written into the existing RCRA regulations, it would be necessary to test the oil before burning it in a space heater. Doing so would be costly and impractical. Thus, the proposed regulations would seem to have the practical effect of banning the use of waste oil in space heaters.

The proposal contradicts the existing RCRA regulations, but does not specifically repeal them. As a result, the Code of Federal Regulations would contain two conflicting sets of rules applicable to the combustion of used oil.

Scrap Tires

The rule also imposes new restrictions on the use of scrap tires as fuel:

... whole used tires (even if collected from tire dealerships and automotive shops and overseen by a state tire collection oversight program) are initially abandoned and thus meet the plain meaning of discard. As a result, whole used tires that are not processed into a legitimate fuel or ingredient (e.g., shredded/chipped with steel belts removed) would be considered a solid waste. We acknowledge that whole tires can be legitimately burned as fuel, but because they have been discarded, whole tires would be considered solid wastes and

⁵⁸ U.S. EPA, “Identification of Non-Hazardous Secondary Materials that Are Solid Waste; Proposed Rule,” 75 *Federal Register* 31865, June 4, 2010.

subject to the CAA section 129 requirements unless processed into a non-waste fuel product.⁵⁹

As with used oil, this would be a change from current policy and would affect the use of scrap tires as fuel.

EPA received over 1,500 comments on the proposed solid waste definitions rule.

The CISWI Rule

The Commercial/Industrial Solid Waste Incinerator (CISWI) rule proposed on June 4 would set emission standards for commercial and industrial facilities that burn materials determined to be solid waste (i.e., materials that do not meet the above criteria). CISWI's emission standards are required to be set under Section 129 of the Clean Air Act, which has more stringent requirements than Section 112. In addition to the five groups of pollutants addressed by the Boiler MACT, the CISWI rule sets emission limits for lead, cadmium, sulfur dioxide, and nitrogen oxides. Section 129 also makes no distinction between major sources and area sources, thus setting the more stringent MACT standards for smaller facilities.

EPA identified five subcategories of CISWI facilities: incinerators, energy recovery units, waste burning kilns, burn-off ovens, and small remote incinerators—a total of 176 existing facilities. The agency estimates that for some units, it would be more cost-effective to use an alternative disposal option than to install emission controls. If those units used alternative disposal options, and the remainder used add-on controls, the total nationwide annualized costs would be approximately \$216 million. If all 176 currently operating CISWI used add-on controls, the total nationwide cost for complying with the rule would be approximately \$244 million per year, according to the agency.

Controversy over this proposal has focused on the burn-off oven subcategory. Burn-off ovens, as defined by EPA, are units that combust residual materials off racks, parts, drums or hooks so that those items can be re-used in various production processes. Operators of such facilities believe that they should not be characterized as incinerators, but should be considered boilers, subject to either the Boiler MACT or the Area Source rule.

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⁵⁹ Ibid, p. 31864.