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VIA ELECTRONIC SUBMISSION

Environmental Protection Agency
Attn: Brian Shrager and Mary Johnson, Office of Air Quality Planning and Standards
Charlene Spells and Toni Jones, Natural Resources and Commerce Group

Subject: Comments on Proposed National Emissions Standards for Hazardous Air Pollutants for Boilers and Process Heaters and Commercial/Industrial Solid Waste Incinerators, 75 Fed. Reg. 31,896, 31,938, & 32,006 (June 4, 2010), Docket Nos. EPA–HQ–OAR–2002–0058, –2003–0119, & –2006–0790

The Institute for Policy Integrity submits the following comments on the Proposed National Emissions Standards for Hazardous Air Pollutants for Boilers and Process Heaters and Commercial/ Industrial Solid Waste Incinerators (collectively the "Proposed Rules") released by the Environmental Protection Agency ("EPA") on June 4, 2010.

The Institute for Policy Integrity at New York University School of Law is a non-partisan think tank dedicated to improving the quality of government decisionmaking through advocacy and scholarship in the fields of administrative law, economics, and public policy.

EPA has proposed three related actions under Sections 112 and 129 of the Clean Air Act ("CAA"), hereinafter referred to as the Major Source Proposal, the Area Source Proposal, and the Incinerator Emissions Proposal.[1] While these proposals make significant progress within the existing structure of the Clean Air Act, the current statutory framework is excessively complex. A set of local market-based programs would be more economically efficient while meeting the same environmental goals. Such a program would solve many of the regulatory issues that EPA is now facing. However, the current statute likely does not give EPA discretion to implement such programs. EPA should make recommendations to Congress that would give them that authority.

Short of that, EPA can still strengthen the existing proposals to maximize net social benefits. In the final rulemakings, EPA should make the following changes:

- Issue any additional or different "beyond-the-floor" standards that maximize net social benefits, as allowed by Section 112(d)(2) of the Clean Air Act and directed by Executive Order 12,866;
- Choose an economically rational definition for "cost-effective energy conservation measure," because the current proposed definition is not sound statutorily or economically;
- Require implementation of cost-effective energy conservation measures identified in the energy assessments;

[1] The full rule titles are: National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters; National Emission Standards for Hazardous Air Pollutants for Area Sources: Industrial, Commercial, and Institutional Boilers; and Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Commercial and Industrial Solid Waste Incineration Units.

- Require an energy assessment after several years for new units, and require energy assessments to be repeated every several years;
- Extend the time horizon of the Regulatory Impact Analysis, to more accurately capture the full range of costs and benefits;
- Further analyze the possible benefits of fuel switching as a compliance mechanism; and
- Fix any mistakes in the discounting formulas for emissions averaging.

I. Overview of Section 112 and the Need for More Flexible Statutory Authority

The current statutory scheme for the regulation of hazardous air pollutants under Section 112 of the Clean Air Act entails a complex array of determinations. A regulatory structure based on market principles could be significantly more efficient, but Congress would likely have to amend the statute to more explicitly grant this kind of flexibility. EPA should make such recommendations to Congress.

The Current Statutory Scheme

Section 112 of the CAA lays out a comprehensive scheme for the regulation of hazardous air pollutants (collectively known as "HAP") from stationary sources across the United States. First, this scheme divides stationary sources which emit (or have the potential to emit) HAP into two categories: major sources and area sources. Major sources are those which emit at least 10 tons per year of any given hazardous air pollutant or 25 tons per year of all hazardous air pollutants combined. Area sources are sources whose emissions do not reach those thresholds. Section 112(b) specifies a list of hazardous air pollutants and a method for changing this list. Section 112(c) gives EPA authority to list categories and subcategories of sources that must be regulated under Section 112. Industrial and commercial combustion of coal, oil, and biomass are listed categories for both major sources and area sources. However, industrial and commercial combustion of natural gas is only covered for major sources and not area sources.[2]

For each listed category of sources, EPA must set emissions standards under Section 112(d)(2) that require:

> the maximum degree of reduction in emissions of the hazardous air pollutants subject to this section (including a prohibition on such emissions, where achievable) that the Administrator, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable. . . .[3]

These standards are known as "maximum achievable control technology" ("MACT"). Section 112(d)(3) sets a minimum emissions standard for each source category ("MACT floor"). The MACT floor standard for new sources is "the emission control that is achieved in practice by the best

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[2] *See* 42 U.S.C. § 7412 (2010) [hereinafter CAA § 112]; National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters, 40 C.F.R. pt. 63(DDDD) (2010). Institutional sources are covered under the umbrella of "commercial."

[3] This process is subject to several statutory exceptions, two of which are used in these proposed rules. For all sources, if the Administrator determines that the standard under Section 112(d) is "not feasible," she may instead issue a "work practice" standard under Section 112(h). "Not feasible" under this subsection is defined as either contrary to another national, state, or local law or "application of measurement methodology to a particular class of sources is not practicable due to technological and economic limitations." CAA § 112(h)(2)(A)-(B). For area sources, the Administrator may instead elect to require "generally available control technologies or management practices." CAA § 112(d)(5). However, Section 112(c)(6) mandates that, for certain HAP including mercury, ninety percent of aggregate emissions must be covered by a MACT standard under Section 112(d)(2) or a health threshold standard under Section 112(d)(4).

controlled similar source." For existing sources, the standard is the average of the top 12% of existing sources if there are more than 30 sources in the subcategory or the average of the top 5 performing sources otherwise. After setting the MACT floor, EPA must also consider more stringent "beyond-the-floor" control measures that are justified under the statutory criteria of Section 112(d)(2).

In its proposed rules, EPA is requiring most new and existing major industrial, commercial, and institutional boilers and process heaters to meet numerical emissions limits as a "MACT floor"; existing major sources must also meet the "beyond-the-floor" requirement of a one-time energy assessment to identify cost-effective energy conservation measures.[4] For area sources, the larger new and existing boilers must meet numerical emissions limits; large, existing area sources must also perform a one-time energy assessment to identify cost-effective energy conservation measures.[5]

Section 129 details separate but substantially similar standards for the regulation of industrial and commercial facilities that combust "solid waste." While these comments mostly focus on the Major Source Proposal and Area Source Proposal under Section 112, EPA should consider how these arguments may also apply to the Incinerator Emissions Proposal under Section 129.[6]

More Statutory Flexibility Could Increase Regulatory Efficiency

The current statutory structure forces EPA to undertake a complex series of determinations and, almost inevitably, to favor command-and-control regulations. The result is a protracted regulatory process, which often produces policies that fail to maximize net social benefits. Instead, it would be more efficient and rational to impose taxes on emissions of hazardous air pollutants or to design a set of local, marketable pollution permit programs. Under these market-based regulatory programs, sources that could reduce their pollution most cheaply would do so, while the others would pay taxes or buy permits, thus achieving emissions reductions at the lowest marginal cost. While the standard marketable pollution regime (such as the Title IV Acid Rain program) may not translate seamlessly to the control of local pollutants (like HAP), it is possible to design modified programs that reap the economic and environmental benefits of a flexible system while minimizing potential problems, such as "hot spots."[7]

Though some have argued that market-based mechanisms are already allowed or even envisioned by many provisions of the Clean Air Act,[8] EPA has struggled in the past to read permission for a cap-

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[4] National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters, 75 Fed. Reg. 32,006, 32,012 (proposed June 4, 2010) (to be codified at 40 C.F.R. pt. 63) [hereinafter Major Source Proposal]. Work practice standards are prescribed for certain boilers in lieu of the numerical limits. *Id.*

[5] National Emission Standards for Hazardous Air Pollutants for Area Sources: Industrial, Commercial, and Institutional Boilers, 75 Fed. Reg. 31,896, 31,901 (proposed June 4, 2010) (to be codified at 40 C.F.R. pt. 63) [hereinafter Area Source Proposal]. Work practice standards are prescribed for smaller area boilers in lieu of the numerical limits. *Id.*

[6] One main difference compared to Section 112 is that Section 129 does not contain any exemptions (e.g., the work practice standards under Section 112(h)), but the Administrator is allowed to set different standard for different "classes, types. . . and sizes of units" when setting emission limits.

[7] *See, e.g.*, Jonathan Remy Nash & Richard L. Revesz, *Markets and Geography: Designing Marketable Permit Schemes to Control Local and Regional Pollutants*, 28 ECOLOGY L.Q. 569 (2001).

[8] *See* Inimai M. Chettiar & Jason A Schwartz, *The Road Ahead: EPA's Options and Obligations for Regulating Greenhouse Gases* at 65-67 (Policy Integrity Report No. 3, 2009) (interpreting CAA terms like "emission standard" and "emission control" to allow market-based mechanisms); *see* CAA § 112(d)(3) (using terms like "emission standards" and "emission control").

and-trade program into Section 112(d).[9] Therefore, the most straightforward solution would be for Congress to pass a new law explicitly granting such authority. Congress has considered similar changes to increase the statutory flexibility of other sections of the Clean Air Act,[10] and Congress has specifically asked for EPA to report to it on the status of standard-setting under Section 112(d).[11] EPA should advise Congress of the need and potential for such legislative fixes, to give the agency the flexible authority under Section 112 to tackle the environmental problems of the twenty-first century with twenty-first century solutions.

II. EPA Should Set Emissions Standards that Maximize Net Social Benefits

Given the mandate from Executive Order 12,866, EPA's default practice should be to design regulations that maximize net social welfare, unless directly forbidden by statute. Since Section 112(d)(2) cannot be read to prohibit such a goal, the agency should pursue any beyond-the-floor regulations where benefits justify the costs. This interpretation is not forbidden by the D.C. Circuit opinion in *Sierra Club v. EPA* (2004), and EPA's regulatory impact analysis indicates that, particularly for the Major Source Proposal, more stringent emission standards than those currently proposed would increase social welfare.

Section 112(d) Gives EPA Legal Authority to Pursue Welfare-Maximizing Regulations

Section 112(d)(2) requires emissions standards to reflect "the maximum degree of reductions in emissions. . . that the Administrator, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable." The stringency of EPA's beyond-the-floor regulations therefore depends on the definition of "achievable." Statutory structure and legal precedent suggest that EPA has authority to define "achievable" in light of costs and benefits.

In the past, EPA has interpreted Section 112(d)(2) not to require consideration of the full range of benefits from curtailing HAP emissions. In *Sierra Club v. EPA* (2004), the D.C. Circuit accepted that interpretation, finding that the phrase "non-air quality health and environmental impact" did not require consideration of the negative social effects from the deposition of HAP emissions.[12] But EPA's past interpretations do not preclude rethinking the appropriate definition of "achievable." The *Sierra Club* decision was largely based on deference to an agency interpretation of an ambiguous term. Under the Supreme Court doctrine established by *Chevron v. NRDC*, courts will uphold any reasonable agency interpretation of an ambiguous term, regardless of whether it is the "best" or "most reasonable" interpretation.[13] So long as the reinterpretation is neither arbitrary nor

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[9] *See* Proposed National Emission Standards for Hazardous Air Pollutants; and, in the Alternative, Proposed Performance Standards for New and Existing Stationary Sources: Electric Utility Steam Generating Units, 69 Fed. Reg. 4652, 4661-62 (proposed Jan. 30, 2004) (proposing—as alternatives to command-and-control regulation under § 112(d)—to develop a cap-and-trade program for utilities under either § 112(n) or § 111, presumably because a cap-and-trade would not work under § 112(d)). Note that in striking down the final version of that rule, the D.C. Circuit Court of Appeals did not rule on the validity of a cap-and-trade program under either § 111 or § 112, *see* New Jersey v. EPA, 517 F.3d 574 (D.C. Cir. 2008).

[10] For example, Senator Voinovich has proposed giving EPA authority under § 111 to enact a "multistate emissions trading program" for sulfur dioxide and nitrogen oxides. *See* Draft Voinovich Legislation at http://www.eenews.net/features/documents/2009/07/31/document_daily_01.pdf.

[11] CAA § 112(s).

[12] 353 F.3d 976, 990 (D.C. Cir. 2004). Instead, "non-air quality health and environmental impacts" meant any negative social effects caused by industry compliance with potential regulation, not those effects caused by the original pollution.

[13] Chevron U.S.A. Inc. v. Natural Resources Defense Council, Inc., 467 U.S. 837, 843-844 (1984).

capricious, it is perfectly acceptable for EPA to issue another reasonable interpretation of Section 112(d)(2)[14]—for example, one that balances costs and benefits.

The Court in *Sierra Club* also believed that the Clean Air Act's statutory structure indicated that Section 112(d) required technology-based instead of risk-based regulations, but that framework is not inconsistent with defining "achievable" in light of costs and benefits. Specifically, *Sierra Club* found:

> [T]here is no apparent reason to suppose that Congress would have required immediate consideration of health and environmental impacts caused by, say, deposition of HAPs, while postponing consideration of the more direct health and environmental impacts caused by emission of HAPs into the air until the second stage of standard promulgation under the CAA. As discussed, the 1990 Amendments established a two-phase approach to promulgating emission standards. The first phase—at issue in this case—requires a technology-based approach. [CAA § 112(d).] The second phase occurs eight years later and involves a risk-based approach. [CAA § 112(f)(2)(A)]("Emissions standards promulgated under this subsection shall provide an ample margin of safety to protect public health. . ."). That risk-based analysis requires EPA to consider, inter alia, public health and adverse environmental effects—precisely what Sierra Club contends EPA must consider now with respect to non-air quality impacts. Sierra Club's interpretation would collapse the technology-based/risk-based distinction at the heart of the Act, undermining the central purpose of the 1990 Amendments—to facilitate the near-term implementation of emission standards through technology-based solutions. In doing so, that interpretation would reintroduce the very problem Congress sought to exorcize—that the pursuit of the perfect (risk-based standards) had defeated timely achievement of the good (technology-based standards). EPA's reading of the statute is reasonable.[15]

First, the distinction between *requiring* the consideration of "direct health and environmental impacts" and *allowing* their consideration should be emphasized. Section 112(f) requires the consideration of these impacts, but Section 112(d)(2) certainly allows them. Recently, in *Entergy v. Riverkeeper*, the Supreme Court affirmed that just because a statute does not require analysis of costs or benefits does not necessarily mean an agency cannot perform cost-benefit analysis.[16]

Second, *Entergy* more generally supports the proposition that broad statutory language allows EPA to weigh the social costs and benefits of regulation unless doing so is directly contrary to the statute. The text of Section 112(d) explicitly requires the consideration of costs,[17] and no language in Section 112(d) prohibits the consideration of benefits. To the contrary, Section 112(d)(4) indicates that EPA is allowed to consider benefits: if a pollutant has an established health threshold, such that additional emissions reductions will not deliver additional health benefits, EPA may consider that benefits threshold when determining which standards are the "maximum. . . achievable" required under Section 112(d)(2).[18] In order words, the statute explicitly allows

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[14] *See* Nat'l Cable & Telecomm. Assoc. v. Brand X Internet Services, 545 U.S. 967 (2005) (explaining that *Chevron* review applies to agency changes of legal interpretations, quoting *Chevron*, 467 U.S. at 865-66); *id.* at 981-82 (Rehnquist, J., concurrent in part, dissent in part) (explaining that changes in administration are legitimate grounds for changing agency interpretations).

[15] 353 F.3d at 990.

[16] 129 S.Ct. 1498, 1509 (2009).

[17] Additionally, it should be noted that "non-air quality health and environmental impacts" are societal costs and are not experienced by the parties themselves.

[18] CAA § 112(d)(4) ("With respect to pollutants for which a health threshold has been established, the Administrator may consider such threshold level, with an ample margin of safety, when establishing emission standards under this subsection.").

consideration of benefits when defining "achievable" in certain contexts, and so does not prohibit consideration of benefits. Given the broad statutory language, the lack of a prohibition, and the overall purpose of the statute—"to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population"[19]—EPA has authority to interpret Section 112(d) to allow the consideration of costs and benefits.

Finally, some consideration of costs and benefits under Section 112(d) will not disrupt the structural distinctions found by the Court in *Sierra Club*. Section 112(f) remains a different, risk-based provision, in particular because its language on public health standards almost certainly excludes consideration of costs, under *Whitman v. American Trucking Association*. The operative language of Section 112(f) is:

> Emission standards promulgated under this subsection shall provide an ample margin of safety to protect public health. . .unless the Administrator determines that a more stringent standard is necessary to prevent, taking into consideration costs, energy, safety, and other relevant factors, an adverse environmental effect.[20]

Obviously, this subsection requires consideration of costs when determining whether a more stringent environment-based standard is required, but it does not require consideration of costs in determining the standard based on public health. In *American Trucking*, the Supreme Court ruled that Section 109 of the CAA (with language similar to Section 112(f)'s public health-based standard)[21] precluded the consideration of costs.[22] More generally, *American Trucking* stands for the proposition that, depending on statutory context unique to certain sections of the CAA, neglecting to require the consideration of costs—as in the first part of Section 112(f)—may be tantamount to prohibiting the consideration of costs.[23]

The interpretation described above would maintain a four-part structure when applying Section 112(d) and Section 112(f) together. Section 112(d)(3) mandates a technology-based floor. Section 112(d)(2) gives EPA discretion to go beyond this floor, to achieve the "maximum degree of reduction. . .achievable" in light of costs and benefits. Section 112(f)(2)(A) then has two parts: first, a health-based standard where EPA is prohibited from considering costs; and second, an environmental risk-based standard where EPA must consider costs to determine whether to go beyond the health-based standard. This interpretation preserves *Sierra Club*'s distinction between the two stages of the standard-setting process.

The D.C. Circuit's other concern in *Sierra Club* was the timely promulgation of standards under Section 112(d). EPA should already have all the data it needs to reconsider whether additional or different beyond-the-floor standards would better maximize net social benefits. This change should not appreciably disturb the 2013 timeline for requiring compliance with the new standards.

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[19] 42 U.S.C. § 7401(b)(1).

[20] CAA § 112(f)(2)(A).

[21] *Compare* CAA § 109(b)(1) ("National primary ambient air quality standards, prescribed under subsection (a) of this section shall be ambient air quality standards the attainment and maintenance of which in the judgment of the Administrator, based on such criteria and allowing an adequate margin of safety, are requisite to protect the public health.").

[22] 531 U.S. 457 (2001).

[23] In *Entergy v. Riverkeeper*, this more general proposition is explained: "In *American Trucking*, we held that the text of § 109 of the Clean Air Act, 'interpreted in its statutory and historical context. . .unambiguously bars cost considerations' in setting air quality standards under that provision. The relevant 'statutory context' included other provisions in the Clean Air Act that expressly authorized consideration of costs, whereas § 109 did not." *Entergy*, 129 S.Ct. at 1508 (citation omitted).

In addition, EPA may be foregoing significant net benefits for every year after 2013 by under-regulating. Surely it would be worth a small delay to ensure that this does not happen.

To conclude, EPA has legal authority to reinterpret the language of Section 112(d) to allow the consideration of costs and benefits when selecting the maximum emissions reduction achievable. As shown in the next section, given administration-wide policy, EPA should exercise that authority to maximize net social benefits under Section 112(d).

Administration Policy Requires EPA to Pursue Welfare-Maximizing Regulations

Given the rationales for public regulation of private entities and the directives of Executive Order 12,866, EPA should interpret Section 112(d) to allow the agency to set all emissions standards that maximize net social welfare.

Typically, entities will not voluntarily reduce their own HAP emissions because they do not pay the full costs of those emissions. Air pollution is a classic "negative externality": the harmful effects of pollution are mostly felt by members of the public who cannot directly influence the production of that pollution. Basic micro-economics holds that when an entity does not pay for an effect it produces, its optimal behavior will not take that effect into consideration. In the status quo, major and area sources of HAP do not pay for the full effect of their emissions.[24] Because there are positive costs (both health effects and environmental effects) from the emission of HAP and regulated entities are not paying for these costs, these entities are currently "over-producing" HAP emissions.

The existence of a negative externality does not necessarily dictate that all HAP emissions must be eliminated. Rather, society should be willing to pay for any change which produces higher benefits than costs. The costs of regulating HAP emissions will be passed from individual sources to society as a whole in a variety of ways: consumers may face higher prices as the cost of production rises; business owners and investors may lose income as regulated entities lose profits; government entities that operate regulated boilers may have to increase taxes or decrease their expenditures in other areas. A wide variety of benefits will counteract these costs, including decreased mortality from lower particulate matter emissions. If the benefits of the proposed rule are higher than the costs, society as a whole is better off.

The goal of maximizing net benefits is enshrined in administration-wide policy under Executive Order 12,866. The Order directs federal agencies to "assess all costs and benefits of available regulatory alternatives" in deciding how to regulate, and then "select those approaches that maximize net benefits. . . unless a statute requires another regulatory approach."[25] Since, as demonstrate above, EPA has statutory authority to consider net benefits under Section 112(d), the directives of Executive Order 12,866 apply.

More Stringent Standards Are Likely Required to Maximize Net Benefits

If more stringent standards did not increase social welfare, EPA would be justified in solely using the "MACT floor" emission standards, as determined by Section 112(d)(3). But the figures presented in the EPA's regulatory impact analysis ("RIA") indicate that this may not be the case.

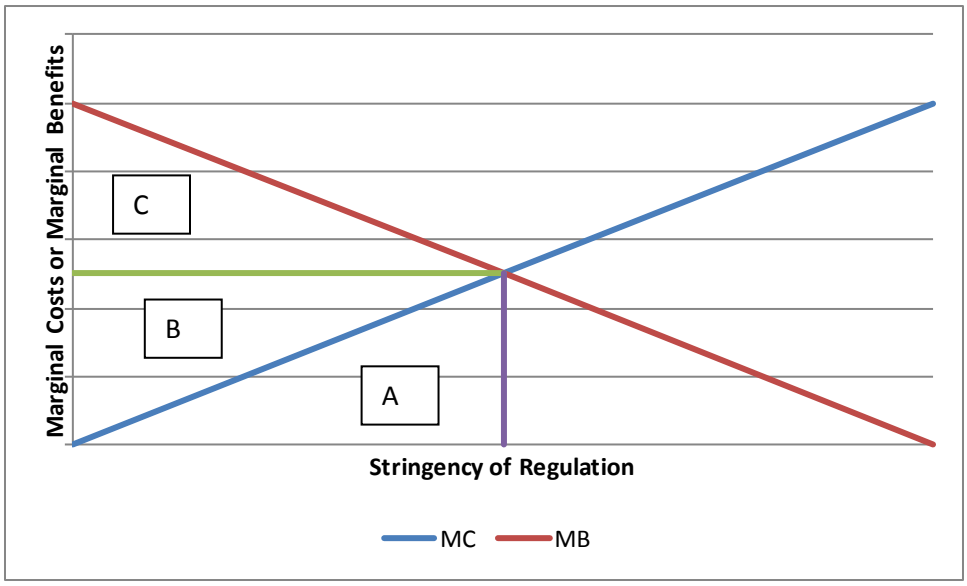
High ratios of benefits to costs may indicate under-regulation. Figure 1 shows a graphical depiction of the marginal costs and benefits of a hypothetical optimized regulation, where the stringency of the regulation has been set to equalize marginal costs and marginal benefits. Area A (the area

[24] Some entities that will be regulated under the rule may currently pay for emissions which are correlated with the emission of HAP (e.g., sulfur dioxide). While this may encourage some reductions in HAP, it will not necessarily lead to the optimal amount of reductions.

[25] Exec. Order No. 12,866 §1, 58 Fed. Reg. 51,735 (1993).

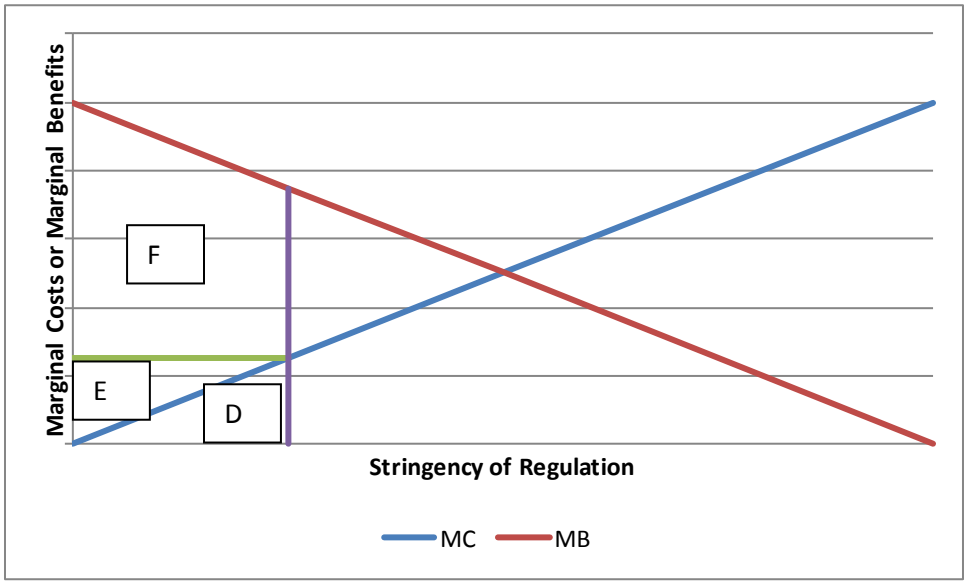
underneath the marginal cost curve) represents the total social costs of the regulation. The combination of Areas A, B, and C (the total area underneath the marginal benefit curve) represents the total social benefits of the regulation. In this simple linear example, this gives a ratio of 3:1 for total benefits to total costs.

Figure 1. Depiction of Hypothetical Optimized Regulation



By contrast, Figure 2 shows a graphical depiction of the marginal costs and benefits of a hypothetical scenario of under-regulation, where marginal costs have been set well below marginal benefits. Area D (the area underneath the marginal cost curve) represents the total social costs of the regulation. The combination of Areas D, E, and F (the total area underneath the marginal benefit curve) represents the total social benefits of the regulation. In this example, the ratio of total benefits to total costs is 7:1.

Figure 2. Depiction of Hypothetical Under-Regulation



These twin examples show how under-regulation leads to a higher ratio of total benefits to total costs.

Table 1 shows the costs and benefits of the Major Source Proposal and Area Source Proposal at a discount rate of 7%.[26]

Table 1. Total Costs and Benefits of Proposed Major and Area Source Rules at 7% Discount Rate (Millions of 2008$)

	Major Source Rule		Area Source Rule	
	Low Estimate	High Estimate	Low Estimate	High Estimate
Total Social Benefits	15,000	37,000	910	2,200
Total Social Costs	2,900	2,900	500	500
Ratio	5.17	12.76	1.82	4.40

Source: raw data from pp. 6-31 to 6-32 of RIA; calculations by Policy Integrity

Given the range of benefit estimates, the ratio of benefits to costs is between 5 and 13 for the Major Source Proposal and between 1.8 and 4.4 for the Area Source Proposal. As demonstrated by the simple example above, this may indicate that the agency is under-regulating in at least the Major Source Proposal. The RIA also excludes many highly significant benefits categories that the agency did not have the time or analytical ability to quantify.[27] This means that the true benefit-to-cost ratios are almost certainly higher than those indicated by the table.

While the RIA indicates that there are no additional benefits from regulating major sources with heat input capacity under 10 MMBtu/hr,[28] this does not show that the costs of additional emissions standards on sources with heat input capacity over 10 MMBtu/hr are higher than the benefits. EPA should analyze whether alternative regulatory structures—in light of all quantified and un-quantified benefits—would better maximize net benefits.

III. EPA Should Fix The Flawed Definition of "Cost-Effective" Energy Conservation Measures

For some existing major and area sources, EPA has proposed requiring an "energy assessment" to identify "a list of energy conservation measures."[29] While the proposed regulations do not require implementation of any of the energy conservation measures identified, they do define "cost-effective energy conservation measures" as any measure with "a payback (return of investment) period of two years."[30]

That definition is fatally flawed statutorily and unjustified economically. If implementation of these measures is not required, there is arguably no need to define "cost-effective," and thus no definition should be issued. But since implementation of these measures is cost-benefit justified and should be required (see *infra*, section IV of these comments), properly defining "cost-effective energy

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[26] Note that choosing the higher discount rate minimizes the ratio in this case.

[27] For example, the RIA concentrates on the health effects related to particulate matter reductions, and "[t]he benefits from reducing hazardous air pollutants have not been monetized in this analysis, including reducing 370,000 tons of carbon monoxide, 37,000 tons of HCl, 1,000 tons of HF, 8.3 tons of mercury, 3,400 tons of other metals, and 1,200 grams of dioxins/furans each year." RESEARCH TRIANGLE INSTITUTE, RTI PROJECT NUMBER 0209897.004.074, REGULATORY IMPACT ANALYSIS: NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FOR INDUSTRIAL, COMMERCIAL, AND INSTITUTIONAL BOILERS AND PROCESS HEATERS at 6-1 (Draft Report, Prepared for EPA, Apr. 2010) [hereinafter RIA].

[28] *Id.* at 6-31.

[29] *See*, *e.g.*, 75 Fed. Reg. at 32,068.

[30] *Id.* at 32,063.

conservation measures" becomes important. The proper definition for that term should be: any energy conservation measure whose net present benefits are greater than zero.

EPA Improperly Looked to the Energy Policy and Conservation Act to Define "Cost-Effective"

The definition of "cost-effective" chosen by EPA is improper for many reasons. There is no need for EPA to look to the Energy Policy and Conservation Act ("EPCA") to define "cost-effective" under the CAA, and there are important differences between the statutes. The definition of "achievable" under Section 112(d) (and thus the subsidiary definition of "cost-effective" if the agency is to require implementation of "cost-effective energy conservation measures") should be based on the statutory text and purposes of the Clean Air Act and not on any part of the EPCA. In addition, the definition chosen by EPA is an improper interpretation of the clause from the EPCA that the agency looked to for guidance. The general context of the EPCA indicates that the clause sets a *floor* for "economically justified" and is not an independently valid definition of the term. Moreover, it is clear from the EPCA that Congress intended "economically justified" to mean cost-benefit justified.

The agency maintains that its proposed definition—"a payback period of two years"—is based on section 325(o)(2)(B)(iii) of the Energy Policy and Conservation Act of 1975.[31] The proposed rules' preamble explains that under this section "there is a presumption that an energy conservation standard is economically justified if the increased installed cost for a measure is less than three times the value of the first-year energy savings resulting from the measure."[32]

First, it is not clear how the agency justifies reading the phrase "three times the value of the first year energy savings" under the EPCA to indicate a two-year payback period. These calculations are distinct in obvious ways.

Second, this interpretation omits crucial parts of the EPCA's statutory scheme. The full text of the cited clause from the EPCA is as follows:

> If the Secretary [of Energy] finds that the additional cost to the consumer of purchasing a product complying with an energy conservation standard level will be less than three times the value of the energy, and as applicable, water, savings during the first year that the consumer will receive as a result of the standard, as calculated under the applicable test procedure, there shall be a rebuttable presumption that such standard level is economically justified. A determination by the Secretary that such criterion is not met shall not be taken into consideration in the Secretary's determination of whether a standard is economically justified.[33]

The final sentence of this clause indicates that a finding that a standard does not meet the criterion cannot even be taken into consideration for whether the standard is "economically justified." Thus, the definition chosen by EPA for "cost-effective" is inappropriate even within the context of the clause they cite to support it.

Third, the cited clause only makes sense in the context of EPCA's Section 325(o)(2)(A):

> Any new or amended energy conservation standard prescribed by the Secretary under this section for any type (or class) of covered product shall be designed to achieve the maximum improvement in energy efficiency . . . which the Secretary determines is technologically feasible and economically justified.[34]

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[31] Codified at 42 U.S.C. § 6295 (2010).

[32] 75 Fed. Reg. at 32,026.

[33] 42 U.S.C. § 6295(o)(2)(B)(iii).

[34] 42 U.S.C. § 6295(o)(2)(A).

In this context, it is clear that the section cited by EPA as justification for the definition of "cost-effective" explicitly sets a *floor* for the Secretary of Energy's determination of "technologically feasible and economically justified," and is not a reasonable definition of "economically justified" or "cost-effective" by itself. More generally, Congress intended "economically justified" to mean cost-benefit justified, because the statute requires the Secretary of Energy to "determine whether the benefits of the standard exceed its burdens."[35]

Ultimately, the EPCA is not an appropriate place to look for a definition under the Clean Air Act at all. First, there are no statutory terms within the relevant sections of Clean Air Act that refer to the EPCA. Second, there is no duplication of statutory terms where proper interpretation would suggest that meanings should be harmonized across the statutes.[36] For example, the EPCA uses "technologically feasible and economically justified" and then lays out criteria to guide the Secretary of Energy for making determinations based on that phrase.[37] None of those criteria or terms is repeated in the Clean Air Act. For purposes of an energy assessment under Section 112(d) of the Clean Air Act, EPA should apply the statutory language of the Clean Air Act and standard economic principles, not the EPCA.

"Cost-Effective" Should be Defined Using Proper Economic Principles

The proposed definition of "cost-effective energy conservation measure" is "a measure that is implemented to improve the energy efficiency of the boiler or facility that has a payback (return of investment) period of two years or less."[38] The agency is requesting comment on "what rate of return should be used" and whether this definition is appropriate "since it refers to payback of energy saving investments without regard to the impact on HAP reduction."[39]

By implicitly limiting the criteria to the private costs and benefits for regulated parties, this definition clearly falls short of the authority EPA has under the best interpretation of the statute (discussed above). Because EPA has authority to consider a fuller range of social costs and benefits in determining which beyond-the-floor regulations are "achievable" under Section 112(d), the definition of "cost-effective" could include social costs and benefits. However, as a practical matter, EPA is likely to exercise its statutory authority to stay focused on private costs and benefits in defining "cost-effective" for these purposes. An energy audit focused on private costs and benefits can still be a crucial element of a broader suite of regulatory policies designed to maximize net social welfare and minimize the negative impacts of HAP emissions. As such, these comments will explore how best to define "cost-effective" considering only private costs and benefits.

Given that it makes sense to define "cost-effective" in this context as reflecting private costs and benefits, it also makes sense to evaluate these costs and benefits in the way that an economically rational firm would value them. This means that all benefits and costs from a project should be

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35 42 U.S.C. § 6295(o)(2)(B)(i).

36 *See, e.g.*, W.V. University Hospitals, Inc. v. Casey, 499 U.S. 83, 100-101 (1991) (looking to other statutes to determine the definition of "attorney's fees").

37 42 U.S.C. § 6295(o)(2)(B)(i)(I)-(VII): "(I) the economic impact of the standard on the manufacturers and on the consumers of the products subject to such standard; (II) the savings in operating costs throughout the estimated average life of the covered product in the type (or class) compared to any increase in the price of, or in the initial charges for, or maintenance expenses of, the covered products which are likely to result from the imposition of the standard; (III) the total projected amount of energy, or as applicable, water, savings likely to result directly from the imposition of the standard; (IV) any lessening of the utility or the performance of the covered products likely to result from the imposition of the standard; (V) the impact of any lessening of competition, as determined in writing by the Attorney General, that is likely to result from the imposition of the standard; (VI) the need for national energy and water conservation; and (VII) other factors the Secretary considers relevant."

38 75 Fed. Reg. at 32,063.

39 75 Fed. Reg. at 32,027.

considered, and a firm should undertake all investments where the net present value of all costs and benefits is higher than zero.

There are two important practical elements in determining the net present value of private investments: the timeframe of the analysis, and the discount rate for future costs and benefits.

The proper period of analysis for evaluating an investment is the period during which the investment affects relevant parties. The Economic Analysis Resource Document published by EPA's Office of Air Quality Planning and Standards states that:

> It is common practice to calculate the costs of a regulatory option over the period of time corresponding to the expected useful lifetime of capital equipment purchased to comply with the rule. For example, if the capital equipment purchased as a result of the rule has an expected useful life of 15 years, an analyst might calculate the expected costs of the rule over a 15-year period. For consistency, benefits should be calculated over the same 15-year period.[40]

This rule of thumb should be used here as well. In the case of energy conservation measures, the "useful lifetime" of the project is the period when it provides benefits to the regulated party. Because many (if not all) of the energy conservation measures being considered will have beneficial effects lasting longer than two years, EPA is unnecessarily limiting the consideration of benefits by defining the payback period as two years. Incorporating the full upfront costs of the measures but ignoring substantial future benefits would lead to under-adoption of energy conservation measures.[41] Given that the statutory explanation chosen by EPA for the two-year payback period is severely deficient, the agency should instead select the project's useful lifetime as the more economically rational period for analyzing energy conservation measures.

The discount rate is also important because it will determine how many measures will have a net present value above zero. In the context of an investment like an energy conservation measure, the costs of implementation will often be frontloaded and the benefits will be fairly constant from year to year (assuming fairly even amounts of energy savings and relatively stable prices). As a result, fewer energy conservation measures will look cost-effective with higher discount rates. For example, consider an investment with a cost of $100,000 in the first year but benefits of $12,000 per year for 10 years. Table 2 shows the net present value of this hypothetical investment under two different discount rates.

Table 2. Net Present Value of Hypothetical Investment with Different Discount Rates

Discount Rate	Undiscounted Benefits	NPV Benefits	NPV Costs	NPV Net Benefits
3%	$120,000	$105,433	$100,000	$5,433
7%	$120,000	$90,183	$100,000	-$9,817

With the discount rate of 3%, the investment has positive returns. However, with the higher discount rate of 7%, the investment has negative returns.

For private investment decisions, the proper discount rate is the opportunity cost of capital, on the assumption that any dollar spent could earn the rate of return that the entity is achieving in its

[40] OFFICE OF AIR QUALITY PLANNING AND STANDARDS, EPA, OAQPS ECONOMIC ANALYSIS RESOURCE DOCUMENT at 8-1 (1999).

[41] Assuming that most capital costs are incurred in the early years of the project.

other projects. The correct rate will be the risk-adjusted rate of return that would be used to evaluate similar investment projects.[42]

IV. EPA Should Mandate Periodic Audits and Implementation of Cost-Effective Measures

EPA is currently proposing a one-time energy assessment for certain existing boilers. Mandatory energy assessments can be justifiable to correct market failures, and that justification can extend beyond a one-time energy audit for existing boilers only. Audits should be periodically repeated and should also apply, at appropriate times, to new boilers. More importantly, regulated entities should be required to implement any cost-effective energy conservation measures identified.

Energy Efficiency Mandates are Necessary to Correct Market Failures

Ample evidence shows that businesses do not always take advantage of all cost-effective investments at their facilities. For example, a McKinsey & Company report from 2007 discovered many un-adopted greenhouse gas reduction measures that would have a negative marginal cost for private actors.[43] Many of the measures identified in that report were available to the same the industrial and commercial sectors covered by EPA's Major Source and Area Source Proposals. EPA notes that the Department of Energy has done energy assessments and discovered that some facilities can reduce energy use by 10 to 15 percent.[44]

The requirement of an energy assessment partially solves this problem. While somewhat controversial, Professor Michael Porter and others have argued that certain types of regulations can have negative costs, by forcing firms to rethink their production processes.[45] In this case, the energy assessment requirement will provide each regulated entity with information it did not have before. New and better information can help overcome organizational inertia by giving evidence of cost-savings. A mandatory energy assessment, rather than a voluntary program, can be justified due to persistent barriers to the voluntary pursuit of energy efficiency—lack of information, lack of attention and salience, prioritization, and so forth.

The energy assessment requirement is a cost-benefit justified regulation even if implementation of identified conservation measures is not mandatory. Armed with better information and focused attention thanks to an energy audit, regulated sources will be better able to take advantage of opportunities with significant private financial benefits, not to mention the environmental and health benefits from cutting energy use and associated pollution. While it is possible that some assessments may not lead to identifying of efficient energy efficient projects at some sources, there is sufficient evidence of general under-adoption of energy efficient technologies in the relevant sectors that substantial cost-savings can be achieved through the assessment requirement.

Implementation of Cost-Effective Measures Should Be Mandatory

The requirement of an energy assessment should provide net benefits to regulated entities as a whole, as well as substantial environmental and health benefits to the entire country. But in order to ensure that maximum net benefits are reaped, EPA should go further and require implementation of all "cost-effective energy conservation measures." Mandatory implementation is

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[42] The standard formulation would include the risk-free rate of return, plus an adjustment for the variance of the rate of return on the project. The risk of the particular energy conservation measure will be driven by volatility in energy prices or uncertainty in the actual quantity of energy savings.

[43] MCKINSEY & COMPANY, REDUCING U.S. GREENHOUSE GAS EMISSIONS: HOW MUCH AT WHAT COST? (2007), *available at* http://www.mckinsey.com/clientservice/sustainability/pdf/US_ghg_final_report.pdf.

[44] 75 Fed. Reg. at 32,026.

[45] *See* David Popp, Richard G. Newell & Adam B. Jaffe, *Energy, the Environment, and Technological Change* (NBER Working Paper No. 14832, Apr. 2009); Michael E. Porter & Claas van der Linde, *Towards a New Conception of the Environment-Competitiveness Relationship*, 4 J. ECON. PERSPECTIVES 97, 99 (1995).

justified regardless of whether EPA continues to use its flawed definition of "cost-effective," or adopts the more economically rational definition discussed above.

The agency has requested comment on whether "requiring implementation of cost-effective measures [is] economically feasible."[46] First, it should be noted that the statutory touchstone for whether EPA should issue this requirement is whether it is "achievable" under Section 112(d). For a range of definitions of "cost-effective," EPA can determine that requiring implementation of "cost-effective energy conservation measures" is, in fact, both achievable and economically feasible.[47]

As explained above, EPA has currently proposed a definition of "cost-effective" that only includes private costs and benefits. This makes the case for requiring implementation very simple. Given a suitable discount rate and time period for the analysis (discussed above), there will be zero net costs to regulated entities from implementing cost-effective measures. Since there will be zero net costs, the requirement should not pose any burden on regulated entities.

Of course, standard economic theory would suggest that regulated entities (as rational actors) would implement all energy conservation measures that have net private benefits on their own, without any requirement. But as discussed above, firms often fail to take advantage of all opportunities to decrease costs (or increase profits). If EPA issues this requirement, it can be assured that the regulated entities will not let this opportunity pass them by. EPA should take the step to ensure that regulated entities will not blindly comply with the bare minimum of the regulation by filing an energy assessment and then promptly forgetting about it.

Energy Audits Should Be Periodic

The final regulation should also require an energy assessment for new sources several years after they come into existence. The preamble justifies the current lack of this requirement because:

> [W]e believe it would not be cost effective because most projected new boilers or process heaters will be installed at existing major source facility which would have already conducted an energy assessment as required by this proposed rule. We also believe that any new greenfield major source facility having boilers or process heaters will be designed to operate with energy efficiency.[48]

While this may or may not be accurate, the distinction between "new" sources and existing sources will diminish over time. After the passage of several years, conditions will change compared to when a new facility was originally designed. Markets and technologies evolve. If interest rates drop (and thus the related discount rates), more projects may become cost-effective. If expected fuel prices increase, the financial return from a given quantity of energy savings will be higher. Existing technologies may become cheaper. New technologies will increase the number of projects to consider. All of these changes mean that new sources may no longer be optimized after several years of operation.

The energy assessments of existing sources will become out of date on a similar timeframe. A new set of cost-effective energy conservation measures could be discovered every few years as a result. Thus, for both new and existing sources, audits should be periodic. This should be achievable at relatively low cost because much of the initial work would be done on the first assessment and would not need to be repeated.

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[46] 75 Fed. Reg. at 32,026.

[47] Under CAA §112(h), EPA may exempt sources from requirements under Section 112(d) if the requirement is not feasible. However, given a proper definition of "cost-effective," this should not be an issue.

[48] 75 Fed. Reg. at 32,030.

Repeated energy assessments will also provide an easy mechanism for verification and enforcement of the required implementation of previously identified cost-effective conservation measures. If the regulated entity has not implemented their required energy conservation measures, this failure will turn up in subsequent energy assessments.

V. Other Analytical Considerations

EPA should extend the time horizon of its regulatory impact analysis, to better capture the full range of the costs and benefits of regulatory alternatives. EPA also needs to revisit its justification for excluding fuel switching as a viable alternative and its formula for emissions averaging. EPA's new approaches to regulating start-up and shut-downs and to calculating employment effects are positive steps that should set a precedent for future rulemakings and analyses.

The Regulatory Impact Analysis Should Include a Longer Time Horizon

EPA's regulatory impact analysis presents monetized benefits and annualized social costs for the year 2013 alone. Annualized social costs are based on estimates of annualized engineering-based compliance costs. Benefit estimates are based on emissions reductions in 2013 alone. Capital costs appear to be annualized over the life of the relevant investment at a 7% interest rate (20 years for major equipment, 2 or 4 years for items like fabric filters). The energy assessment is annualized over 5 years (although no justification is given for this). While this is an appropriate method for determining costs and benefits for 2013, it ignores several important longer-term issues.

For example, shutdown of existing units and increased numbers of new units are not accounted for. Shutdown of existing units due to the program would count as additional decreases in emissions and increased costs. Shutdown of units due to independent factors would not directly count as incremental decreases in emissions; however, this would result in spreading the compliance costs of these units over fewer years and fewer reduced emissions, and thus decrease the cost-effectiveness of the program. By contrast, the number of new units over time would probably add net benefits to the rule.

In addition to these sorts of effects, the short time horizon for the regulatory impact analysis ignores future cost decreases due to both innovation and learning, effectively freezing the cost estimates at current technology costs. With technological innovation, economies of scale, and learning, compliance costs may decrease with time.[49] Both the White House's Office of Management and Budget and the EPA's own Economic Analysis Guidelines stress the need to account for technological innovation and learning effects.[50] In particular, the OMB's Circular A-4 advises agencies: "The time frame for your analysis should cover a period long enough to encompass all the important benefits and costs likely to result from the rule."[51] Due to the short time horizon of its regulatory impact analysis, EPA may have underestimated the net benefits of various alternative policies.

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[49] For example, fabric filters may cost $X right now, last two years, and generate $Y/year benefits. But as the regulation increases market share for the filters and incentivizes innovation, as the manufacturers learn more cost-effective filter production techniques, and as the polluters learn more cost-effective filter application techniques, in future years, maybe filters will only cost $½X and last for three years, but still generate $Y/year in benefits (or, possibly, $2Y, if the technology improves or if new applications have unexpected co-benefits).

[50] WHITE HOUSE OFFICE OF MGMT. & BUDGET, CIRCULAR A-4 at 34 (2003); EPA, 240-R-00-003, GUIDELINES FOR PREPARING ECONOMIC ANALYSIS at 5-7(2008 external review draft).

[51] CIRCULAR A-4, *supra* note 50, at 15.

Fuel Switching May Be an Appropriate Technology, and More Analysis Is Required

EPA considered requiring fuel switching as a method of controlling HAP but decided against including such a requirement in the proposed rule.[52] EPA identified three concerns that cut against the imposition of fuel switching requirements: failure to achieve lower HAP emissions, lack of availability of certain sources of fuel, and difficulty in achieving fuel switching given current boilers and process heaters.[53] There are flaws in all three rationales.

First, the agency determined that virtually all types of switching would increase some HAP, even if it would decrease others.[54] This rationale is incomplete because it fails to recognize that not all HAPs are created equal. This rationale suggests that a complete elimination of an extremely dangerous HAP would not be permissible if it caused even a slight increase in a less dangerous HAP. While this goes against common sense, other parts of Section 112 take this into account. Section 112(g) stipulates that a change in operation is not deemed a "modification" if "such increase in the quantity of actual emissions of any hazardous air pollutant from such source will be offset by an equal or greater decrease in the quantity of emissions of another hazardous air pollutant (or pollutants) from such source which is deemed more hazardous. . . ."[55] EPA should try to take a similar approach in determining whether fuel switching would be beneficial overall.

Second, EPA argues that biomass and natural gas supply may be limited in some areas. In particular, the agency notes that natural gas supplies are constrained in some places and that, in some cities in the winter, natural gas is prioritized for residential usage. These are the sorts of analyses that should be done by regulated entities on a case-by-case basis. Every fuel source has its own risks (both in terms of price and availability), and it is not obvious that the theoretical possibility of supply shortages in some parts of the country should prevent an otherwise sound policy from going forward.

Finally, EPA argues that it would be costly and technically difficult for many sources to switch fuels. In fact, it would not be "technically difficult" to purchase a natural gas boiler to replace boilers which combust other fuels. The agency implicitly acknowledges this because it analyzed requiring all sources to switch to natural gas. This analysis determined that such a requirement would be just as effective as the proposed rule but more costly:

> The annualized cost of fuel switching was estimated to be $13.5 billion compared with $3.5 billion under the floor approach. . . .The cost for fuel switching is over double the cost of the floor approach while the emission reductions associated with fuel switching are approximately the same.[56]

This is a mischaracterization of the emissions benefits from fuel switching. Appendix A-7 of the memorandum "Development (2010) of Fuel Switching Costs and Emissions Reductions for Industrial, Commercial, and Institutional Boilers and Process Heaters National Emission Standards for Hazardous Air Pollutants" compares the emissions reductions from fuel switching to the emission reductions from the proposed rule. Table 3 shows the emissions reductions from a

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[52] While, within the current statutory scheme, this type of analysis is necessary, one major advantage of market-based schemes is that EPA would no longer need to do this. Instead, each source would be able to analyze their options for fuel switching. One of the major successes of the Title IV sulfur dioxide marketable pollution permit program was the increased use of low-sulfur coal. This unforeseen development was one of the chief reasons that compliance costs for this program were significantly lower than initially projected. *See* RICHARD L. REVESZ & MICHAEL A. LIVERMORE, RETAKING RATIONALITY: HOW COST-BENEFIT ANALYSIS CAN BETTER PROTECT THE ENVIRONMENT AND OUR HEALTH 136-37 (2008).

[53] 75 Fed. Reg. at 32,019.

[54] *Id.*

[55] CAA § 112(g)(1)(A).

[56] 75 Fed. Reg. at 32,026.

hypothetical requirement for all boilers covered by the rule to switch to natural gas, along with the emission reductions from the proposed rule.[57]

Table 3. Comparison of Emission Reductions from Fuel Switching and Proposed Rule (Tons per Year)

	Fuel Switching	Proposed Rule	Incremental Reductions from Fuel Switching
Mercury	7	7	0
Filterable PM	52,880	42,690	10,190
HCl	42,289	42,405	-116
Total Hydrocarbons	8,773	3,106	5,667
VOC	8,267	1,782	6,485
CO	407,680	331,926	75,754
Dioxins/Furans	0.000	0.001	-0.001
HF	8,041	1,196	6,845
SO2	386,274	360,300	25,974
Total Selected Metals	4,297	3,200	1,097

Although the EPA characterizes this as "approximately the same," there are substantial additional emissions reductions for seven of the ten pollutants examined. Reductions are 24% higher for particulate matter and 7% for sulfur dioxide. Reductions in total hydrocarbons, volatile organic compounds, and hydrogen fluoride are all well over 100% higher. There is little or no difference for two pollutants (mercury and HCl). Only reductions in dioxins and furans may be significantly lower.

While these incremental reductions may not be cost-justified, EPA has not yet shown this to be the case. The benefits of emission reductions from fuel switching have not been quantified in either the Regulatory Impact Analysis or the document which develops the costs. EPA has not properly considered the option of fuel switching until these additional benefits have been quantified.

Even if requiring all sources to switch to natural gas is not justified by the incremental costs, such a requirement may still be cost-benefit justified for particular types of boilers. EPA should compare the incremental costs and benefits of fuel switching for each class of boilers.

In conclusion, EPA should improve its explanation for not requiring any fuel switching. In particular, EPA has failed to properly describe and quantify the benefits of this option.

EPA Should Fix Errors in the Discounting Formulas for Emissions Averaging

For the Major Source Rule, EPA is proposing to allow emissions averaging within a regulated source over its existing individual boilers in the same category. This is being proposed as a flexibility mechanism because emissions reductions may be cheaper at a particular unit. This proposal is subject to several conditions including an "emissions averaging plan" and a cap on the overall emissions level.[58] In addition to these other safeguards, EPA is proposing a discount factor of ten

[57] *Development of Fuel Switching Costs and Emissions Reductions for Industrial, Commercial, and Institutional Boilers and Process Heaters National Emission Standards for Hazardous Air Pollutants* at 24-25 (2010). The "Total" emissions reductions for PM from the proposed option shown at the bottom of the table does not equal the sum of each category. As a result, the sum of each category in Appendix A-7 is used in Table 3 instead of the given totals.

[58] 75 Fed. Reg. at 32,034-35.

percent to "ensure that averaging will be at least as stringent."[59] The agency is requesting comment on "use of a discount factor and whether ten percent is the appropriate discount factor."[60]

While the practical effect of this is not clear from the preamble, it is possible to discern its impact from the proposed regulatory language. Section 63.7522(d) of the proposed rule states that the "The averaged emissions rate from the existing boilers and process heaters participating in the emissions averaging option must be in compliance with the limits in Table 2 [emissions limits for existing sources] to this subpart at all times following the compliance date. . . ."[61]
Section 63.7522(e) then gives two alternative formulas to demonstrate initial compliance. According to these formulas, the average emissions rate used to determine compliance is only 90% of the actual weighted average emissions rate (in this case, weighted by the maximum rated heat input capacity). Subsequent to this, each entity must demonstrate compliance on a monthly basis according the formulas laid out in Section 63.7522(f).[62] Similarly to the formulas for initial compliance, the average emissions rate here is also only 90% of the actual weighted average emissions rate (weighted here by actual heat input).

These formulas appear to be mistaken and, instead of multiplying by 0.9, they should be multiplying by 1.1 (or dividing by 0.9). To see the error in the formulas, the simplest case can be considered. If there are two boilers at the same facility with identical heat input capacity and actual monthly heat input, then instead of a weighted average the formulas reduce to a simple average. Thus, if both actual emission rates for a given pollutant are 1, then the simple average emission rate is 1. This figure is then multiplied by 90%, giving an emissions rate of 0.9 for the purposes of regulatory compliance. Obviously, the result of the formula is a lower emissions rate than the actual correct weighted average. This seems directly contrary to the stated purpose of the discounting provision and should be fixed by EPA.

If the formulas are corrected to be in accord with the stated purpose of the discounting provision, there will be several effects from discounting. By penalizing averaging, it disincentivizes sources from using this option. This will lead to fewer cost savings, which is the goal of allowing averaging in the first place. However, averaging may lead to fewer reductions in emissions and thus fewer benefits to the general public. The net effect of this is ultimately an empirical one. If the agency is under-regulating (as seems likely, see *supra* pp. 8-9), then the decrease in emissions reductions is unwarranted and not worth the reduced costs. However, if the standards are set efficiently (as we argue they should be), this should be unnecessary unless it is motivated by other concerns (such as measurement error).

EPA should have an independent justification for any discounting provision that explains why it should be implemented and not just what its effects are. It is impossible to determine what the proper discount factor should be without knowing the provision's purpose. The justification of ensuring stringency could equally well justify a discount factor of 5%, 10%, or 20%.

Important Improvements Made by EPA in the Proposed Rules

Start up, shut down, and malfunction rules: The previous boiler MACT proposal and the prior solid waste incinerator rules contained exceptions for otherwise applicable emissions limits during "periods of startup, shutdown and malfunction."[63] In accordance with the D.C. Circuit's opinion in

[59] *Id.* at 32,035.

[60] *Id*.

[61] 75 Fed. Reg. at 32,053

[62] *Id.* at 32,053-54.

[63] *Id.* at 32,012.

Sierra Club v. EPA (2008),[64] the current proposed rules do not contain any such exemptions, and the proposed standards would apply to regulated sources at all times.[65]

In addition to the legal reasons contained in the D.C. Circuit's opinion, this change is also justified on policy grounds. As the proposed rule notes, startup and shutdown are entirely predictable events and can be included in the general emissions standard by EPA.[66] By contrast, malfunction events should be entirely unpredictable and, as the preamble for the Major Source Proposal notes, the best performing sources should not be malfunctioning at all.[67]

Estimates of employment impact derived from Morgenstern et al.: The Regulatory Impact Analysis uses two techniques to estimate the changes in employment due to the proposed rules. The first is a longstanding method used by EPA in many previous analyses. This technique looks at the output decrease in the relevant sectors and uses an estimate for jobs per unit of output to calculate a projected decrease in employment. This "demand effect" technique for projecting changes in employment is described in the Economic Analysis Resource Document issued by the Office of Air Quality Planning and Standards in April of 1999.[68] It contains an implicit assumption that the result of environmental regulations will be price increases and that these price increases will result in lower sales for regulated entities.

However, this type of employment projection is incomplete. The agency correctly identifies that there are at least two types of employment effects from environmental regulations which are not included in the "demand effect" calculation: the "cost effect" and the "factor shift effect."[69] The "cost effect" recognizes that, for a given level of output, expenditures on reducing pollution often require additional employees. The "factor shift effect" recognizes that production can be more or less labor intensive after compliance with an environmental regulation.

The size of each of these effects and the direction of the "factor shift effect" are all empirical matters and will likely vary from industry to industry and from regulation to regulation. In order to estimate these effects, EPA uses econometric estimates from a 2002 paper by Morgenstern et al.[70] This paper estimated the employment effects of spending on environmental policies across a number of industries.[71] As the RIA recognizes, the point estimates do not perfectly correspond to the analysis that EPA is doing. The range of industries analyzed is not the same and the paper uses older data.

Nevertheless, this technique at least recognizes and has the possibility of capturing effects that the traditional techniques of estimating employment effects cannot. This makes the estimates derived from the Morgenstern paper at least as valuable as the traditional techniques of estimating employment effects. The adoption of this technique by EPA could attract additional interest in this area and encourage economists to publish new studies on the topic with newer data.

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64 551 F.3d 1019 (DC Cir. 2008), cert. denied, 2010 U.S. LEXIS 2265 (2010).

65 75 Fed. Reg. at 32,012.

66 *Id.* at 32,013.

67 *Id.*

68 OFFICE OF AIR QUALITY PLANNING AND STANDARDS, EPA, OAQPS ECONOMIC ANALYSIS RESOURCE DOCUMENT at 5-42 to 5-43 (1999).

69 RIA at 4-6 to 4-7.

70 *Id.* at 4-7.

71 Richard D. Morgenstern, William A. Pizer & Jhih-Shyang Shih, *Jobs Versus the Environment: An Industry Level Perspective*, 43 JOURNAL OF ENVIRONMENTAL ECONOMICS AND MANAGEMENT 412, 412 (2002).

Conclusion

The proposed rules take a significant step forward in reducing the emissions of hazardous air pollutants. But before it finalizes new standards for boilers, process heaters, and incinerators, EPA should fine-tune its regulatory impact analysis and rethink some of its policy choices. In particular, EPA should choose a more appropriate time horizon for its analysis and fully analyze the costs and benefits of key regulatory alternatives, such as more stringent numerical limits or fuel-switching. The agency should then exercise its statutory authority to select any beyond-the-floor standards that maximize net social benefits. More stringent standards under the Major Source Rule in particular may better maximize net benefits, as would mandatory implementation of periodic energy audits and cost-effective conservation measures (with "cost-effective" properly defined by economic principles).

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