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Section 111(d) of the Clean Air Act

The Legal Foundation for Strong, Flexible & Cost-Effective Carbon Pollution Standards for Existing Power Plants

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Environmental Defense Fund

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I. Introduction

The Intergovernmental Panel on Climate Change's recent report, "Climate Change 2013: The Physical Science Basis," includes several grim findings:

- Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased.[1]
- It is *extremely likely* that human influence has been the dominant cause of the observed warming since the mid-20th century.[2]
- Continued emissions of greenhouse gases will cause further warming and changes in all components of the climate system. Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions.[3]

Climate impacts are already affecting American communities—and the impacts are projected to intensify. The U.S. Global Change Research Program has determined that if greenhouse gas emissions are not reduced it is likely that American communities will experience:

- increased severity of dangerous smog in cities;[4]
- intensified precipitation events, hurricanes, and storm surges;[5]
- reduced precipitation and runoff in the arid West;[6]
- reduced crop yields and livestock productivity;[7]
- increases in fires, insect pests, and the prevalence of diseases transmitted by food, water, and insects;[8] and
- increased risk of illness and death due to extreme heat.[9]

Extreme weather imposes a high cost on our communities, our livelihoods, and our lives. The National Climatic Data Center reports that the United States experienced twelve climate disasters each causing more than a billion dollars of damage in 2012, including a yearlong drought and widespread crop failure in 22 states, western wildfires that burned over 9.2 million acres, and

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[1] Intergovernmental Panel on Climate Change Working Group I, Summary for Policymakers, at 3 (2013), *available at* http://www.climatechange2013.org/images/uploads/WGIAR5-SPM_Approved27Sep2013.pdf.

[2] *Id.* at 12.

[3] *Id.* at 14.

[4] U.S. Global Change Research Program, Global Climate Change Impacts in the United States, at 92-93 (2009), *available at* http://downloads.globalchange.gov/usimpacts/pdfs/climate-impacts-report.pdf.

[5] *Id.* at 34-36.

[6] *Id.* at 45.

[7] *Id.* at 74-75, 78.

[8] *Id.* at 82-83.

[9] *Id.* at 90-91.

Hurricane Sandy, which devastated major population centers in the Northeast.[10] These are precisely the type of impacts projected to affect American communities with increasing frequency and severity as climate-destabilizing emissions continue to accumulate in the atmosphere.

Power plants are far and away the largest source of greenhouse gas emissions in the United States. In 2011, fossil fuel fired power plants emitted more than 2 billion metric tons of CO_2e, equivalent to 41% of U.S. carbon pollution and nearly one-third of total U.S. greenhouse gas emissions.[11]

Section 111 of the Clean Air Act provides for the establishment of nationwide emission standards for major stationary sources of dangerous air pollution—including, since 1971, power plants. In response to the Supreme Court's decision in *Massachusetts v. EPA*[12] that the Clean Air Act's protections encompass greenhouse gas emissions and to EPA's science-based determination that these climate-destabilizing emissions endanger public health and welfare,[13] EPA is now developing § 111 Carbon Pollution Standards for power plants.

EPA is developing separate carbon pollution-reduction frameworks for new and existing power plants under Clean Air Act § 111(b) and (d) respectively. Emission standards for existing pollution sources are developed and implemented through a dynamic federal-state collaboration, the legal underpinnings of which are described here. Through this collaboration, EPA and the states can put in place strong standards that will drive cost-effective reductions in carbon pollution and support our nation's transition to a cleaner, safer, smarter power infrastructure.

II. Background

Section 111(b) directs EPA to identify ("list") categories of stationary sources that significantly contribute to dangerous air pollution, and to establish emission standards for air pollutants emitted by new sources in the listed categories.[14] Power plants were listed in 1971.[15] Section 111(d) directs the development of emission standards for pollutants emitted by existing sources

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[10] National Climatic Data Center, Billion-Dollar U.S. Weather/Climate Disasters (2013), *available at* www.ncdc.noaa.gov/billions/events.pdf.

[11] EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011, at ES-5, ES-7 (Apr. 2013), *available at* http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2013-Main-Text.pdf. Of the heat-trapping pollutants emitted by sources in the United States, carbon dioxide is by far the most prevalent. Transportation emissions are the only greenhouse gas emission source that approaches the scale of power plants.

[12] 549 U.S. 497 (2007).

[13] Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66,496 (Dec. 15, 2009).

[14] 42 U.S.C. § 7411(b)(1).

[15] Air Pollution Prevention and Control: List of Categories of Stationary Sources, 36 Fed. Reg. 5931 (Mar. 31, 1971) (listing "Fossil fuel-fired steam generators of more than 250 million B.t.u. per hour heat input").

in the listed categories. Emission standards are not established under § 111(d) if a source category's emissions of a specific pollutant are regulated under the provisions of the Clean Air Act addressing hazardous or criteria air pollutants.[16] Emission standards developed under § 111(d) must apply to "any existing source."[17]

The Clean Air Act provides that an emission standard (for new or existing sources) must reflect the emission reductions achievable through application of the "best system of emission reduction" that EPA finds has been adequately demonstrated, taking into account costs and any non-air quality health and environmental impacts and energy requirements.[18] For existing sources, once EPA guidance is issued identifying the best system of emission reduction and the emission reductions achievable under that system, the standards are implemented through state plans submitted to EPA for approval.[19] These plans must provide for the enforcement of the emission standards.[20]

III. Understanding § 111(d)'s Dynamic Federal-State Collaboration

Section 111(d) provides for federal-state collaboration in securing emission reductions from existing sources, with state flexibility to identify the optimal systems of emission reduction for their state while achieving the necessary environmental performance. EPA's longstanding § 111(d) implementing regulations[21] provide for EPA to issue "emission guidelines" in which the

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[16] 42 U.S.C. § 7411(d). Congress enacted § 111 in the 1970 Clean Air Amendments. Emissions of criteria pollutants from all sources are addressed through the detailed State Implementation Plan process set forth in § 110, *id.* § 7410, and hazardous air pollutants are the subject of a detailed framework of protections set out in § 112, *id.* § 7412. In its 1975 implementing regulations and for the subsequent 15 years EPA treated § 111(d) as a means of 'filling the gap,' and addressing pollutants that were not otherwise covered by § 110 or 112. *See* 40 Fed. Reg. 53,340, 53,340 (Nov. 17, 1975). In 1990, the House and Senate passed conflicting amendments to § 111(d), both of which were included in the Clean Air Act Amendments of 1990. In a 2005 rulemaking, after conducting a thorough analysis of the language and legislative history of the two versions, EPA described one way to reconcile them in a manner that comported with the overall thrust of the Clean Air Act Amendments of 1990. EPA concluded that it has authority under § 111(d) to regulate any air pollutant not listed under § 112(b) (i.e., any non-hazardous air pollutant), even if the source category to be regulated under § 111 is also being regulated under § 112. *See* 70 Fed. Reg. 15,994, 60,030-32 (Mar. 29, 2005). Thus, the only pollutants EPA may *not* regulate under § 111(d) are hazardous air pollutants emitted from a source category that is actually being regulated under § 112.

[17] 42 U.S.C. § 7411(d).

[18] *Id.* § 7411(a)(1).

[19] *Id.* § 7411(d)(1)(A).

[20] *Id.* § 7411(d)(1)(B).

[21] 40 C.F.R pt. 60, subpt. B. EPA's regulations for the general implementation of § 111(d) have not been challenged since they were promulgated in 1975. *See* 40 Fed. Reg. 53,340 (Nov. 17, 1975); *see also* Clean Air Mercury Rule, 70 Fed. Reg. 28,606 (May 18, 2005), vacated on other grounds by *New Jersey v. EPA*, 517 F.3d 574 (D.C. Cir. 2008). Any challenge would now be time-barred. 42 U.S.C. §

Agency fulfills its § 111 duty to identify the "best system of emission reduction" for a specific pollutant and listed source category.[22] EPA then identifies the emission reductions achievable using that system. States are given the flexibility to deploy different systems of emission reduction than the "best" system identified by EPA, so long as they achieve equivalent or better emission reductions.[23] The achievement of equivalent emission reductions enables state plans to be deemed "satisfactory" in the statutorily required review.[24] The statute provides that when states do not submit a satisfactory plan, EPA must develop and implement emission standards for the sources in that state.[25]

A. The statute gives EPA ample authority to oversee state compliance with § 111(d).

Although some industry attorneys have posited that the states have the sole authority to determine the stringency of emission standards under § 111(d), this disregards the plain language of § 111. Section 111(a)(1) elucidates that it is EPA—not the states—that identifies the best system of emission reduction considering the statutory factors:

> The term "standard of performance" means a standard for emissions of air pollutants which reflects the degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction and any nonair quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated.[26]

That definition specifically refers to "the Administrator"[27] as the entity that "determines" what constitutes the best system of emission reduction based on the statutory factors such as optimal environmental performance ("best") and cost. It is the Administrator who "tak[es] into account the cost of achieving such reduction and any nonair quality health and environmental impact and energy requirements." Significantly, that definition is explicitly made applicable to the entirety of § 111.[28]

7607(b); *see also Am. Rd. & Transp. Builders Ass'n v. EPA*, 705 F.3d 453, 457-58 (D.C. Cir. 2013); *Am. Rd. & Transp. Builders Ass'n v. EPA*, 588 F.3d 1109, 1113 (D.C. Cir. 2009).

[22] 40 C.F.R. § 60.22(b)(5) (guidelines will "reflect[] the application of the best system of emission reduction (considering the cost of such reduction) that has been adequately demonstrated for designated facilities, and the time within which compliance with emission standards of equivalent stringency can be achieved").

[23] *See* 40 C.F.R. § 60.24.

[24] *Id.*; 42 U.S.C. § 7411(a); *id.* § 7411(d)(2).

[25] *Id.* § 7411(d)(2).

[26] *Id.* § 7411(a)(1) (emphasis added).

[27] *Id.* § 7602(a) (defining "Administrator" to be "the Administrator of the Environmental Protection Agency").

[28] *See id.* § 7411(a) ("For purposes of this section . . .").

Under § 111(d)(1)(A), state plans must impose "standards of performance" on existing sources[29] according to the criteria provided in the "standard of performance" definition quoted above.[30] Section 111(d)(2) directs states to submit "satisfactory" plans, implementing such standards of performance, to EPA for review and approval.[31] EPA's regulations and emission guidelines have long interpreted the Agency's § 111(d) responsibility to determine whether state plans are "satisfactory" as governed by whether the plans implement emission standards that reflect the emission reductions achievable under the best system of emission reduction identified by the Administrator.[32]

EPA's review of state plans is guided by the statutory parameters defining a "standard of performance"—do state plans establish emission standards that achieve emission reductions equivalent to or better than those achievable using the best system of emission reduction? This manifest interpretation of the statute flows inexorably from its plain language and structure, and EPA's interpretation of its substantive role under § 111(d) carries the weight of nearly four decades of Agency statutory interpretation and practice under the 1975 § 111(d) implementing regulations.[33] It is implausible that Congress provided statutory criteria that state plans must meet and further provided for EPA review state plans, but did not intend for the statutory criteria to direct the review. Indeed, for EPA to approve state plans without regard to whether those plans satisfy the statutory criteria for standards of performance would be arbitrary.

Yet the language of § 111 requires substantive review of state plans by EPA even more directly. A "standard of performance" is defined as "a standard for emissions of air pollutants *which reflects the degree of emission limitation achievable through the application of the best system of emission reduction*" identified by the Administrator. An emission standard that fails on its face to secure the degree of emission reductions achievable under the best system of emission reduction is outside the statutory definition of standards of performance and does not meet the requirement that the "State establish[] standards of performance" for existing sources. State plans that fail to include a standard of performance cannot be approved as "satisfactory" by EPA under any reading of § 111.

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[29] *Id.* § 7411(d)(1)(A).

[30] *Id.* § 7411(a) (all definitions, including "standard of performance," apply "[f]or purposes of this *section*" (emphasis added)).

[31] *Id.* § 7411(d)(2) (discussing results if "the State fails to submit a *satisfactory* plan" (emphasis added)).

[32] *See* State Plans for the Control of Existing Facilities, 39 Fed. Reg. 36,102 (Oct. 7. 1974); *see also* State Plans for the Control of Certain Pollutants from Existing Facilities, 40 Fed. Reg. 53,340, 53,342-44 (Nov. 17, 1975) (rejecting commenters' argument that EPA does not have authority to require states to establish emissions standards that are at least as stringent as EPA's emission guidelines); *id.* at 53,346 (defining "emission guideline" as "a guideline . . . which reflects the degree of emission reduction achievable through the application of the best system of emission reduction which (taking into account the cost of such reduction) the Administrator has determined has been adequately demonstrated for designated facilities.").

[33] *Id.* EPA has issued § 111(d) emission guidelines for a number of source categories. *See* 42 Fed. Reg. 12,022 (Mar. 1, 1977) (phosphate fertilizer plants); 42 Fed. Reg. 55,796 (Oct. 18, 1977) (sulfuric acid plants); 44 Fed. Reg. 29,828 (May 22, 1979) (kraft pulp mills); 45 Fed. Reg. 26,294 (Apr. 17, 1980) (primary aluminum plants); 61 Fed. Reg. 9,905 (Mar. 12, 1996) (municipal solid waste landfills).

In addition to being inconsistent with the language of § 111, exclusive state authority over the substance of existing source standards would be contrary to the purpose of the 1970 Clean Air Act—"to provide for a more effective program to improve the quality of the Nation's air"[34]—because air quality could *worsen* if state plans were not subject to any enforceable substantive standards. Evidence of the central role for protective federal standard setting is found throughout the Clean Air Act, including in § 116, which prohibits the states from adopting or enforcing emission standards less stringent than those set by EPA.[35]

Preserving that basic role for EPA in protecting the nation's air quality was a central theme of the regulations EPA adopted in 1975 to implement § 111(d). As EPA noted in the rulemaking:

> [I]t would make no sense to interpret section 111(d) as requiring the Administrator to base approval or disapproval of State plans solely on procedural criteria. Under that interpretation, States could set extremely lenient standards—even standards permitting greatly increased emissions—so long as EPA's procedural requirements were met. Given that the pollutants in question are (or may be) harmful to public health and welfare, and that section 111(d) is the only provision of the Act requiring their control, it is difficult to believe that Congress meant to leave such a gaping loophole in a statutory scheme otherwise designed to force meaningful action.[36]

In sum, both the language of § 111 and the overall purpose of the 1970 Clean Air Act amendments require a strong substantive role for EPA in ensuring that standards for existing sources meet the statutory requirements.

B. EPA's responsibility includes promulgation of binding emission guidelines for the states.

Similarly, some stakeholders have questioned EPA's authority to establish binding emission guidelines that identify the "best system of emission reduction" and the resulting emissions reductions that each state plan must achieve. That argument fails in light of the structure of § 111(d) and in light of congressional intent. It is also contrary to EPA's reasonable interpretation of its statutory responsibility, laid out in the long-established regulations implementing § 111.

EPA's interpretation of § 111(d) as authorizing it to adopt emission guidelines makes eminent sense in light of the statute's overall structure. As EPA ultimately must approve state plans for existing sources under § 111(d), the states benefit from EPA giving them initial guidance on what the Agency will be expecting to see in their state plans. That guidance, in the form of emission guidelines, helps the states avoid wasting valuable time and resources as they develop their standards. The guidelines do so by providing states with the parameters a state plan must fit within in order to be found "satisfactory" by the Administrator.

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[34] Clean Air Amendments of 1970, Pub. L. No. 91-604, 84 Stat. 1676, 1676 (1970).

[35] 42 U.S.C. § 7416.

[36] 40 Fed. Reg. at 53,343.

Moreover, while Congress did not detail the process by which EPA would evaluate and approve state plans, there is considerable evidence that Congress subsequently recognized and approved the guidelines process that EPA established in its 1975 regulations. In 1977, for example, when Congress modified the definition of "standard of performance," the House committee explained that under § 111(d) "[t]he Administrator would establish *guidelines* as to what the best system for each . . . category of existing sources is."[37] Then, in 1990, in § 129 of the Clean Air Act, Congress directed EPA to adopt standards for solid waste combustion that would mirror the § 111 process, expressly referring to the "*guidelines* (under section 7411(d) of this title . . .)."[38] Thus, Congress has both recognized and legislated in reliance upon EPA's guidelines process under § 111(d).

Congress is not alone in affirming the place of emissions guidelines in the § 111(d) structure. The Supreme Court recently noted that states issue § 111(d) standards "in compliance with [EPA] guidelines and subject to federal oversight."[39]

In the 1975 rulemaking to implement § 111(d), EPA received a number of comments questioning the Agency's authority to set those substantive guidelines.[40] In response, EPA demonstrated its authority to do so with a detailed analysis of the language, purpose, and legislative history of § 111(d).[41] EPA's authority to issue emission guidelines has long been settled.[42]

C. States can deploy locally designed solutions to meet EPA's emission guidelines.

Although EPA adopts emission guidelines identifying the best system of emission reduction, § 111(d) (and EPA's implementing regulations) provide for state tailoring and flexibility in meeting those guidelines. The statute does not require states (or sources) to use the exact system of emission reduction identified by EPA. Instead, states simply must achieve the level of emission reductions that would be achieved under that best system, and can deploy the system or systems of emission reduction most appropriate for the emission sources in their state.[43]

With this state flexibility, § 111 is very similar to the process implemented under § 110, under which states put in place plans to achieve National Ambient Air Quality Standards for criteria pollutants. The safe level of ambient pollution is an expert, science-based determination made by EPA, but states have considerable discretion in determining how to reduce emissions to that level. EPA then reviews each state plan to ensure that "it meets all the applicable requirements"

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[37] H.R. Rep. No. 95-294, at 195 (1977) (emphasis added).

[38] 42 U.S.C. § 7429(a)(1)(A) (emphasis added).

[39] *Am. Elec. Power Co. v. Connecticut*, 131 S. Ct. 2527, 2537-38 (2011).

[40] 40 Fed. Reg. at 53,342.

[41] *Id.* at 53,342-44.

[42] *See* 42 U.S.C. § 7607(b) (60-day review period for Clean Air Act rulemakings).

[43] *See id.* § 7411(a) (a "standard of performance" must "reflect[]" the emission reductions achievable through use of the best system, but need not actually use the best system).

of § 110.[44] This parallel structure for §§ 110 and 111—in which EPA uses its expertise to identify the emission reductions that must be achieved, states use their discretion to develop plans to achieve the emission reductions, and EPA reviews plans to ensure they are meeting the relevant statutory criteria—is reinforced by the statute explicitly, which provides that § 111(d) state plans be developed through "a procedure similar to that provided by" § 110.[45]

In sum, § 111(d) establishes a collaborative federal-state process for regulating existing sources in which EPA establishes quantitative emission guidelines and the states deploy locally tailored and potentially innovative solutions to achieve the required emission reductions.

IV. A System of Emission Reduction That Achieves the Rigorous Cuts in Carbon Pollution Demanded by Science and Does so Cost-Effectively is Eminently Consistent with the § 111 Criteria and Is Plainly Authorized by § 111

As EPA evaluates systems of emission reduction for existing power plants, it is instructive to look at what is taking place on the ground. Across the country, states and power companies are reducing emissions from fossil fuel fired power plants by making those plants more efficient, increasing the use of lower-carbon generation capacity and zero-emitting energy, and investing in demand-side energy efficiency. At their core, these approaches all have the same result—reducing emissions from existing high-emitting fossil fuel fired power plants and improving the emission performance of the power plant source category. The broad employment of this system across the country indicates that it is demonstrated in practice—and indeed, these approaches have been in use for decades.[46]

When seen through the lens of § 111, the system described above is fundamentally an emissions averaging system, achieving broadly based reductions from the power plant source category. Improving efficiency at plants, deploying zero-emitting energy on the grid, investing in demand-side energy efficiency to reduce demand, and shifting utilization towards lower-emitting generation all reduce emissions from fossil fuel fired units as a group. This system of emission reduction is conceptually more expansive than the typical pollution-control technology installed

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[44] *Id.* § 7410(k)(3). Section 110 requires, *inter alia*, state plans to provide for "implementation, maintenance, and enforcement of" National Ambient Air Quality Standards, *id.* § 7410(a)(1), the use of emissions monitoring equipment as prescribed by EPA, *id.* § 7410(a)(2)(F), and any air quality modeling requirements prescribed by EPA, *id.* § 7410(a)(2)(K).

[45] *Id.* § 7411(d)(1).

[46] *See, e.g.*, World Resources Institute, Power Sector Opportunities for Reducing Carbon Dioxide Emissions: Michigan (Sept. 2013), *available at* http://www.wri.org/publication/power-sector-opportunities-for-reducing-carbon-dioxide-emissions-michigan; World Resources Institute, Power Sector Opportunities for Reducing Carbon Dioxide Emissions: North Carolina (Sept. 2013), *available at* http://www.wri.org/publication/power-sector-opportunities-for-reducing-carbon-dioxide-emissions-north-carolina; World Resources Institute, Power Sector Opportunities for Reducing Carbon Dioxide Emissions: Ohio (Aug. 2013), *available at* http://www.wri.org/publication/power-sector-opportunities-for-reducing-carbon-dioxide-emissions-ohio. *See generally* World Resources Institute, GHG Mitigation in the United States: An Overview of the Current Policy Landscape, at 10-12 (2012), *available at* http://www.wri.org/publication/ghg-mitigation-us-policy-landscape; Database of State Incentives for Renewables & Efficiency, http://www.dsireusa.org/ (last visited Sept. 30, 2013).

at a plant but satisfies the statutory language and purpose of § 111(d) and is a reasonable interpretation of that provision. This system would employ emissions averaging across the regulated sources in order to recognize the pollution reductions achieved by changes in utilization at plants and among plants.

By incorporating an averaging framework, this system could create flexibility to identify the most cost effective emission reductions across the regulated sources. If sources are allowed to average emission reductions, the system will give sources flexibility to reduce emissions onsite or secure emission reductions from other sources that can achieve reductions beyond those necessary for their own compliance at lower cost. Each source would be required to comply with the emission standard established but could meet its compliance obligation by securing emission reductions at other units in the source category. By recognizing the emission reductions achieved by the deployment of low-carbon generation, shifts in utilization toward lower- or non-emitting generation, and improvements in demand-side energy efficiency, the system would create flexibility for states and regulated sources and enhance the cost-effectiveness and environmental co-benefits of the emission standards.

As discussed below, the language of § 111 is broad enough to encompass such an emission reduction system. Moreover, under § 111(d), where the goal is maximizing the reduction of carbon pollution from existing power plants considering cost and wider environmental and energy impacts, this emission reduction system facilitates optimization of the statutory factors.

A. Section 111 gives EPA wide discretion to establish a system of emission reduction that achieves rigorous reductions in carbon pollution through locally tailored solutions.

The language and structure of § 111 give EPA expansive authority to determine which system of emission reduction best serves the statutory goals. The marked breadth of the language indicates Congress' intention to provide EPA with ample flexibility in conceiving systems of emission reduction. Neither the term "best system of emission reduction" nor its components are given technical definitions in the Act. In common usage, a "system" is defined as "a complex unity formed of many often diverse parts subject to a common plan or serving a common purpose."[47] Clearly the ordinary meaning of the term "system" does not limit EPA to choosing end-of-pipe control technologies or other mechanical interventions at the plant. Rather, EPA may choose any "complex unity . . . serving a common purpose" that meets the other statutory requirements. A system of emission reduction that reflects the unified nature of the electric grid and achieves cost-effective emission reductions from the source category by treating all fossil fuel fired power plants as an interconnected group, averaging emissions across plants and recognizing changes in plant use that reduce emissions, fits securely within this framework.

The history of § 111 demonstrates that Congress deliberately rejected terms that were more restrictive than "best system of emission reduction," and that it was especially important to Congress for EPA to have flexibility in identifying solutions to reduce emissions from existing sources. The original 1970 language provided a unitary definition of "standard of performance"

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[47] Webster's Third New International Dictionary 2322 (1967).

for both new and existing sources that is rather similar to the current definition: "a standard for emissions of air pollutants which reflects the degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction) the Administrator determines has been adequately demonstrated."[48] Changes to the definition made in the 1977 Amendments to the Clean Air Act required § 111 standards for new sources to reflect "the best *technological* system of *continuous* emission reduction."[49] In contrast, the § 111 standards for existing sources were to reflect the "best system of continuous emission reduction,"[50] which, as clarified by the Conference Report, need not be a technological system.[51] In 1990, Congress removed the requirements that standards for new sources be based on "technological" systems and that standards for both new and existing sources achieve "continuous" reductions, restoring use of broad "system" language for both new and existing source standards.[52] It is noteworthy that even during the period of time when Congress determined a more specific definition of "standard of performance" was advisable for new sources, it did not take this approach for existing sources. The current text of the Clean Air Act reflects both Congress' more recent decision to allow EPA to select a non-technological system of emission reduction when promulgating standards for new sources under § 111 as well as Congress' longstanding policy of allowing that approach for existing sources.

Courts have recognized that the identification of the best system of emission reduction is an expansive, flexible endeavor, in the service of securing the maximum emission reductions, finding that EPA may weigh "cost, energy, and environmental impacts in the broadest sense at the national and regional levels and over time as opposed to simply at the plant level in the immediate present."[53] Further, courts have noted that EPA's choice of the best system of emission reduction should encourage the development of systems that achieve greater emission reductions at lower costs and deliver energy and nonair health and environmental benefits.[54]

In short, § 111 gives EPA wide discretion to identify an emission reduction system that relies on solutions such as averaging to maximize environmental performance and enhance cost-effectiveness.

B. The language of § 111 is sufficiently broad to authorize the selection of an averaging system as the best system of emission reduction.

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[48] Clean Air Amendments of 1970, Pub. L. No. 91-604, § 4(a), 84 Stat. 1676, 1683 (1970). The original definition lacks the language directing EPA to consider "any nonair quality health and environmental impact and energy requirements." 42 U.S.C. § 7411(a)(1).

[49] Clean Air Act Amendments of 1977, Pub. L. No. 95-95, § 109(c)(1)(A), 91 Stat. 685, 699-700 (1977) (emphases added).

[50] *Id.*

[51] The conference committee explained that the amendments "make[] clear that standards adopted for existing sources under section 111(d) of the act are to be based on available means of emission control (*not necessarily technological*)." H.R. Rep. No. 95-564, at 129 (1977) (Conf. Rep.) (emphasis added).

[52] Clean Air Act Amendments, Pub. L. No. 101-549, § 403(a), 104 Stat. 2399, 2631 (1990).

[53] *Sierra Club v. Costle*, 657 F.2d 298, 321, 330 (D.C. Cir. 1981).

[54] *Id.* at 346-47.

Although the term "best system of emission reduction" is broad, it is not unbounded. Section 111 requires the "best" system to be the system adequately demonstrated to achieve the maximum emission reductions from the regulated sources, considering cost and impacts on non-air quality health or environmental impacts and energy requirements. The system must also provide the foundation for state standards of performance to apply a "standard for emissions" to "any existing source" in the listed category. EPA must seek out the system that best serves these clearly enunciated goals of § 111.

There are many available options for reducing carbon dioxide emissions from existing power plants through modifications or upgrades at these plants. In order to satisfy the statutory criteria described above, such an analysis of "onsite" measures would by necessity be expansive in scope—including not only significant improvements to the efficiency or "heat rate" of the plant, but also other emission reduction measures such as co-firing or re-powering with lower-carbon fuels;[55] utilizing renewable energy sources to provide supplemental steam heating;[56] using available waste heat to remove moisture from coal or switching to higher-rank coal;[57] and implementing combined heat and power (CHP) systems at plants near industrial facilities or district heating systems,[58] among other solutions. For example, engineering firms have estimated that with modest modifications, coal-fired power plants can derive as much as 50% of their heat input from natural gas.[59] Co-firing at this level could yield emission reductions of 20%, and could be combined with heat rate and other improvements to achieve even deeper reductions at a specific plant.

In some circumstances, however, averaging systems may distinctively further the statutory factors.[60] Flexible averaging programs implemented under the Clean Air Act and by states and

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[55] *See* F.J. Binkiewicz, Jr. et al., Natural Gas Conversions of Existing Coal-Fired Boilers (Babcock & Wilcox White Paper MS-14, 2010), *available at* http://www.babcock.com/library/pdf/ms-14.pdf; Brian Reinhart et al., *A Case Study on Coal to Natural Gas Fuel Switch* (Black & Veatch, 2012), *available at* http://bv.com/Home/news/thought-leadership/energy-issues/paper-of-the-year-a-case-study-on-coal-to-natural-gas-fuel-switch..

[56] *See* Craig Turchi et al., Solar-Augment Potential of U.S. Fossil-Fired Power Plants (National Renewable Energy Laboratory, 2011), *available at* http://www.nrel.gov/docs/fy11osti/50597.pdf. Several projects are currently under way to augment existing coal-fired power plants in Australia and the United States with concentrated solar thermal power systems. *See Hybrid Renewable Energy Systems Case Studies*, Clean Energy Action Project, http://www.cleanenergyactionproject.com/CleanEnergyActionProject/Hybrid_Renewable_Energy_Systems_Case_Studies.html (last visited Oct. 4, 2013).

[57] *See* EPA, Available and Emerging Technologies for Reducing Greenhouse Gas Emissions From Coal-Fired Electric Generating Units, at 31-33 (Oct. 2010), *available at* http://www.epa.gov/nsr/ghgdocs/electricgeneration.pdf (describing a commercially-available on-site drying process that can reduce CO_2 emissions from a pulverized coal boiler by approximately 4%).

[58] *See id.* at 34-35.

[59] *See* Reinhart et al., *supra* note 55.

[60] EPA has allowed averaging or trading programs where they provide greater emissions reductions than source-specific technology standards. *See*, *e.g.*, Regional Haze Regulations, 64 Fed. Reg. 35,714,

companies have demonstrated that they can significantly lower the cost of cutting pollution because they facilitate capture of the lowest-cost emission reduction opportunities.[61] In the context of the forthcoming Carbon Pollution Standards for existing power plants, a flexible averaging framework that rigorously quantifies the emission reductions achieved via increased utilization of lower and zero-emitting generation and investments in demand-side energy efficiency could achieve very substantial carbon pollution reductions cost-effectively while enabling proactive management of generation capacity and enhancement of grid reliability. Indeed, a flexible system would facilitate efficient compliance not only with the Carbon Pollution Standards but also with other applicable air quality and energy regulations, allowing states and companies to make sensible investments in multi-pollutant emission reductions and clean, safe, and reliable electricity infrastructure. Such a system would enable states to consider the "remaining useful life" of sources as the Clean Air Act provides[62] and optimize investments in existing and new generation to secure the necessary emission reductions. A flexible system that facilitates a variety of emission reduction pathways is also the system already being deployed by a number of states and companies, mobilizing innovative emission reduction measures and securing significant reductions in carbon pollution.[63]

35,739 (July 1, 1999) (allowing state plans "to adopt alternative measures in lieu of BART where such measures would achieve even greater reasonable progress toward the national visibility goal").

[61] For example, a recent survey of economic research found that the Clean Air Act's flexible Acid Rain Program has achieved "a range of 15-90 percent savings, compared to counterfactual policies that specified the means of regulation in various ways and for various portions of the program's regulatory period." Gabriel Chan, Robert Stavins, Robert Stowe & Richard Sweeney, The SO_2 Allowance Trading System and the Clean Air Act Amendments of 1990: Reflections on Twenty Years of Policy Innovation, at 5 (2012), *available at* http://belfercenter.ksg.harvard.edu/files/so2-brief_digital4_final.pdf.

[62] 42 U.S.C. § 7411(d)(1).

[63] Some have suggested that the general Clean Air Act definition of "standard of performance" in § 302(l) also applies in the context of § 111, and precludes an averaging approach because it requires "continuous emission reduction." *Id.* § 7602(l). It is unlikely that the § 302(l) definition applies given that Congress provided a specific and different definition of the term "[f]or purposes of" § 111, 42 U.S.C. § 7411(a). *See Reynolds v. United States*, 132 S. Ct. 975, 981 (2012) (specific statutory language supersedes general language); *Fourco Glass Co. v. Transmirra Prods. Corp.*, 353 U.S. 222, 228 (1957) (same). However, even if § 302(l) were found to apply, an averaging approach qualifies as "a requirement of continuous emission reduction" per the § 302(l) definition because covered sources must collectively achieve the emission limitations, which apply continuously. Even in a flexible program each source meets its obligations continuously. Under an averaging framework each source must secure the emission reductions needed, onsite or from other plants, to continuously be in compliance with the standard.

It is also worth noting that the generally applicable definition of "emission standard" in § 302(k) likely does inform the otherwise undefined phrase "standard for emissions" within the definition of "standard of performance" in § 111(a)(1). *See* 42 U.S.C. § 7416 (referring to an "emission standard or limitation . . . under section 7411"). A § 302(k) "emission standard" or "emission limitation" is defined as "a requirement . . . which limits the quantity, rate, or concentration of emissions of air pollutants *on a continuous basis*." *Id.* § 7602(k) (emphasis added). An averaging approach qualifies as an "emission standard" or "emission limitation," because covered sources must meet a limitation that applies

EPA has long interpreted the statute to authorize the Agency to determine when an averaging framework is an appropriate emission reduction system for a § 111(d) standard. In one of its first § 111(d) rulemakings after the Clean Air Act Amendments of 1990, EPA's 1995 emission guidelines for existing municipal waste combustors allowed states to establish averaging and trading programs through which these sources could meet standards for nitrogen oxides ("NO_x") emissions.[64]

In addition, the Clean Air Act provides that the procedure for establishing standards of performance for existing sources under § 111(d) is to be "similar" to that of § 110,[65] and § 110 expressly provides that emission limitations and control measures can include "fees, marketable permits, and auctions of emissions rights."[66] The direct link to § 110 thus further reinforces the appropriateness of such flexible approaches under § 111(d).

In the context of § 111 and greenhouse gas emissions, a flexible system that enables a wide variety of available solutions to achieve rigorous and cost-effective carbon pollution reductions manifestly fulfills the statutory criteria for the "best" system.

C. Both EPA and the states can consider broad systems of emission reduction under § 111.

Some stakeholders have proposed that there are systems of emission reduction that states may include in § 111(d) implementation plans that EPA may not consider in identifying the best system of emission reduction. This hypothesis assumes that when EPA identifies the best system of emission reduction under § 111(a)(1) it must ignore certain flexible, cost-effective means of securing emission reductions from fossil fuel power plants, while a state may rely on these very mechanisms in developing a "plan which . . . provides for the implementation and enforcement of such standards of performance" under § 111(d)(1). This contention is directly contrary to the process set forth in § 111, under which EPA must consider cost, impacts on energy, and other factors in identifying the best system of emission reduction; if there are systems of emission reduction that can better optimize pollution reductions considering cost, impacts on energy, etc., EPA must consider such systems in order to identify the best system.

Section 111 requires EPA to determine the best system of emission reduction for existing stationary sources. States then implement the system of emission reduction they deem most appropriate for their sources—which could be more expensive, more stringent, or have different

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continuously. Indeed, Congress used the term "emission limitation" in 1990 to describe its Acid Rain Program. *See id.* §§ 7651b(a)(1), 7651c(a).

[64] 40 C.F.R § 60.33b(d)(2). This provision is still in effect. EPA also designed a trading program for mercury from power plants under § 111(d), 70 Fed. Reg. 28,606 (May 18, 2005), but the regulation of mercury under § 111(d) was found to violate the Act's requirement that hazardous air pollutants be regulated under § 112, *see New Jersey v. EPA*, 517 F.3d 574 (D.C. Cir. 2008), *cert. dismissed*, 555 U.S. 1162 (2009), *and cert. denied*, 555 U.S. 1169 (2009).

[65] 42 U.S.C. § 7411(d)(1).

[66] *Id*. § 7410(a)(2)(A).

energy requirements or non-air impacts on health or the environment—provided that the states' plans secure the same or better emission reductions as the "best system of emission reduction" identified in EPA's emission guidelines. States can also innovate under § 111, and implement cutting-edge systems of emission reduction of which EPA may not have been aware or which it may not have deemed "adequately demonstrated." However, neither the language of § 111 nor EPA's implementing guidelines distinguish between the systems of emission reduction that state plans can implement and the systems of emission reduction that EPA is to review in identifying the "best system of emission reduction." The systems of emission reduction to be evaluated by EPA and the systems that can be implemented by the states share the same legal contours. As such, for EPA to ignore well-known and adequately demonstrated systems of emission reduction that achieve greater emission reductions and satisfy the other statutory criteria would be arbitrary. Indeed, if EPA were to adopt a narrow scope of inquiry, closing its eyes to what states are doing, and identify a "best system" that failed to achieve meaningful emission reductions—and then approve state plans implementing other systems capable of achieving greater emission reductions cost-effectively—the Agency would clearly violate its statutory responsibility to identify the best system of emission reduction.

V. Conclusion

Across the country, states and power companies are reducing emissions from fossil fuel fired power plants by improving plant efficiency, by increasing the use of lower-carbon generation capacity and zero-emitting energy, and by investing in demand-side energy efficiency and demand management. The widespread and long-established use of this system and its success in achieving cost-effective carbon pollution reductions for diverse states and companies indicate that it satisfies the statutory criteria for the "best system of emission reduction." This system allows states and companies to adjust to locally relevant factors and generation-fleet characteristics, deploying the emission reduction strategies most appropriate and effective. The language of § 111 is sufficiently broad to encompass a system-based approach to securing carbon pollution reductions from existing power plants. Indeed, the constraints provided by § 111—directing EPA to identify the system of emission reduction best able to secure rigorous carbon emission reductions considering cost and impacts on energy and other environmental considerations—strongly suggest that a system-based approach is optimal in satisfying the statutory requirements by securing the vital cuts in carbon pollution that science demands through locally-tailored and innovative solutions.