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Efficiency Rules

The Case for End-Use Energy Efficiency Programs in the Section 111(d) Rule for Existing Power Plants

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Executive Summary

Robust discussions are underway about EPA's options for crafting greenhouse gas emission guidelines for existing power plants. The discussions reflect widespread agreement that end-use energy efficiency is a cost-effective method for reducing greenhouse gas emissions. Yet stakeholders diverge on the role energy efficiency programs should play in the guidelines.

The Clean Air Act authorizes greenhouse gas performance standards for existing power plants based on emission reductions achievable across the power sector. Therefore, end-use energy efficiency may be considered an eligible system of emission reduction. Moreover, EPA must set emission guidelines based on the "best system of emission reduction" that has been "adequately demonstrated," and must tighten standards when "emission limitations and percent reductions beyond those required by the standards . . . are achieved in practice." These statutory directives establish the "symmetry principle:" any adequately demonstrated system of emission reduction available for compliance with a performance standard must also drive the standard's stringency.

End-use energy efficiency programs have been adequately demonstrated as cost-effective methods for achieving energy savings and reducing air pollution. Stakeholders support these programs to comply with performance standards. Under the symmetry principle, EPA must then account for achievable emission reductions from end-use energy efficiency programs in setting the stringency of its emission guidelines for existing power plants.

Stakeholders also debate the existence of reliable protocols for measuring and verifying emission reductions from energy efficiency. Over the last 30 years, the Department of Energy (DOE), States, electric utilities, energy service contractors, and regional grid operators have developed methods for measuring energy savings from energy efficiency programs. Parties rely on these methods to enforce energy efficiency mandates, to calculate utility rates, incentives, and energy service contract compensation, and to maintain reliability of the electric grid. EPA has developed methods for converting energy savings from energy efficiency into emission reductions, and States have used these mechanisms to demonstrate compliance with Clean Air Act requirements. EPA should reference established energy efficiency measurement and verification protocols when setting minimum standards in its power plant guidelines.

Efficiency Rules

The Case for End-Use Energy Efficiency Programs in the Section 111(d) Rule for Existing Power Plants

EPA has proposed New Source Performance Standards (NSPS) for cutting greenhouse gas (GHG) emissions from new fossil-fuel burning power plants.[1] In parallel or directly following promulgation of new source standards, Section 111(d) of the Clean Air Act directs EPA to issue guidelines for States to follow when implementing performance standards from existing power plants.[2]

Existing power plant guidelines could drive significant GHG reductions in the electricity sector.[3] However, due to the relatively small universe of pollutants covered by Section 111(d), EPA has triggered this provision infrequently. Therefore, EPA has not explored the full potential of options for setting an existing source standard, and courts have set no boundaries in this regard. This paper discusses the flexible contours of Section 111(d) and establishes the potential for end-use energy efficiency (EE) programs to drive existing source guidelines and meet the corresponding performance standards.

Introduction

Robust discussions are underway about EPA's options for crafting GHG guidelines for existing plants.[4] These discussions reflect widespread agreement that EE is a cost-effective method for reducing GHGs.[5] States, industry, and environmental groups alike have asked EPA to consider incorporating these types of programs into the Agency's power plant guidelines.[6]

> Given the flexible contours of Section 111(d), EPA could consider achievable emission reductions from end-use energy efficiency (EE) programs to drive existing source guidelines and authorize their use to meet the corresponding performance standards.

Stakeholders diverge, however, on EE's precise role. Some organizations urge EPA to include these programs as part of the "best system of emission reduction" (BSER) for power plants, and therefore for EE to drive the stringency of the performance standard.[7] Other organizations argue that performance standards should be based on a narrower universe – what reductions are achievable within the fence line of an emitting source – but that EE should be available as an equivalent means of complying with that standard.[8] One industry group, the National Climate Coalition (NCC), acknowledges that EE programs could be part of the BSER, if they "develop to the point where they offer a consistent, adequately demonstrated and cost-effective compliance pathway."[9] Until then, the NCC believes EE should only be used for crediting avoided emissions to generators.[10]

If serious questions did exist about EE, it would be inappropriate to rely on these programs for compliance. However, this paper argues that EE is an adequately demonstrated method for achieving cost-effective GHG emission reductions. The results of EE programs are consistent enough for grid operators, states, utilities, and energy service companies to rely on them for many financial and legal purposes. EE's well-established reliability supports its use for compliance purposes *and* qualifies EE as part of the BSER. Regardless of the form EPA's emission guidelines take, the Agency would be on solid legal footing to set their stringency based in part on EE's demonstrated ability to achieve emissions reductions.

Section 111(d) Authorizes EPA to Define a Best System of Emission Reductions for the Power Sector

Section 111(d): Legal Framework

Section 111(b) of the Clean Air Act directs EPA to publish a list of categories of stationary sources that in the Agency's judgment, "cause[ ], or contribute[ ] significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare."[11] EPA sets standards of performance for new sources in each category.[12] Under Section 111(d), EPA issues emission guidelines for existing sources in the same category;[13] States then implement performance standards that are "no less stringent than the corresponding emission guideline(s)."[14]

Some have argued that Section 111 requires all emission reduction measures to occur due to action taken at a source.[15] However, the language of the statute does not support this contention. The heart of the Section 111 program is the standard of performance, defined in Section 111 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 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.*[16]

This definition does not limit EPA's consideration of emission reduction systems to those that are implemented at a source or facility. To the contrary, the breadth of the "best system of emission reduction" and the fact that the Clean Air Act provides no definition for this term implies a broad delegation of authority, providing EPA with flexibility in setting and approving performance standards. The definition's multi-factor balancing test provides some guidance, while enabling the Agency and the States to craft cost-effective standards that make sense for each source category.

The rest of Section 111 likewise supports EPA's broad inquiry into "adequately demonstrated" systems. There is no language requiring the performance standard to be achieved *at each* source. Section 111(b) directs EPA to set standards of performance "for new sources";[17] Section 111(d) requires states to "establish[ ] standards of performance for any existing source".[18] These provisions do not constrain the setting of performance standards to systems of emission reduction occurring within the source's fence line.

Section 111(d) goes further in supporting consideration of all "systems of emission reduction" across a category of existing sources. First, when describing the process for setting existing source standards, Section 111(d) references

Section 110,* which contemplates the use of "economic incentives such as fees, marketable permits, and auctions of emissions rights."[19] Under Section 110, EPA and the States previously established a "beyond the fence line" pollution trading programs to limit smog and soot from power plants.[20] By referencing Section 110, Section 111(d) incorporates its list of approved measures for emissions reductions, including market-based, system-wide programs.[21]

Second, Section 111(d) authorizes EPA and the States to consider "other factors" when establishing existing source guidelines and standards.[22] Here, "other factors" should include the pollutants and the source category at issue. GHGs are ubiquitous and well-mixed in the atmosphere. Pollution trading programs can lead to "hot spots" of pollution, particularly with pollutants that have strong localized effects, such as soot or heavy metals. This is not a concern with GHGs,[23] making them particularly amenable to category-wide emission reduction approaches.

In addition, electric generating units are more integrated than other source categories regulated by the EPA. The electricity grid is a system of interconnected generators and consumers, operated on a regional basis.[24] Grid operators** generally dispatch generating facilities to meet demand in a cost-effective way. If a generator is unavailable or demand increases, the system operator calls on other facilities to operate or increase output to make up for the shortfall. Similarly, when demand decreases, a system operator will order facilities to shut down or reduce their output. This integration supports consideration of the entire system when setting performance standards.

EPA has issued Section 111(d) guidelines based on systems of emission reduction beyond the fence line of each source. Specifically, EPA has authorized pollution trading among sources in two Section 111(d) rules.

In sum, the statute provides significant discretion to EPA, while setting forth a multi-factor analysis that requires EPA to evaluate cost, energy requirements, and health and environmental benefits to arrive at the *best system* of emission reductions. By relying on this test, incorporating Section 110 by reference, and enabling consideration of "other factors," Section 111(d) authorizes EPA to consider measures that reduce emissions from the source category, whether they are implemented within or beyond the fence line of any particular source.

EPA's Previous 111(d) Regulations

In 1975, EPA issued general rules governing the submission and review of State's Section 111(d) plans.[25] EPA has also issued health-based*** guidelines under Section 111(d) for eight types of existing sources: landfills; municipal waste

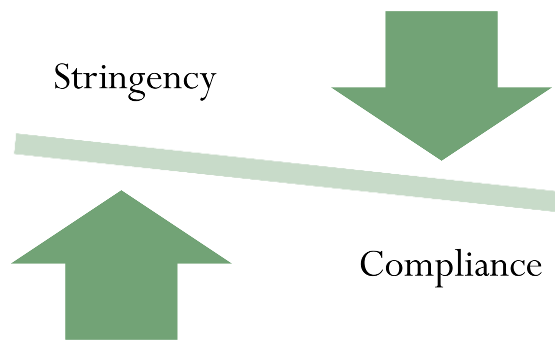
* Some have argued that the reference to Section 110 in 111(d)(1) is intended to establish a process only and does not incorporate Section 110's substantive requirements. *See* HUNTON & WILLIAMS, *supra* note 4, at 3-4. However, the procedure set forth in Section 110 requires State plans to include all substantive provisions that are "necessary or appropriate to meet the applicable requirements" of the Clean Air Act, 42 U.S.C. § 7410(a), and directs EPA to set substantive criteria, review State plans for compliance with those criteria, and disapprove non-compliant portions, 42 U.S.C. § 7410(k). Thus, the substantive provisions in Section 110 are embedded in and inextricably linked with the procedure.

** Grid operators are responsible for balancing supply of electricity from generators with consumer demand for power across their regional territories. Operators instruct generators how much to produce and ensure that the system has adequate reserves available. Grid operators include independent entities, such as PJM, private utilities, and Federal government entities.

*** EPA's rules establish a less formal process for Section 111(d) guidelines relating to welfare-based pollutants. *See* 40 C.F.R. § 60.22(d)(1). EPA has issued welfare-based guidelines for fluoride emitted from phosphate fertilizer plants and primary aluminum plants, and total reduced sulphur emitted from kraft pulp mills.

combustors; two other categories of commercial and industrial solid waste incinerators; sulfuric acid plants; medical waste incinerators; sewage sludge incinerators; and coal-fired power plants. Standards for seven remain in full effect. The D.C. Circuit vacated the eighth rule on threshold grounds but passed no judgment on the rule's design.[26]

While the 1975 general rules do not mention off-source reduction measures, EPA has issued Section 111(d) guidelines based on systems of emission reduction beyond the fence line of each source. Specifically, EPA has authorized pollution trading among sources in two Section 111(d) rules. In 1995, EPA authorized States to establish a nitrogen oxides trading program for municipal waste combustors.[27] A decade later, EPA authorized States to establish a mercury-emissions trading program for coal-fired power plants.[28] The Agency issued an initial guideline based entirely on reductions achievable through a cap-and-trade program,[29] and a "phase 2" standard based on the trading program and add-on pollution controls.[30]



The Symmetry Principle

As discussed, the flexibility to apply a system of emission reductions across a category of existing sources is particularly relevant when addressing GHG pollution from electric generators. In fact, any adequately demonstrated system of emission reduction eligible for compliance with a performance standard must also drive the standard's stringency. Support for this "symmetry principle" may be found in the language of Section 111 and in the case law.

Under Section 111, EPA must set performance standards based on the best system – according to the provision's multi-factor test – that has been "adequately demonstrated."[31] Any system that has been adequately demonstrated, then, must be considered when setting the standards.

Courts have required that the starting point for setting a performance standard is actual practice in the source category, a rule described by the D.C. Circuit as "achievable because it has been achieved."[32] Prior Section 111 cases have turned on how far above this floor EPA may go in setting a standard; generally, courts will uphold standards that are more stringent than what is currently achieved, so long as they are based on "what may fairly be projected for the regulated future."[33]

In a parallel example, the D.C. Circuit rejected a performance standard where EPA's prescribed method for demonstrating compliance did not correlate to and was far more stringent than the test EPA had used to set the standard.[34] In the Court's view, the discrepancy between the standard and the compliance method implied that the standard might not be "achievable."[35]

Generally, Section 111 case law was developed in response to industry challenges that a standard was too stringent. However, the principles established – that "achievable" constitutes a combination of what "has been achieved" and "what may fairly be projected, " and that methods for determining compliance should track the methods used for setting the standard – should apply equally to ensure that a standard is not too weak to meet statutory requirements.

Once standards have been set, statutory requirements continue to support the symmetry principle. EPA must tighten standards "[w]hen implementation and enforcement of any requirement in this chapter indicate that emission limitations and percent reductions beyond those required by the [existing] standards . . . are achieved in practice."[36] Congress directed EPA to conduct standards reviews "at least" every 8 years,[37] or upon a showing by a State that "a new, innovative, or improved technology . . . has been adequately demonstrated."[38][*] EPA has followed this statutory directive; for instance, in 2006, the Agency tightened dioxin/furan and mercury guidelines for new and existing municipal waste combustors, "to reflect the actual performance levels being achieved by existing . . . units."[39]

Compliance may outpace the BSER temporarily; however, EPA must then revise standards to capture the technological advance. It would be inconsistent with this statutory scheme to set a weak standard that adequately demonstrated systems already achieve and exceed.

End-Use Energy Efficiency Should be Part of the Best System of Emission Reduction for GHGs in the Power Sector

EPA is exploring how to design a Section 111(d) guideline "that recognizes and builds off efforts already underway to reduce CO_2 emissions from the power sector, provides flexibility for states to adopt measures that meet the reduction goals, and accommodates the diverse needs of states."[40] When the Agency looks across the category of existing power plants to identify the BSER, end-use EE should stand out as a key component.

End-use EE reduces energy consumption at the point of electricity consumption. Policies and programs to increase end-use EE are diverse and include adoption of updated building codes, installation of efficient lighting in government buildings, and rebates and financing for private installation of more efficient appliances.[**] EE is ripe for inclusion as part of the "best system of emission reduction" for existing power plants because it is adequately demonstrated and cost-effective, imposes minimal environmental costs, and reduces overall energy requirements.

[*] Some have argued that the 8 year look-back requirement does not apply to Section 111(d) standards, and that Section 111(g)(4) offers the exclusive mechanism for reviewing existing source standards. However, Section 111(b) refers to "revising standards promulgated under this *section*" which covers all of Section 111, including 111(d). 42 U.S.C. § 7411(b)(1)B).

[**] In the Clean Air Act Amendments of 1990, Congress allowed utilities to earn emission allowances in exchange for completing EE or renewable energy projects. EPA compiled a list of pre-approved measures. *See* 40 C.F.R. § 73, app. A, § 1.

As noted above, Section 111 requires the BSER to be "adequately demonstrated." The D.C. Circuit has described "[a]n adequately demonstrated system" as:

> one which has been shown to be reasonably reliable, reasonably efficient, and which can reasonably be expected to serve the interests of pollution control without becoming exorbitantly costly in an economic or environmental way."[41]

Case Study: Translating EE into Air Quality Impacts

Texas
In 2008, EPA approved a Texas plan to achieve NO_x emission goals in part through energy efficiency. At the request of the State, a university energy lab modeled the effect that new state-mandated building codes would have on electricity consumption. The lab then distributed the savings across regional power plants, based on their capacities and historic utilization rates to determine the air quality impacts.

EE programs meet this standard because they have a track record of achieving real energy savings. Customers of State-regulated utilities have been funding EE since the late 1970s.[42] At least 44 States and the District of Columbia currently operate EE programs, with budgets totaling nearly $6 billion.[43] More than half of all States also set and enforce EE targets for utilities.[44] As detailed below, energy savings from these programs are relied upon by State regulators, regional electric grid operators, and government and private sector parties to energy service contracts.[45]

EE programs are also cost-effective and have positive impacts on health and the environment. Not only has EPA endorsed EE as "a low cost, vital first step toward reducing GHG emissions",[46] but industry analysts, states, and environmental organizations broadly agree that EE is the most cost-effective method available.[47] EE also imposes minimal environmental costs, particularly when compared to other forms of emission reduction. Add-on pollution control technologies consume energy and can generate solid waste. Even renewable energy siting can disturb wildlife and critical habitat. In contrast, EE programs reduce electricity consumption and related water use, generate little waste, and take up virtually no space. Indirectly, because about two-thirds of U.S. electricity is generated using coal, oil, and natural gas,[48] EE-driven energy savings can mitigate health and environmental effects associated with the extraction, processing, and transportation of fossil fuels.

These attributes of EE – established, reliable, cost-effective, and environmentally friendly – have led many stakeholders to advocate for using EE as a compliance method for GHG performance standards. Under the symmetry principle, these same factors establish that EE programs must drive the stringency of the performance standards.

EE as a Work Practice Standard

Section 111 authorizes the use of a work practice standard where "it is not feasible to prescribe or enforce a standard of performance,"[49] including where "the application of measurement methodology to a particular class of sources is not practicable due to technological or economic limitations."[50] Work practice standards are enforceable against a source in the same way as a numerical limitation.[51]

EPA may jointly require numerical emission limitations and work practice standards. For instance, in its 1997 medical incinerator rule, EPA set numerical limitations for carbon monoxide, mercury, and seven other pollutants.[52] In addition, EPA required sources to implement a waste management program as a work practice standard.[53]

As this paper describes, reliable methods exist for measuring and verifying emission reductions from EE programs. Therefore, EPA and States can set numerical emission limitations based on achievable energy savings from EE. However, at the very least, EPA should require energy savings from EE as a work practice standard.

Energy Efficiency Meets Emission Reduction Crediting Standards under the Clean Air Act

In discussions about GHG performance standards for existing power plants, stakeholders also debate the rigor of existing protocols for measuring, verifying, and crediting EE emission reductions. EPA has been designing Clean Air Act-compliant approaches for valuing and crediting off-source emissions reductions for 30 years. Over this same period, States, electric utilities, and, more recently, regional electric grid operators have been measuring and verifying energy savings from end-use EE. Meanwhile, States, EPA, and Congress have suggested methods for converting those energy savings into emission reductions. Together, these well-established approaches can inform a robust EE program under Section 111(d).

EPA began exploring multi-facility emissions crediting in the 1970s, initially by defining "source" expansively to include multiple emission units on contiguous or adjacent properties.[54] After the Supreme Court upheld this approach,[55] EPA updated its "Emissions Trading Policy Statement" to expand the use of off-source emission reductions to meet Clean Air Act requirements.[56*]

EPA established four basic elements for eligibility as an Emission Reduction Credit.[57] Each credit must be:

- Enforceable;
- Permanent;
- Surplus; and
- Quantifiable.

For twenty-five years, States have analyzed potential emissions reductions using these factors. EPA has discussed these factors in a number of subsequent rulemakings, and most recently in its Roadmap for Incorporating Energy Efficiency/Renewable Energy Policies and Programs into State and Tribal Implementation Plans (2012 Roadmap).[58] These long-standing factors demonstrate that EE meets the threshold requirements for off-source crediting, and under the symmetry principle, support EE's inclusion in the BSER for existing power plants. The factors are helpful guideposts for a discussion about EE in the Section 111(d) context.

Emission Limitations Based on EE Are Enforceable

EPA requires Clean Air Act emission reductions to be federally enforceable.[59] The Clean Air Act authorizes EPA to enforce violations of any "requirement or prohibition of any rule, plan, order, waiver, or permit [that the Agency] promulgated, issued, or approved".[60] Under that authority, once it approves a Section 111(d) plan, EPA may directly enforce any standard set forth in the plan.[61] This backstop authority exists in the event a State declines to enforce.

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[*] Some commentators are proposing that EPA establish or authorize States to establish formal trading programs under Section 111(d). The merits of this proposal are beyond the scope of this paper. The EPA trading guidance is general enough to apply to trading programs or other crediting systems.

To ensure that its enforceability is intact, when reviewing a State plan EPA determines whether the plan facilitates practical enforcement. EPA has established generic enforcement criteria for States to follow, including that the plans specify: (1) a technically accurate limitation; (2) the time period for the limitation; (3) the method to determine compliance including appropriate monitoring, record keeping, and reporting; (4) the categories of sources that are covered by the rule; and (5) enforcement consequences for non-compliance.[62]

The simplest way for a State to establish enforceability of a Section 111(d) performance standard would be to specify a GHG intensity rate or mass emissions cap, measured over a certain time period in a particular way, for each source or group of sources. The plan would then specify penalties for sources that fail to meet the specified rate or cap.

If EE is part of the BSER, generators may not be directly responsible for achieving these reductions. Many well-established EE programs are administered by State-created entities or utility distribution companies that do not own generators. Outside of traditionally regulated states, where a vertically integrated utility generates and distributes electricity, many generators will have neither legal control nor a financial interest in State EE programs. While this structure can pose an enforcement challenge, the situation is not unique. Emitting sources often rely on third parties to meet Clean Air Act requirements. Even when purchasing control equipment for emission reductions at the plant, sources depend on third parties to meet compliance obligations and "control their compliance risks by choosing carefully among vendors and by negotiating for appropriate guarantees."[63]

That said, a performance standard that contemplates reliance on multiple off-source systems will be more complex than a standard based on a single pollution control device at a source. Given this, EPA's guidelines could offer additional assurance to sources without compromising the performance standard or undermining State EE programs.

For instance, the guidelines could:

1. **Require State Liability for Distribution Companies and Other EE Program Administrators.** As noted, many well-established State EE programs are administered by utility distribution companies. Some States have developed strong accountability and enforcement mechanisms, to ensure the projected energy savings from EE are realized. For instance, Pennsylvania law requires each large distribution company to achieve specified energy savings and peak demand reductions by a date certain.[64] A Public Utilities Commission order details methods of measuring compliance and authorizes the distribution companies to recover EE investment costs.[65] If the distribution companies do not achieve the specified energy savings and peak demand reductions, they are subject to penalties of not less than $1 million.[66] These types of provisions make an EE program more robust and the predicted energy savings more reliable.

   EPA's guidelines should suggest that State EE programs include similar provisions to ensure that the State can enforce EE requirements against the EE program administrators. The States need not directly incorporate their EE program provisions into the Section 111(d) plan. Instead, a State plan could articulate a performance standard for existing power plants, and then state that some amount or percentage of that standard is expected to be achieved through energy savings generated by State-mandated EE. The plan would reference the relevant state law, and describe the enforcement mechanisms in place to hold the EE program administrators accountable. The plan would then specify how a power plant could earn credit for energy savings from these EE programs.

2. **Authorize an Affirmative Defense to Penalties for Reliance on State-Mandated EE.** A State plan that relies on State-mandated EE and references robust state laws that ensure the program's integrity, could operate in tandem with an affirmative defense to penalties.

   The Clean Air Act enables EPA to consider a source's "good faith efforts to comply" when determining penalty amounts.[67] Courts have deferred to EPA's interpretation that this provision authorizes narrowly tailored affirmative defenses to Clean Air Act penalties.[68] EPA has authorized States to provide affirmative defenses in State Implementation Plans for excess pollution during plant startup, shutdown, and malfunction (SSM) periods, so long as the violation does not violate a national air quality standard and may still be addressed through injunctive relief.[69]

   EPA could establish a similar policy for reliance on State-mandated EE programs. If EE emission reductions from these programs fell short of projections, sources could argue that they should not be assessed Clean Air Act penalties for that portion of their compliance obligation. The sources would remain responsible for making up the emission reductions shortfall. Any source that failed to achieve the additional reductions within a specified time frame would be subject to Clean Air Act penalties.

3. **Require Certifications from Other EE Providers.** States could decide to limit eligible EE emission reductions to those provided through a State or distribution company EE program. Those larger entities can serve as gatekeepers to assure quality control. Alternatively, States could allow other EE providers, such as energy service companies or commercial or industrial entities with large electric loads, to provide EE credits to generators for compliance with the performance standard. In those cases, it could be inefficient and harder to enforce against each of these smaller EE generators. However, State plans could hold these EE providers to the same standards imposed on distribution companies by requiring certifications about their estimated emission reductions. If the EE program turned out to be fraudulent or grossly underperforming, States could use the certifications to impose penalties on these EE providers. This would incentivize EE providers to offer real services with an accurate accounting of the results.[70]

Beyond the generic enforceability criteria, EPA has also suggested that States require audits of emission reduction programs, "to evaluate the program's performance . . . and the effects of reconciliation measures . . . taken as a result of previous audit findings."[71] Reconciliation measures could include enhanced monitoring, adjustments to EE credit values or projections based on demonstrated availability and efficacy, increased penalties, or a makeup of missed reductions.[72] EPA could require States to build the cost of audits into funding for the EE programs.[73]

EE Drives Permanent GHG Emission Reductions

EPA has noted that "[p]ermanence may generally be assured by requiring federally enforceable changes in permits or applicable State regulations."[74] The Agency's 2012 Roadmap says that States should demonstrate emissions reductions are "permanent" by adopting the EE program in a regulation or enacting it into law.[75] Notably, the Roadmap defines "permanent" as continuing through the attainment year (or other compliance period).

The 2012 Roadmap also suggests that one way to ensure the success of EE programs is to secure continued support and funding. Most States have some funding commitments in place, although funding levels range widely. States with existing programs and adequate funding commitments should include those provisions in their Section 111(d) plans for EPA review and approval. Where States cannot guarantee specific amounts of long-term funding for EE programs, EPA could suggest that the plans identify likely sources of sufficient funding, such as surcharges on utility bills or bond issuances.

EE Drives Surplus Emission Reductions

In 1986, EPA defined "surplus" emission reductions as those reductions "not required by current regulations in the SIP, not already relied on for SIP planning purposes, and not used by [a] source to meet any other regulatory requirement."[76] Whether an emission reduction is surplus, then, does not demand a metaphysical determination about whether the EE program would ever have been undertaken in the absence of a Section 111(d) guideline. Instead, surplus EE emission reductions are those reductions not already incorporated in an established baseline, or relied upon to demonstrate compliance with another Clean Air Act program.

To demonstrate that an EE program is surplus, a State would first need to project its electricity demand and associated emissions without an EE program, starting from a baseline year. EPA might consider setting an early baseline date, to reward early-actor States while giving other States time to ramp up their EE capacity. In the last ten years, funding for State electric efficiency programs has quadrupled.[77] However, State's EE investments range from less than $1 to nearly $80 per capita.[78] Setting a baseline year that predates the most recent wave of EE investment rewards early-actor States while enabling other States to catch up by passing EE legislation where needed, writing EE requirements, and funding EE programs.

EPA's guidelines could require that States affirm that reductions from EE programs included in the submitted plans have not been modeled in SIP baselines, or relied on to demonstrate compliance with another Clean Air Act program.[79]

EE Emissions Reductions are Quantifiable

EPA contemplates a broad range of quantification methods for "estimating" emissions, including "emission factors, stack tests, monitored values, . . . modeling, or other *reasonable* measurement practices."[80*] In the 2012 Roadmap, EPA considered emissions "quantifiable if someone can reliably measure or determine their magnitude in a manner that can be replicated."[81] So long as EPA's guidelines for EE quantification are "reasonable" and "reliable," the Agency has the flexibility to draw from existing and trusted methods to measure and verify EE. Quantifying emissions reductions from EE programs is a two-step process:

1. Projecting the energy savings due to an EE program; and then
2. Translating these savings into air quality impacts.

The DOE, States, electric utilities, energy service companies, and regional grid operators have deep experience with the first step. EPA has developed methods for converting energy savings from energy efficiency into emission reductions, and States have used these mechanisms to demonstrate compliance with Clean Air Act requirements. EPA should reference established EE measurement and verification protocols when setting minimum standards in its power plant guidelines.

[*] The Agency further suggested that "[t]he same method of calculating emissions should generally be used to quantify emission levels both before and after the reduction," 51 Fed. Reg. at 43832. Thus, if States use emission factors to set the performance standard, they should generally use emission factors to determine compliance as well.

Case Study: Translating EE into Air Quality Impacts

Washington, DC
In 2011, EPA approved a plan to reduce ozone pollution in the District of Columbia. The plan included modest reductions in NOx emissions from installation of efficient traffic lights. A consulting group used EPA Energy Star guidelines to calculate the energy savings. Then, the group distributed efficiency gains on an hourly basis across fossil-fuel fired power plants in the region that were operating at less than full capacity to arrive at the emission reductions.

Step One: Measuring and Verifying Reductions in Energy Consumption

At least 35 States have established protocols for measuring and verifying energy savings from EE.[82] Typically, utilities in regulated States and distribution companies in restructured States are responsible for quantifying and reporting EE program results to State regulators. Approximately twelve States are directly involved in this process, through State-created organizations such as Efficiency Vermont or Wisconsin's Focus on Energy, public utility commissions, or agencies.[83] Regulators, utilities, grid operators, project developers, and other firms that invest in efficiency rely on these calculated savings from EE programs, in a number of settings.

By 2013, twenty-six States had energy efficiency resource standards (EERS) that required utilities to meet efficiency targets. State regulators rely on established quantification protocols to determine compliance with these standards. By mid-2012, twenty-three States offered incentives to utilities achieving savings beyond the State's target. Thirteen States compensated utilities for energy reductions from EE in ratemaking calculations.[84] States, utilities, ratepayer advocates, and other interested parties bring their expertise and different interests to bear in regulatory proceedings, which present opportunities to scrutinize EE program results.

Two of the largest regional grid operators in the U.S., PJM and ISO-New England, allow developers to bid EE projects into capacity markets. As the name of these markets implies, capacity markets ensure that the electricity system has sufficient capacity to meet peak demand. In these auctions, EE resources are treated identically to generation – increasing supply by adding generation is compensated the same amount as reducing demand due to EE.[85] To encourage accurate savings projections (thereby ensuring grid reliability), the grid operators require robust reporting, can audit projects, and assess penalties for underperformance.[86]

More than 40 States encourage agencies to negotiate energy service performance contracts.[87] In these contracts, compensation paid to the energy service company is based at least partially on projected energy savings. Energy service companies have the incentive to achieve promised results to receive full compensation. Meanwhile, the private party or government entity contracting with the energy service company is motivated to track actual reductions to avoid overpayment.

These stakeholders have developed methods to measure and verify energy savings from EE programs and have relied on these methods for enforcement purposes, electricity rate setting, grid reliability, and contract compensation. EPA should reference these methods and established procedures when setting minimum standards in its 111(d) guidance.*

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* *See, e.g.*, Tina Jayaweera, et. al., *The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures*, NAT'L. RENEWABLE ENERGY LAB. (2013); EFFICIENCY VALUATION ORGANIZATION, INTERNATIONAL PERFORMANCE MEASUREMENT AND VERIFICATION PROTOCOL: CONCEPTS FOR DETERMINING ENERGY AND WATER SAVINGS (2007); CALIFORNIA PUB. UTILS. COMM'N, CALIFORNIA ENERGY EFFICIENCY EVALUATION PROTOCOLS: TECHNICAL, METHODOLOGICAL AND REPORTING REQUIREMENTS FOR EVALUATION PROFESSIONALS (2006).

Reliance on State procedures is consistent with an explicit Congressional directive in the acid rain program. Title IV of the Clean Air Act allows generators to earn emission allowances for EE projects, but only if a State has approved the projects.[88] EPA's implementing regulations specify that when applying for EE allowances, a generator should use the State's measurement and verification procedures.[89] EPA reserves the right to conduct its own review.[90]

Step Two: Translating Energy Reductions into GHG Emission Reductions

EPA has not determined whether the existing power plant performance standards should be "rate-based" (i.e., expressed as pounds of GHG per megawatt hour of electricity) or "mass-based" (i.e., expressed as total tons of GHGs), and whether they should apply to each source or to a group of sources across a State.[91] The relative merits of these approaches are beyond the scope of this paper; what is important is that EE is amenable to any approach.

As noted, the magnitude of a quantifiable emission reduction can be estimated using any "reasonable" method.[92] There are at least two types of reasonable methods for quantifying EE emission reductions: converting EE energy savings into GHG emission reductions using an emission factor; and, treating EE as zero emission generation.

To illustrate these approaches, it helps to consider a scenario where only EE is used to establish a performance standard.[*] EPA would begin by setting a guideline based on a level of EE that has been adequately demonstrated. This could be done by reviewing actual megawatt hour reductions achieved in States with EE mandates. The Agency could translate achievable EE into an emission rate or mass budget for each source or for all sources in a State.

Case Study: Translating EE into Air Quality Impacts

Louisiana

In 2005, EPA approved a Louisiana plan to attain the 8-hour ozone standard in part by conducting EE retrofits in 33 municipal buildings in the Shreveport area. At the State's request, the National Renewable Energy Lab quantified the emission reductions expected from the energy savings guaranteed in the contract between the City of Shreveport and an energy services company. The Lab compared results of three methods and concluded that a simple approach, using the average emission rate of all non-baseload plants in the

Each State would then derive a standard no less stringent than EPA's guidelines,[93] based on EE energy savings and their corresponding GHG emission reductions. To do this, each State would convert its achievable energy savings from EE into the tons of GHG avoided over a period of time (for a mass-based program), or a rate of avoided pounds of GHG for each megawatt hour of electricity generated (for a rate-based program).

Quantifying EE for a Mass-Based Standard

Under a mass-based approach, the State would calculate a budget of GHG emissions. First, the State would calculate its total avoided emissions by multiplying its achievable EE energy savings by an emission factor, provided by EPA and expressed as pounds of GHG reduced for every avoided megawatt hour in that State. Second, the State would subtract these avoided emissions from its baseline emissions, to arrive at a budget. Compliance with the State's achievable EE savings could then be monitored using well-established methods described above under Step One.

[*] In fact, EPA could set emission guidelines based on a number of adequately demonstrated systems of emission reductions across the sector. Each state could then set standards as stringent as the guidelines, based on some or all of those systems.

EPA could set EE emission factors a number of ways. In the 2012 Roadmap, EPA suggested four ways to craft an emissions factor, based on regional average emission rates, generator-specific data (such as size, capacity factor, hourly generation) or dispatch modeling.[94] EPA has approved SIPs that included EE energy savings calculated using these techniques (see insets).

Any of these four methods could be used by EPA to calculate emission factors that estimate avoided emissions for each megawatt hour of energy savings. Moreover, these approaches are not the only "reasonable" methods for estimating GHG reductions from EE. Other methods have been suggested as well.[95]

Quantifying EE for a Rate-Based Standard

Under a rate-based approach, the State would calculate the target rate in pounds of GHGs per megawatt hour that it would need to achieve to meet EPA's guidelines. Again, the State could use the EE emission factor created by EPA to calculate the energy savings that EE programs must achieve to meet the standard.[96]

Alternatively, each State could treat EE as zero emission generation. The State would start with a baseline emission rate, computed by dividing the total GHG emissions from all fossil-fuel generators in the State by their total output in megawatt hours. To determine the State's new rate based on achievable energy savings from EE, the State would add the megawatt-hours that could be avoided by EE programs to the denominator. The calculation would look like this:

$$\text{New Emission Rate} = \frac{\text{Emissions from Fossil Fuel Generators and Zero-Emission Generators}}{\text{Output at Fossil Fuel Generators (MWh)} + \text{MWh of Energy Savings from EE}}$$

The new emission rate would be the performance standard, so long as it was at least as stringent as EPA's guidelines.

Treating EE as zero emission generation reflects that end-use EE is a substitute for generating additional energy; EE provides *the same level of performance* as using more energy, but emits no pollution.[97] As discussed above, PJM and ISO-New England, two interstate grid operators, already treat EE identically to generation in markets designed to ensure reliability.

It is instructive to note the simple method for estimating EE emission reductions that Congress provided in Title IV of the Clean Air Act. To credit EE towards sulfur dioxide caps, Congress directed sources to multiply each kilowatt-hour avoided by .0004, and to divide the result by 2000.[98] Each of the approaches discussed here are more nuanced and more geographically appropriate than the straightforward accounting method sanctioned by Congress.

Interstate Effects

Because the electric grid is interconnected, EE programs in one State may decrease output and therefore emissions at generators in neighboring or even non-contiguous States. This has raised questions about how States would credit avoided emissions from EE in a Section 111(d) plan. EPA's guidelines could address this issue in one of three ways.

First, EPA could authorize crediting emission reductions to the State that implemented the EE program, regardless of the location of the sources that actually lowered their output. This simple approach reduces administrative burden, and incentivizes investment in EE by removing the "free rider" risk, and reflects the fact that GHGs are well-mixed in the atmosphere and reductions anywhere will have the same effect.

Again, the Agency can rely on past guidance for support. The Agency has stated that in general, "to avoid complex accounting problems, EPA will deem [credits] created in another State to contribute to progress in the State where used."[99] While this quote contemplates an interstate trading scheme, the point is that EPA has sanctioned crediting that rewards the EE program investor or purchaser of EE credits rather than the source that incidentally benefits.

Second, EPA could instead create State-specific emission factors that discount for interstate effects. EPA recently explained that because electricity demand is met jointly by generation resources throughout the region, emission reductions from EE programs occur at plants throughout the region.[100] Discounting emission factors so a State only gets credit for emission reductions occurring at plants within its borders would more closely estimate the in-state emission reductions of an EE program. This approach is more complicated and might dampen the incentive of a State that relies on out-of-state generation from investing wholeheartedly in EE programs for Section 111(d) compliance. However, EPA's discounts could also reduce the risk that neighboring States might double-count emission reductions from the same plant in their region.

Third, EPA's guidelines could encourage States to forge regional compliance strategies under Section 111(d). EPA suggested this approach in 1995, advising States to enter into Memoranda of Understanding to link State-based programs.[101] Northeastern States have used this approach to form an interstate GHG trading program for power plants.[102] The Northwestern Energy Efficiency Alliance, a non-profit with more than one hundred public and private utility members, has launched utility-led interstate programs. Regions may take different approaches. Pacts among States or utilities may facilitate compliance determination, relieve complications about the interstate effects of EE, and further reduce compliance costs.

Conclusion

The Clean Air Act affords flexibility in setting performance standards, particularly for existing sources. Under the symmetry principle, if a system of emission reduction is "adequately demonstrated" now, that system should drive the performance standard. EE should be part of the "best system of emission reduction" for existing power plants because it is adequately demonstrated, cost-effective, imposes minimal environmental costs, and reduces overall energy requirements. Moreover, emission reductions from EE can be enforceable, permanent, surplus, and quantifiable as those terms are defined by EPA. The Agency can draw on long-standing state, private sector, and federal methodologies for measuring and verifying emission reductions from end-use EE.

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[1] Standards of Performance for Greenhouse Gas Emissions from New Stationary Sources: Electric Utility Generating Units, 79 Fed. Reg. 1430 (Jan. 8, 2014).
[2] 42 U.S.C. § 7411(d).
[3] *See, e.g.*, Daniel A. Lashof et al., *Closing the Power Plant Carbon Pollution Loophole: Smart Ways the Clean Air Act Can Clean up America's Biggest Climate Polluters*, NRDC REPORT 12-11-A, at 4, 25 (Mar. 2013) (describing a proposal to reduce power plant GHG emissions 26% from 2005 levels by 2020); Dallas Burtraw & Matt Woerman, *State and Fuel-Specific Benchmarks for Greenhouse Gas Performance Standards*, RFF DISCUSSION PAPER 13-37 (Nov. 2013) (describing proposals to reduce power sector GHG emissions by 340 million short tons by 2020).
[4] *See supra* note 3; *see also* NAT'L CLIMATE COALITION, NATIONAL CLIMATE COALITION PROGRAM DESIGN RECOMMENDATIONS (Dec. 5, 2013), *available at* http://bipartisanpolicy.org/sites/default/files/NCC.pdf; Jeremy M. Tarr, Jonas Monast & Tim Profeta, *Regulating Carbon Dioxide Under Section 111(d) of the Clean Air Act: Options, Limits, Impacts*, NICHOLAS INSTITUTE REP. 13-01 (Jan. 2013); HUNTON & WILLIAMS, ESTABLISHMENT OF STANDARDS OF PERFORMANCE FOR CARBON DIOXIDE EMISSIONS FROM EXISTING ELECTRIC UTILITY GENERATING UNITS UNDER CLEAN AIR ACT § 111(D) (April 2013).
[5] *See, e.g.*, Dawn Reeves, *EPA Faces Struggle to Credit Demand-Side Efficiency in Utility Climate Rule*, INSIDE EPA (Jan. 6, 2014), at 1 (noting that "[m]ost participants in the debate over the upcoming rule favor use of efficiency measures to curb emissions, . . . as one of the most cost-effective means of addressing GHGs") ; Tarr, Monast & Profeta, *supra* note 4, at 13-14 (noting "[m]any workshop attendees spoke in favor of crediting [EE] measures toward 111(d) compliance").
[6] *See* AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON. & ALLIANCE TO SAVE ENERGY, *Response to EPA: Considerations in the Design of a Program to Reduce Carbon Pollution from Existing Power Plants* (Dec. 5, 2013); COMMENTS OF THE ATTORNEYS GENERAL OF NEW YORK, CALIFORNIA, MASSACHUSETTS, DELAWARE, NEW MEXICO, OREGON, WASHINGTON, CONNECTICUT, MAINE, MARYLAND, RHODE ISLAND, VERMONT, DISTRICT OF COLUMBIA ON THE DESIGN OF A PROGRAM TO REDUCE CARBON POLLUTION FROM EXISTING POWER PLANTS 7-9 [hereinafter COMMENTS OF THE ATTORNEYS GENERAL], *available at* http://www.atg.wa.gov/uploadedFiles/Environment.pdf; Letter from Stuart A. Clark & Larry F. Green, Co-Chairs, National Ass'n of Clean Air Agencies Global Warming Committee, to Regina McCarthy, EPA Adm'r 1-2 (Aug. 21, 2013), *available at* http://airweb.timberlakepublishing.com/rc_files/5537/Principles_letter_to_EPA-final_Letterhead.pdf; Letter from Paul N. Cicio, President, Indus. Energy Consumers of America to U.S. EPA 2 (Dec. 13, 2013), *available at* http://www.ieca-us.com/wp-content/uploads/IECA-GHG-EPA-Preliminary-Comments_12.13.13.pdf.
[7] *See, e.g.*, COMMENTS OF THE ATTORNEYS GENERAL, *supra* note 6, at 7-9.
[8] *See, e.g.*, Letter from Paul N. Cicio, *supra* note 6, at 2; NAT'L CLIMATE COALITION, *supra* note 4, at 1.
[9] *Id*. at 3-4.
[10] *Id.* at 2.
[11] 42 U.S.C. § 7411(b).
[12] *Id.*
[13] 42 U.S.C. § 7411(d).
[14] 40 C.F.R. § 60.24(c).
[15] *See, e.g.*, HUNTON & WILLIAMS, *supra* note 4, at 13-15.
[16] 42 U.S.C. § 7411(a)(1) (emphases added).
[17] 42 U.S.C. § 7411(b)(1)(B).
[18] 42 U.S.C. § 7411(d)(1)(A).
[19] 42 U.S.C. § 7410(a)(2)(A).
[20] Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport of Ozone, 63 Fed. Reg. 57356 (Oct. 27, 1998); Rule to Reduce Interstate Transport of Fine Particulate Matter and Ozone (Clean Air Interstate Rule); Revisions to Acid Rain Program; Revisions to NOx SIP Call, 70 Fed. Reg. 25162 (May 12, 2005), *vacated*, North Carolina v. EPA, 531 F.3d 896 (D.C. Cir. 2008), *reinstated pending further rulemaking*, 550 F.3d 1176 (D.C. Cir. 2008); Federal Implementation Plans: Interstate Transport of Fine Particulate Matter and Ozone and Correction of SIP Approvals, 76 Fed. Reg. 48208 (Aug. 8, 2011), *vacated*, EME Homer City Generation, L.P. v. EPA, 696 F.3d 7 (D.C. Cir. 2013). The D.C. Circuit did not question the use of inter-source trading in the transport programs, but vacated the rules over how state budgets were determined.
[21] *See, also*, William F. Pederson, Comment, *Should EPA Use Emissions Averaging or Cap and Trade to Implement § 111(d) of the Clean Air Act?,* 43 ENVTL. L. REP. 10731, 10732 & n.10 (Sept. 2013).
[22] 42 U.S.C. § 7411(d).
[23] Evan J. Ringquist, *Trading Equity for Efficiency in Environmental Protection? Environmental Justice Effects from the SO_2 Allowance Trading Program*, 92 SOC. SCI. Q. 297 (2011) (describing that the same equity concerns do not exist for carbon dioxide trading programs).
[24] The continental United States' power grid consists of three large interconnected systems. *What Is the Electric Grid and What Are Some of the Challenges It Faces*, EIA (Apr. 27, 2012), http://www.eia.gov/energy_in_brief/article/power_grid.cfm.

[25] Standards of Performance for New Stationary Sources: State Plans for Certain Pollutants at Existing Facilities, 40 Fed. Reg. 53346 (Nov. 17, 1975).
[26] *See,* New Jersey v. EPA, 517 F.3d 574, 578 (D.C. Cir. 2008).
[27] 40 C.F.R. § 60.33b(d)(2).
[28] Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units, 70 Fed. Reg. 28606, 28657 (May 18, 2005) (finalizing 40 C.F.R. § 60.4101).
[29] *Id*. at 28618-19.
[30] *Id*. at 28619-21. The D.C. Circuit vacated this rule on a threshold matter and reached no judgment about the trading program. *See, supra,* note 29.
[31] 42 U.S.C. § 7411(a)(1).
[32] Natural Res. Def. Council v. EPA, 655 F.2d 318, 331 (D.C. Cir. 1981) (citing cases).
[33] *See, e.g.*, Portland Cement Ass'n v. Ruckelshaus, 486 F.2d 375, 391 (D.C. Cir. 1973)
[34] *Portland Cement Ass'n,* 486 F.2d at 396 (finding "a significant difference between techniques used by the agency in arriving at standards, and requirements presently prescribed for determining compliance with standards, raises serious questions about the validity of the standard").
[35] *Id*. at 396-97.
[36] 42 U.S.C. § 7411(b)(1)(B).
[37] *Id.*
[38] 42 U.S.C. § 7411(g)(4).
[39] Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Large Municipal Waste Combustors, 71 Fed. Reg. 27324 (May 10, 2006).
[40] Considerations in the Design of a Program to Reduce Carbon Pollution from Existing Power Plants, U.S. Environmental Protection Agency, Sept. 23, 2013, *available at* http://www2.epa.gov/sites/production/files/2013-09/documents/20130923statequestions.pdf.
[41] Essex Chem. Corp. v. Ruckelshaus, 486 F.2d 427, 433 (D.C. Cir. 1973).
[42] Dan York et al., *Three Decades and Counting: A Historical Review and Current Assessment of Electric Utility Energy Efficiency Activity in the States*, AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON. RESEARCH REP. U-123 (June 2012).
[43] Martin Kushler, Seth Nowak, & Patti Witte, *Examining the Net Savings Issue: A National Survey of State Policies and Practices in the Evaluation of Ratepayer-Funded Energy Efficiency Programs*, AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON. RESEARCH REP. U1401, at 8 (Jan. 2014). In 2013, 48 States had electric EE programs with budgets totaling $5.8 billion. Annie Downs et al., *The 2013 State Energy Efficiency Scorecard*, AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON. RESEARCH REP. E13K, at vi, 16 (Nov. 2013).
[44] Downs et al., *supra* note 50, at vi, 16; Kushler, Nowak & Witte, *supra* note 50, at 8.
[45] In many such contracts, compensation is linked to achieving a pre-specified level of energy savings. Energy service companies entered into $3 billion of performance-based contracts in 2011. Elizabeth Stuart et. al, *Current Size and Remaining Market Potential of the U.S. Energy Service Company Industry*, LAWRENCE BERKELEY NAT'L LAB. REP. LBNL-6300E (Sept. 2013).
[46] Mandatory Reporting of Greenhouse Gases, 74 Fed. Reg. 56260, 56289 (Oct. 30, 2009).
[47] *See*, *e.g.*, MCKINSEY & CO., ENERGY EFFICIENCY: A COMPELLING GLOBAL RESOURCES (2010); Tarr, Monast & Profeta, *supra* note 4, at 13 fig.12 (describing EE as "the least cost resource"); Christina Hood, *Summing up the Parts: Combining Policy Instruments for Least-Cost Climate Mitigation Strategies*, INT'L ENERGY AGENCY (Sept. 2011) ("Improvement in energy efficiency is often claimed to be the most cost-effective way to reduce energy consumption and carbon emissions . . . ").
[48] EIA, MONTHLY ENERGY REVIEW 95 tbl.7.2a (Dec. 2013), *available at* http://www.eia.gov/totalenergy/data/monthly/archive/00351312.pdf. According to the EIA, in 2012, 37.4% of electric power generated in the U.S. was fueled by coal, 30.29% by natural gas, and 0.57% by oil.
[49] 42 U.S.C. § 7411(h)(1).
[50] 42 U.S.C. § 7411(h)(2)(B).
[51] 42 U.S.C. § 7411(h)(5).
[52] 40 C.F.R. § 60.33e.
[53] 40 C.F.R. §§ 60.35e, 60.55c.
[54] Part 51 – Requirements for Preparation, Adoption, and Submittal of Implementation Plans, 44 Fed. Reg. 3274, 3276 (Jan. 16, 1979); see also Modification, Notification, and Reconstruction, 40 Fed. Reg. 58416 (Dec. 16, 1975) (overturned by Asarco, Inc. v. EPA, 578 F.2d 319, 325 (D.C. Cir. 1978)
[55] *See* Chevron U.S.A., Inc. v. Natural Res. Def. Council, 467 U.S. 837 (U.S. 1984).
[56] Emissions Trading Policy Statement, 51 Fed. Reg. 43814 (Dec. 4, 1986).
[57] *Id*. at 43831-32.

[58] EPA, ROADMAP FOR INCORPORATING ENERGY EFFICIENCY/RENEWABLE ENERGY POLICIES AND PROGRAMS INTO STATE AND TRIBAL IMPLEMENTATION PLANS F8-9 (July 2012) [hereinafter "2012 Roadmap"].
[59] *Id*. at 43832; *see also* Requirements for the Preparation, Adoption, and Submittal of Implementation Plans; Approval and Promulgation of Implementation Plans, 54 Fed. Reg. 27274 (June 28, 1989), Jan. 25, 1995 Guidance on Enforceability Requirements for Limiting Potential to Emit through SIP and § 112 Rules and General Permits (1995 Guidance).
[60] 42 U.S.C. § 7413(a)(3); *see also* 42 U.S.C. § 7413(a)(1) (authorizing EPA to enforce SIP provisions).
[61] *See, e.g.*, Bayview Hunters Point Cmty. Advocates v. Metro. Transp. Comm'n, 366 F.3d 692 (9th Cir. 2004) (SIP requirements are directly enforceable by EPA and citizens).
[62] 54 Fed. Reg. 27274 (June 28, 1989); 1995 Guidance, *supra* note 66. The sixth enforceability requirement applies only where coverage by the Clean Air Act requirement is optional.
[63] Open Market Trading Rule for Ozone Smog Precursors, 60 Fed. Reg. 39668, 39675 (Aug. 3, 1995).
[64] 66 PA. CONS. STAT. § 2806.1.
[65] Pennsylvania Pub. Util. Comm'n, "Energy Efficiency and Conservation Program," Docket No. M-2008-2069887 (Jan. 15, 2009).
[66] 66 PA. CONS. STAT. § 2806.1(f).
[67] 42 U.S.C. § 7413(e).
[68] Luminant Gen. Co., LLC. v. EPA, 714 F.3d 841, 851-52 (5th Cir. 2013); Arizona Pub. Serv. Co. v. EPA, 563 F.3d 1116, 1129 (10th Cir. 2009).
[69] Source-Specific Federal Implementation Plan for Four Corners Power Plant; Navajo Nation, 72 Fed. Reg 25698, 25,702 (May 7, 2007); Envt'l Protection Agency Memo to Regional Administrators, State Implementation Plans: Policy Regarding Excessive Emissions During Malfunctions, Startup, and Shutdown (Sept. 20, 1999).
[70] *See, e.g.,* Open Market Trading Rule for Ozone Smog Precursors, 60 Fed. Reg. at 39677; *see also* REG'L GREENHOUSE GAS INITIATIVE MODEL RULE § XX-5.3(d)(2)(i) (2008) (directing any state that uses renewable energy credits as part of its compliance program to require that documentation of purchases is verifiable, detailed, and generated by pre-determined "reputable sources"), *available at* http://www.rggi.org/docs/ProgramReview/_FinalProgramReviewMaterials/Model_Rule_FINAL.pdf.
[71] Open Market Trading Rule for Ozone Smog Precursors, 60 Fed. Reg. at 39675.
[72] *Id.*
[73] In Pennsylvania, State regulators selected an independent engineering and consulting firm to evaluate distribution companies' EE program. The distribution companies shared the cost. Pennsylvania Pub. Util. Comm'n, *Energy Efficiency and Conservation Program,* Implementation Order at Docket Nos. M-2012-2289411, M-2008-2069887, pp. 69-71 (Aug. 3, 2012).
[74] Emissions Trading Policy Statement, 51 Fed. Reg at 43832.
[75] 2012 Roadmap, *supra* note 65, at app. F.
[76] Emissions Trading Policy Statement, 51 Fed. Reg. at 43832.
[77] In 2004, total spending on electric energy efficiency programs was $1.45 billion. York et. al, *supra* note 49, at 10.
[78] Downs et al., *supra* note 50, at app. A. Half of states spend more than $15 per capita on EE.
[79] 2012 Roadmap, *supra* note 65, at F7-8.
[80] Emissions Trading Policy Statement, 51 Fed. Reg. at 43832 (emphasis added).
[81] 2012 Roadmap, *supra* note 65, at F-6.
[82] Kushler, Nowak & Witte, *supra* note 50, at app. B. State protocols vary. Some States have adopted technical manuals containing specific calculations that must be used to quantify savings from different EE measures.
[83] *Id.* at 8.
[84] THE EDISON FOUND. INST. FOR ELECTRIC EFFICIENCY, STATE ELECTRIC EFFICIENCY REGULATORY FRAMEWORKS (July 2012).
[85] PJM FORWARD MARKET OPERATIONS, PJM MANUAL 18B: ENERGY EFFICIENCY MEASUREMENT & VERIFICATION § 1.1 (Mar. 2010), *available at* http://www.pjm.com/~/media/documents/manuals/m18b.ashx; ISO NEW ENGLAND, TRANSMISSION, MARKETS & SERVICES TARIFF § III.13.1.4.2.2.5 (Capacity Commitment Period Election) (Jan. 2014), *available at* http://iso-ne.com/regulatory/tariff/sect_3/mr1_sec_13-14.pdf.
[86] PJM FORWARD MARKET OPERATIONS, *supra* note 94; ISO NEW ENGLAND, *supra* note 94, at §§ III.13.1.4.2 (Show of Interest Form for New Demand Resources), III.13.1.4.3. (Measurement and Verification Applicable to All Demand Resources), III.13.6.1.5.3. (Additional Requirements for Demand Resources), III.13.6.1.5.4. (Demand Response Auditing), III.13.7.2.7.5.4. (Determination of Net Demand Resource Performance Penalties and Demand Resource Performance Incentives).
[87] Downs et al., *supra* note 52, at 87-88.
[88] 42 U.S.C. § 7651c(f)(2)(D)
[89] 40 C.F.R. § 73.82(c).
[90] *Id*.

[91] EPA, CONSIDERATIONS IN THE DESIGN OF A PROGRAM TO REDUCE CARBON POLLUTION FROM EXISTING POWER PLANTS (Sept. 23, 2013), *available at* http://www2.epa.gov/sites/production/files/2013-09/documents/20130923statequestions.pdf.
[92] Emissions Trading Policy Statement, 51 Fed. Reg. at 43832; 2012 Roadmap, *supra* note 65, at F-6.
[93] 40 C.F.R. § 60.24(c).
[94] In its 2012 Roadmap, *supra* note 65, EPA instructed States that the same methodologies could be used to calculate the air quality impacts of EE *or* renewable energy.
[95] *See, e.g.*, NRDC REPORT, *supra* note 3.
[96] To arrive at its target emission rate, the State would calculate a weighted average of its baseline emissions and its EE savings multiplied by the EPA-provided emission factor.
[97] Amory B. Lovins, *The Negawatt Revolution*, 27 ACROSS THE BOARD 18, 21-22 (1990).
[98] 42 U.S.C. § 7651d(f)(2)(E).
[99] Emissions Trading Policy Statement, 51 Fed. Reg. at 48346.
[100] EPA, AVOIDED EMISSIONS AND GENERATION TOOL (AVERT) USER MANUAL, p. 14 (Feb. 2014).
[101] Open Market Trading Rule for Ozone Smog Precursors, 60 Fed. Reg. at 39691.
[102] REGIONAL GREENHOUSE GAS INITIATIVE, http://www.rggi.org/.

Notes from the State Case Studies:

Texas: *See* Approval and Promulgation of Air Quality Implementation Plans; Texas; Revisions to Ch. 117 and Emission Inventories for the Dallas/Fort Worth 8-Hour Ozone Nonattainment Area, 73 Fed. Reg. 47835, 47836 (Aug. 15, 2008).

Washington, DC: *See* Approval and Promulgation of Air Quality Implementation Plans; District of Columbia, Maryland, and Virginia, 76 Fed. Reg. 58116 (Sep. 20, 2011); METRO. WASH. COUNCIL OF GOV'TS, PLAN TO IMPROVE AIR QUALITY IN THE WASHINGTON, DC-MD-VA REGION 6-82 (May 2007), *available at* http://www.regulations.gov/#!documentDetail;D=EPA-R03-OAR-2010-0475-0005; Colin J. High & Kevin M. Hathaway, *Avoided Air Emissions from Energy Efficiency and Renewable Electric Power Generation in the PJM Interconnection Power Market Area*, RESOURCE SYSTEMS GROUP INC. (Mar. 2007), *available at* http://www.mwcog.org/environment/air/downloads/SIP_APP/App_H_-_RSG_Avoided_Emissions_Rept_5-23-07_Draft_Final.pdf.

Louisiana: *See* 40 C.F.R. § 52.970; Approval and Promulgation of Air Quality Implementation Plans; Louisiana; Attainment Demonstration for the Shreveport-Bossier City Early Action Compact Area, 70 Fed. Reg. 25000 (May 12, 2005); A. Chambers et al., *Comparison of Methods for Estimating NO_x Emission Impacts of Energy Efficiency and Renewable Energy Projects: Shreveport, Louisiana Case Study*, NAT'L RENEWABLE ENERGY LAB. (July 2005), *available at* http://www.nrel.gov/docs/fy05osti/37721.pdf.