January 21, 2016

Environmental Protection Agency

VIA ELECTRONIC SUBMISSION

Attn: Docket ID No. EPA-HQ-OAR-2015-0199

Re: Comments on Proposed Federal Plan Requirements for Greenhouse Gas Emissions from Electric Utility Generating Units Constructed on or Before January 8, 2014; Model Trading Rules; Amendments to Framework Regulations, 80 Fed. Reg. 64,966 (Oct. 23, 2015)

The Institute for Policy Integrity at New York University School of Law[1] ("Policy Integrity") respectfully submits the following comments[2] on the Environmental Protection Agency's ("EPA") proposed Federal Plan Requirements for Greenhouse Gas Emissions from Electric Utility Generating Units Constructed on or Before January 8, 2014; Model Trading Rules; Amendments to Framework Regulations.[3] Policy Integrity is a non-partisan think tank dedicated to improving the quality of government decisionmaking through advocacy and scholarship in the fields of administrative law, economics, and public policy.

Concurrently with issuing its final Clean Power Plan to limit greenhouse gas emissions from existing power plants,[4] EPA issued a set of proposed federal plan requirements and model trading rules to provide states guidance as they determine their strategy to comply with the Clean Power Plan. In order to reduce compliance costs and promote effectiveness of the plan:

- EPA should select a mass-based trading system over a rate-based system as its default federal plan and should encourage states to do the same;
- The agency should encourage the development of the broadest possible trading markets to minimize costs, while consulting with market regulatory agencies to reduce the potential for market manipulation;
- EPA should reduce leakage from mass-based trading systems by encouraging states to include new sources in the program, or in the alternative, to use set-asides;

[1] No part of this document purports to present New York University School of Law's views, if any.
[2] These comments incorporate by reference into the record all of the documents cited herein.
[3] 80 Fed. Reg. 64,966 (Oct. 23, 2015).
[4] 80 Fed. Reg. 64,662 (Oct. 23, 2015).

- The agency should promote fairness and market transparency by encouraging the use of auctions to distribute mass-based allowances;
- For the benefit of states that elect to use a rate-based trading system, EPA should allow a broad variety of low-emitting generators to qualify for emission rate credits, while avoiding incentives that could inadvertently increase emissions.

Additionally, these comments explain how EPA's federal plan design is well-grounded in Section 111(d) of the Clean Air Act.[5]

I. EPA Should Encourage the Use of a Mass-Based Trading System over a Rate-Based System, but Both Approaches Will Produce Lower Compliance Costs and Greater Incentives for Innovation than a Command-and-Control Approach

In this proposal, EPA presents two versions of trading systems for Clean Power Plan compliance—a mass-based trading system and a rate-based trading system. EPA has proposed that these trading systems can serve either as model state plans for states that want a shortcut to designing an approved plan, or as a template for federal plans in states that decline to submit a satisfactory state plan.[6] EPA has further proposed that it will select either the rate-based or mass-based trading system as the default approach for federal plans. Though both trading-based approaches will result in lower costs and more incentives for innovation than a command-and-control approach, in order to best achieve these advantages of trading, EPA should promote the development of the broadest possible mass-based trading system that effectively realizes the applicable emission reductions.

A. EPA Should Select a Mass-Based Trading System as the Default Approach for Federal Plans and Should Also Encourage States to Use Mass-Based Trading for Their State Plans

Because a mass-based trading system is likely to have lower compliance costs and greater net benefits than a rate-based trading system, EPA should select the mass-based trading system as the default federal plan,[7] and it should encourage states to do the same in their state plans.

A mass-based trading system would establish a fixed number of allowances representing tons of carbon dioxide ("CO_2") emissions allowed in a state over the applicable compliance

[5] 42 U.S.C. § 7411(d).

[6] The proposed model state plans and proposed federal plans are nearly identical, with a few small exceptions. For example, the proposed model state plans provide more options for early action credits than do the proposed federal plans. *See* 80 Fed. Reg. at 65,025-26.

[7] Some stakeholders have encouraged EPA to decide on a case-by-case basis for states subject to a federal plan whether a mass-based or rate-based approach is preferable, rather than picking a uniform plan for the whole country. The principal concern these stakeholders raise is the desirability of facilitating neighboring states whose electricity grids are linked to also use the same emission trading system. *Cf.* Marc Chupka et al., The Brattle Group, Issue Brief: The Clean Power Plan: Focus on Implementation and Compliance 17-18 (2016) (discussing the benefits from neighboring states that share electrical grid connections also sharing trading systems). If, upon further analysis, EPA determines that it wants to address this concern, it can do so by making the mass-based trading system the default federal plan, but considering evidence that a rate-based federal plan might be preferable in particular states.

period, and affected generators would need to acquire an allowance for each ton of CO_2 they emitted during that period. In contrast, a rate-based system would require affected generators to match the category-specific emission rates in the Clean Power Plan (expressed in pounds of CO_2 per megawatt-hour) by acquiring credits representing megawatt-hours of electricity from zero- or lower-emitting sources.

EPA should ultimately select a mass-based trading system instead of a rate-based trading system for the default federal plan, because a mass-based system could be modeled on existing, highly successful regulatory regimes for greenhouse gases and other pollutants, would likely lead to lower compliance costs and higher net benefits, and would not incentivize existing zero-emission generators to retire. A rate-based trading system would create more uncertainty, would require EPA to reinvent the wheel, and would cost more to achieve comparable reductions. Therefore, EPA should select the mass-based trading system as the default federal plan and should encourage states to do the same for their state plans.

A Mass-Based Trading System Can Be Based on Proven Models and Integrated with Existing Markets

A major advantage of a mass-based trading system is that it is familiar territory for EPA and is, therefore, likely to have lower administrative implementation costs than a rate-based system. As EPA recognizes, "the mass-based trading approach would be more straightforward to implement compared to the rate-based trading approach," and regulators and industry "have extensive knowledge of and experience with mass-based trading programs."[8] There is a long list of successful mass-based trading systems that can provide models and lessons for the implementation of the Clean Power Plan. American states and regions operate greenhouse gas trading regimes, including the AB-32 program in California and the Regional Greenhouse Gas Initiative in the Northeast. EPA administers mass-based emission trading systems for other pollutants, including the Acid Rain Trading Program and the Cross-State Air Pollution Rule. Additional mass-based trading systems exist in other regions or for other pollutants, including the European Union Emission Trading System and the Regional Clean Air Incentives Market in Southern California. The cumulative experience of these systems demonstrates that mass-based trading mechanisms are "proven to be environmentally effective and economically cost-effective relative to traditional command and control approaches."[9] Furthermore, sources in states with a mass-based system will likely have the option to join pre-existing mass-based trading systems, including the Regional Greenhouse Gas Initiative and possibly California's AB-32 market, if California satisfies certain conditions.[10] These other trading systems can serve as foundations for the development of mass-based trading systems in new states, which will help lower implementation costs.

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[8] 80 Fed. Reg. at 64,970.

[9] Richard Schmalensee & Robert N. Stavins, Lessons Learned from Three Decades of Experience with Cap-and-Trade 16 (Resources for the Future Discussion Paper 15-51), *available at* http://www.rff.org/files/document/file/RFF-DP-15-51.pdf.

[10] *See* 80 Fed. Reg. at 64,977.

A Mass-Based Trading System Appears Likely to Have Lower Costs and Greater Benefits

A mass-based trading program appears likely to have significantly lower compliance costs than a rate-based program in earlier and later years. According to EPA's analysis, in 2020, a rate-based program will have compliance costs of $2.5 billion (in 2011 dollars), while a mass-based program will have costs of only $1.4 billion, a 44% cost reduction.[11] In addition, in 2030, a rate-based program will have compliance costs of $8.4 billion, while a mass-based program will have costs of $5.1 billion, a 39% cost reduction.[12] While it is true that a rate-based system appears to be lower-cost in the year 2025, a net present value calculation of the cost estimates for the select years reported in the Regulatory Impact Analysis shows a lower overall cost for a mass-based system.[13] Even though a more precise calculation cannot be made without knowing the cost estimates for every year during the timespan of the analysis, it is likely that this result would continue to hold given the cost advantage of a mass-based system in both the earlier and later years.

Furthermore, EPA's projection of costs and benefits suggests that the mass-based approach will have higher net benefits than the rate-based approach. The estimated benefits of a mass-based plan are significantly higher in 2020 than the benefits of a rate-based plan, while the two have very comparable estimated benefits in 2025 and 2030.[14] Though a full net present value analysis is not available,[15] EPA's five-year-interval projections would result in the mass-based approach having higher net benefits than the rate-based approach.[16] Based on this analysis, in order to maximize net social welfare, EPA should select a mass-based trading system as the default approach for the federal plan and encourage states to adopt an interoperable mass-based trading system for their own plans.

A Rate-Based Trading System Could Perversely Encourage Existing Zero-Emission Generators to Retire

A rate-based trading system could create a problematic incentive for states to retire existing nuclear and renewable capacity and replace the generation from those zero-emission electricity resources with increased use of existing natural gas generators.[17] EPA is proposing that Gas Shift Emissions Rate Credits would be awarded to existing natural gas generators that increase their output regardless of whether their incremental generation replaces coal-fired generation or zero-emitting generation,[18] which would give existing

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[11] EPA, REGULATORY IMPACT ANALYSIS FOR THE PROPOSED FEDERAL PLAN REQUIREMENTS FOR GREENHOUSE GAS EMISSIONS FROM ELECTRIC UTILITY GENERATING UNITS CONSTRUCTED ON OR BEFORE JANUARY 8, 2014; MODEL TRADING RULES; AMENDMENTS TO FRAMEWORK REGULATIONS 1-15 (2015).

[12] *Id.*

[13] *Id.*

[14] *Id.* at 1-28 to 1-29.

[15] This is because EPA's Regulatory Impact Analysis provides information only for select years.

[16] Of course, the actual benefits and costs will depend on which states decide to link with one another in each type of trading system. Based on EPA's projections, the greatest net benefits would be achieved if the largest possible number of states link together in a mass-based trading system.

[17] *See* Jesse Jenkins, *Nuclear Retirements Would Sabotage Clean Power Plan Carbon Reductions*, THE ENERGY COLLECTIVE (Sept. 1, 2015).

[18] In particular, EPA is "assum[ing] that any increase in [natural gas combined cycle] generation above 2012 levels is displacing fossil fuel-fired steam" generation and is not considering the possibility that an increase in

natural gas generators an edge over both of those sources. While it is beneficial for natural gas generation to replace coal generation, the retirements of existing nuclear or renewable generators could result in higher overall greenhouse gas emissions. A mass-based trading system could similarly cause "leakage" to *new* natural gas or coal generation, but EPA has proposed allowance set-aside mechanisms to address this issue. At a minimum, the potential for the rate-based system, as currently designed, to favor the expansion of natural gas generation at the expense of existing zero-emitting generation calls into question any advantage that a rate-based system might have over a mass-based system based on its assumed lack of "leakage." Additionally, as discussed below in Section II.C and the Technical Addendum to these comments, EPA should consider ways to mitigate this perverse incentive through possible design changes.

Interstate Electricity Trades Involving Rate-Based Trading Systems Could Undermine the Goals of the Clean Power Plan

A further problem with a rate-based trading system is that trades of electricity between rate-based states and mass-based states could erode emission reductions and lead to "double counting" of zero-emission electricity. A mass-based state could reduce its in-state emissions by importing more electricity from outside its borders, and if that electricity is from a rate-based state, the expected level of emission reductions might not be achieved.[19] For instance, if a zero-emitting source that qualifies for creating Emissions Rate Credits (ERCs) in a rate-based state sells its power to a mass-based state, the emission reductions from that resource will effectively be "double-counted," as the mass-based state is able to meet load without expending any allowances, while the rate-based state can use the resulting ERCs. EPA proposes that, for zero-emission resources in mass-based states to qualify for generating ERCs, EPA will require that resource to provide either "a power delivery contract or power purchase agreement" to demonstrate that the resource serves load in a rate-based state.[20] This would prevent some double counting, but EPA's proposed federal plan does nothing to prevent other likely scenarios of double counting. For example, a zero-emission electricity resource located in a rate-based state can sell electricity to a mass-based state and still create ERCs, or a zero-emission energy resource that provided a power delivery contract or power purchase agreement could resell its power on the spot market to a mass-based state. Even if EPA decided to require all ERC-generating resources in both mass- and rate-based states to demonstrate that the resource serves load in a rate-based state via a power purchase agreement or delivery contract, such a system would likely be difficult and costly to track. Moreover, such an approach would likely fail to fully solve the double-counting problem, given the opportunity to resell electricity on spot markets.

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natural gas generation might be displacing a lower-emission electricity source like nuclear generation. 80 Fed. Reg. at 64,991 n.54.

[19] NextGen Climate America, Potential Emission Leakage Under the Clean Power Plan and A Proposed Solution 17-18, *available at* https://nextgenamerica.org/wp-content/uploads/sites/2/2015/07/248965004-NextGen-Climate-America-Comment-Leakage-Potential-in-Clean-Power-Plan.pdf.

[20] 80 Fed. Reg. at 64,978, 64,999, 65,094.

Thus, it may be difficult for EPA to ensure that electricity trades between rate-based and mass-based states do not undermine the goals of the Clean Power Plan. Such problems inevitably arise if the nation is a patchwork of mass-based and rate-based systems. This risk could be avoided only if all states use the same approach. Because of existing cap-and-trade systems in the Northeast and California, some states will almost certainly select mass-based compliance. Encouraging all states to follow a mass-based approach, and adopting one for the default federal plan, will maximize the chances of nationwide uniformity in trading mechanisms.

B. Whether Rate-Based or Mass-Based, Trading is Preferable to a Command-and-Control Approach

Whether EPA ultimately selects a mass-based or rate-based system for the federal plan and model trading rules, EPA's choice to use market-based mechanisms to control greenhouse gas emissions will have significant advantages over a command-and-control approach. While a mass-based trading system would be superior to a rate-based trading system, as explained above, both mechanisms would allow for highly beneficial, cost-minimizing trades to occur between different regulated generators and between regulated generators and other parties. By proposing these flexible regulatory mechanisms, EPA is following the best practices for environmental regulation, as recognized by a wide range of scholars and confirmed in numerous empirical studies. A decentralized market process, which would be created by either mechanism, will be better at finding lower-cost forms of compliance than a traditional command-and-control approach. Firms with lower marginal abatement costs[21] will be able to reduce their emissions more than necessary to satisfy their own compliance obligations, and then sell their surplus allowances or credits to firms with higher marginal abatement costs, leading to a lower total cost of achieving compliance, as compared to a system with no trading.

There is a rich empirical and theoretical literature showing that marketable permit systems can achieve emission reduction goals at far lower cost than command-and-control mechanisms. A survey of studies of emissions trading systems by the economist T.H. Tietenberg found substantial cost savings associated with emissions trading systems compared to command-and-control regulations.[22] The economist Nathaniel Keohane has estimated that trading under the Acid Rain Program for sulfur dioxide emissions reduced compliance costs by $153 million per year in Phase I of the program compared to a "uniform emissions rate standard," a cost reduction of 17%, and that a technology-forcing standard requiring scrubbers would have cost $1.8 billion more per year than the trading system.[23] Legal scholars Bruce Ackerman and Richard Stewart have argued that "[a] system of tradeable rights will tend to bring about a least-cost allocation of control burdens,"

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[21] A firm's marginal abatement cost is the cost it would incur to reduce one additional ton of CO_2 pollution.
[22] T.H. Tietenberg, EMISSIONS TRADING: PRINCIPLES AND PRACTICE 72-73 (2d. ed. 2006).
[23] Nathaniel O. Keohane, *Cost Savings from Allowance Trading in the 1990 Clean Air Act: Estimates from a Choice-Based Model*, *in* Jody Freeman & Charles D. Kolstad, eds., MOVING TO MARKETS IN ENVIRONMENTAL REGULATION: LESSONS FROM TWENTY YEARS OF EXPERIENCE 194 (2006).

reducing pollution at much lower cost compared to command-and-control regulation.[24] In addition to achieving environmental goals at a lower cost than command-and-control regulation, marketable permit systems will spur innovation in new technologies to reduce carbon pollution by creating strong markets for those technologies.[25]

A marketable-permit system is particularly appropriate for tackling climate change. Marginal costs of reducing greenhouse gas emissions and generating zero-emission electricity likely vary widely among different firms, so there are large gains to be achieved through allowing trades between firms.[26] In addition, the location of carbon dioxide emissions does not matter because carbon dioxide is a global pollutant, unlike pollutants such as particulate matter and mercury that have more localized health effects.[27] As a result, there is no need to avoid local "hot spots" of greenhouse gas pollution, making market-based mechanisms much simpler to administer in this area compared to control mechanisms for local pollutants.

II. EPA Should Ensure That Both the Mass-Based and the Rate-Based Trading Systems Are Designed To Be Flexible, Efficient, and Effective

In promulgating model trading rules and a default federal plan, EPA should continue with efforts it has made and take certain additional steps to ensure that these trading systems will be flexible, efficient, and effective.

A. Both Mass- and Rate-Based Trading Systems Should Facilitate Creation of the Broadest Possible Trading Markets, While Also Taking Steps to Limit the Potential for Market Manipulation

EPA's primary focus in finalizing the model trading rules and either a mass-based or rate-based trading approach to the federal plan should be to encourage the creation and use of the broadest markets possible with verifiable emission reductions. The scope of an emissions credit trading market contributes greatly to its success. A large market with many participants allows for greater liquidity of credits, lower price volatility, and lower-cost implementation of emission reductions.[28] EPA has proposed guidelines for interstate trading that are designed to facilitate broad trading while maintaining the integrity of each state's program.[29] To facilitate desirable linkages, EPA should maintain its position in the proposed plan that trading may occur between generators in states with approved state

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[24] Bruce A. Ackerman and Richard B. Stewart, *Reforming Environmental Law*, 37 STAN. L. REV. 1333, 1341-42 (1985).

[25] For a discussion of how the Acid Rain Program induced innovation in technology, see A. Denny Ellerman et al., MARKETS FOR CLEAN AIR: THE U.S. ACID RAIN PROGRAM 235-43 (2000).

[26] Richard G. Newell & Robert N. Stavins, *Cost Heterogeneity and Potential Savings from Market-Based Policies*, 23 J. REGULATORY ECON. 43, 44 (2003).

[27] Environmental justice advocates have raised concerns that carbon trading systems may result in an increase in other pollutants of local concern that are released in tandem with carbon. EPA works toward addressing these concerns in section IX of the proposed rule, beginning at page 65,048.

[28] See Erik Haites & Michael Mehling, *Linking Existing and Proposed GHG Emissions Trading Schemes in North America*, 9 CLIMATE POL'Y 373, 374 (2009); Christian Flaschland et al., *To Link or Not to Link: Benefits and Disadvantages of Linking Cap and Trade Systems*, 9 CLIMATE POL'Y 358, 359 (2009).

[29] 80 Fed. Reg. at 64,839.

plans and generators in states covered by the federal plan.[30] Moreover, it should continue to allow any affected generator to use an allowance from any affected generator in another state towards compliance so long as both states are covered by plans using the same (either mass-based or rate-based) approach to trading.[31]

While EPA should strive to make the markets as broad as possible, the agency should also take care to ensure that the credited reductions are meaningful and verifiable. The agency should, likewise, consult with the relevant market regulators in advance of finalizing the model rules and federal plans in order to reduce the potential for market manipulation.

EPA Should Allow Trading Between States with Approved Interoperable Tracking Systems and States Covered by the Federal Plan

EPA proposes several requirements for interstate trading between generators in states covered by the federal plan and generators in states covered by approved state plans (including those that have adopted the model trading rules as state plans). One of these conditions requires a state plan that wishes to trade with entities covered by a federal plan to use an EPA-administered tracking program for compliance measures.[32] EPA should broaden the scope of states allowed to trade with federal-plan states to also include states using interoperable tracking systems that have an approved method of verifying and keeping track of reduction credits. Interoperable tracking systems would still avoid issues of consistency in measuring compliance between states, while creating more flexibility for states to innovate and increasing the opportunities for interstate trading. Moreover, this is the level of coordination envisioned in the Clean Power Plan's discussion of interstate trading. The Clean Power Plan describes states as ready for trading within a bilateral or multilateral scheme if they have either joint or interoperable tracking systems.[33] Even if EPA opts to administer the trading plan for affected entities in states covered by a federal plan, other states' sources should be allowed to trade with these entities so long as the systems are interoperable. Broadening the scope of the trading markets in this way will help to lower compliance costs.

Before Finalizing Its Model Rule, EPA Should Consult with Other Relevant Agencies, Including the Commodity Futures Trading Commission and Federal Energy Regulatory Commission, Regarding Market Oversight, in Order to Reduce the Potential for Market Manipulation

Based on the agency's past experiences implementing emission trading programs in the power sector, the EPA "believes the potential or likelihood of market manipulation" in allowance or ERC markets created pursuant to the Clean Power Plan "is fairly low."[34] Nevertheless, price manipulation is a possibility in any commodities market, and EPA

[30] 80 Fed. Reg. at 64,977.
[31] *Id.*
[32] *Id*. Though EPA proposes that a state plan must use an EPA-administered tracking system in order to link with a federal plan, it provides no rationale for this decision and moves immediately to its request for comment on requiring interoperable tracking systems. *See id.*
[33] Clean Power Plan Final Rule, 80 Fed. Reg. at 64,839.
[34] 80 Fed. Reg. at 64,977.

should consult with relevant federal agencies to ensure that its trading framework, as currently proposed, will allow for adequate market oversight.

As explained in a 2008 report from the Congressional Research Service, price manipulation in allowance markets would likely resemble the kind of manipulation that occurs in other commodities markets:

> To corner the market, a manipulator would amass a large inventory of allowances while simultaneously taking futures or forward positions that required others to make delivery to it. When a squeeze is successful, traders with delivery obligations have no choice but to buy from the manipulator at prices it can dictate, and then sell those same allowances back to the manipulator at the lower prices specified in the futures and forward contracts.[35]

Indeed, allowance markets may be particularly susceptible to this kind of manipulation. Unlike other commodities, for which rising prices produce a supply response, allowances in a cap-and-trade system are created by the government and decrease predictably over time.[36] Thus, it may be easier for entities to corner the market for carbon allowances than for other commodities. Additionally, the risk of manipulation may be higher if the Clean Power Plan ends up producing a number of unlinked intrastate or subregional markets, as a smaller market will generally be easier to corner.

The Commodity Futures Trading Commission ("CFTC") appears to be the agency best positioned to regulate carbon markets created pursuant to the CPP, as indicated by the work that it is already doing to regulate carbon allowances for the Regional Greenhouse Gas Initiative ("RGGI") and California's AB-32 trading system, and by Congress's 2010 decision to create an interagency working group chaired by CFTC to study the oversight of existing and prospective carbon markets.[37]

The Federal Energy Regulatory Commission ("FERC") may also have a role to play. While FERC's jurisdiction is limited to wholesale transactions in electricity, natural gas, and oil, it may be able to collaborate with CFTC to prevent cross-market manipulation.[38] The Dodd-Frank Act gives CFTC and FERC authority to share information in areas where their jurisdiction overlaps,[39] and the agencies have used this authority in the past.[40] Accordingly,

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[35] CONGRESSIONAL RESEARCH SERVICE, REGULATING A CARBON MARKET: ISSUES RAISED BY THE EUROPEAN CARBON AND U.S. SULFUR DIOXIDE ALLOWANCE MARKETS 33 (2008), *available at* http://nationalaglawcenter.org/wp-content/uploads/assets/crs/RL34488.pdf. [hereinafter "CRS REPORT"].

[36] Jonas Monast, *Climate Change and Financial Markets: Regulating the Trade Side of Cap and Trade*, 40 ENVTL. L. REP. 10,051, 10,056 (2010).

[37] *See* INTERAGENCY WORKING GROUP FOR THE STUDY ON OVERSIGHT OF CARBON MARKETS, REPORT ON THE OVERSIGHT OF EXISTING AND PROSPECTIVE CARBON MARKETS (2011), *available at* http://www.cftc.gov/idc/groups/public/@swaps/documents/file/dfstudy_carbon_011811.pdf; *see also* Dodd–Frank Wall Street Reform and Consumer Protection Act § 750 (mandating the working group report).

[38] CRS REPORT, *supra* note 35, at 34.

[39] Dodd–Frank Wall Street Reform and Consumer Protection Act § 720(b).

[40] Press Release, Commodity Futures Trading Commission, FERC, CFTC Sign MOUs on Jurisdiction and Information Sharing (Jan. 2, 2014), *available at* http://www.cftc.gov/PressRoom/PressReleases/pr6816-14.

EPA should consult with both the CFTC and FERC to ensure that the trading framework it proposes will allow for adequate market oversight.

B. EPA Should Take Steps to Ensure that Mass-Based Trading Programs Minimize Leakage and Allocate Allowances Fairly and Efficiently

EPA's proposed mass-based trading approach is likely to maximize net benefits relative to both a command-and-control approach and a rate-based trading approach. Nonetheless, if left uncorrected, certain design features could interfere with the effectiveness of the program. In particular, EPA should endeavor to minimize leakage from the trading system and encourage states to allocate emission allowances through auctions.

EPA Should Minimize Leakage from the Mass-Based Trading System by Broadening the System's Coverage to Include New Sources, or in the Alternative, Instituting a Robust Program of Set-Asides

In order to ensure that the Clean Power Plan as implemented achieves its projected emission reductions, EPA must take steps to mitigate leakage. EPA defines the term "leakage" as "the potential for an alternative form of [Best System of Emission Reduction, or BSER] implementation," such as a mass-based trading scheme, "to create a larger incentive for affected [generators] to shift generation to new fossil fuel-fired [generators]" relative to what would occur under the traditional command-and-control implementation of the BSER performance standards presented in the Clean Power Plan.[41] In other words, leakage from a trading system occurs when emission sources that can substitute for covered sources are not covered by the market, and usage shifts to the unregulated sources, resulting in fewer emission reductions than expected under the standard.

EPA raises the issue of leakage as a concern particular to its mass-based federal plan and model trading rule proposals.[42] In the context of the mass-based system, restrictions on generation by existing sources could lead to an unwanted shift in generation from regulated generators to unregulated generators.[43] Here, the most significant concern is the risk of generation shifting to new gas-fired plants, which are not covered by the existing source performance standards and which, currently, allow a higher rate of emission than covered sources.[44] If generation shifts from existing plants to new plants not covered by the standard, the system could fail to achieve the expected reductions. This particular type of leakage does not arise to the same extent under the rate-based plan because the structure of the plan incentivizes increased generation from covered, existing natural gas generators, which may reduce the incentive to shift to new generators.[45]

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[41] Clean Power Plan Final Rule, 80 Fed. Reg. at 64,822.
[42] 80 Fed. Reg. at 64,977-78; *see also* Clean Power Plan Final Rule, 80 Fed. Reg. at 64,822.
[43] Clean Power Plan Final Rule, 80 Fed. Reg. at 64,823.
[44] *See* 80 Fed. Reg. at 65,019, 65,413.
[45] 80 Fed. Reg. at 64,991 (describing the award of incremental natural gas emission reduction credits to fulfill the Building Block 2 goal of achieving 75% capacity factor at each natural gas EGU). There are certain leakage-like scenarios that could occur under a rate-based plan; these are discussed below and in the Technical Addendum.

Addressing leakage is a necessary part of properly implementing the performance standards under section 111(d). The mass-based trading system is a cost-minimizing alternative to requiring each source to individually meet the mandated performance standards. System-wide emission reductions under a mass-based system must, therefore, be commensurate with the level of reductions expected under the performance standards, or else the performance standards are violated. A scenario in which leakage prevents a state from achieving emission reductions equivalent to the level set by the performance standards would violate the statute. Therefore, EPA must ensure that it or states take steps to reduce the effects of leakage.

Here, the most effective way to address leakage would be to include as many sources as possible in the mass-based trading system.[46] In particular, the mass-based trading systems should include not only existing generators, but also new generators, as well as modified and reconstructed generators. EPA properly notes that states can satisfy their requirements to consider leakage by including new sources under their caps, without incorporating set-asides.[47] Given the substantial advantages of this approach, EPA should affirmatively encourage states to select this option and should reconsider whether EPA may want to take this approach, as well.[48] Similarly, EPA has requested comment on whether modified and reconstructed sources should continue to be covered by the Clean Power Plan after they are modified.[49] From a leakage perspective, keeping sources within the Clean Power Plan, even after modification or reconstruction, is preferable.

In order to address leakage, EPA has also proposed set-asides in the mass-based proposed federal plan and model trading rule. These set-asides are a sensible second-best approach to addressing leakage in those cases where the statewide cap does not cover both existing and new sources. EPA has proposed two types of set-asides: (1) an output-based set-aside for affected combined-cycle natural gas generators, and (2) a renewable energy set-aside. Using these set-asides is an appropriate approach to reducing leakage, in cases where new natural gas plants will not be covered by the cap, but certain changes can further improve outcomes.

Output-based Set-Asides

The output-based set-aside for affected combined-cycle natural gas generators reserves a portion of the predetermined total emission cap for these generators, which can then use them for generation or trade them to other generators. Providing additional allowances

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[46] See Robert N. Stavins, *Addressing Climate Change with a Comprehensive U.S. Cap-and-Trade System*, 24 OXFORD REV. ECON. POL'Y 298, 304 (2008) (comparing an economy-wide cap and its relative lack of leakage to the greater leakage problem arising from a cap with limited coverage).
[47] *See* 80 Fed. Reg. at 64,888, 65,018.
[48] EPA has questioned whether it has the legal authority to include new sources under the existing sources cap, 80 Fed. Reg. at 65,019, but there is reason to believe that it does. *See* Gregory E. Wannier et al., Prevailing Academic View on Compliance Flexibility Under § 111 of the Clean Air Act 7 (2011) ("A safer option might be for EPA to issue baseline performance standards for new sources (as it did in [the Clean Air Mercury Rule]) and, in a separate and severable rulemaking, incorporate new sources under a single flexible regime with existing sources.").
[49] *See* 80 Fed. Reg. at 65,038-39.

under this mechanism effectively subsidizes the recipient generators so that they produce more energy.[50] The number of extra allowances an eligible generator receives in each compliance period is based on how much it generated in the previous compliance period.[51] Thus, eligible facilities have an incentive to increase generation as a result of the set-aside, because they can gain more allowances in the next period. Though the affected generators that receive more allowances would increase production, and therefore would generate more emissions, the overall cap on emissions remains the same; therefore, the output-based set-aside would not diminish the effectiveness of the mass-based plan as a method of implementing the best system of emission reduction ("BSER").[52] With this design, the output-based set-aside should help to decrease leakage to new generators not covered by the program.

Though the output-based set-aside is likely to be a useful tool for reducing leakage, it could be improved in certain ways. For instance, EPA proposes to award allowances only for generators that exceed a 50-percent capacity factor.[53] The 50-percent capacity factor threshold could result in generation shifts between existing generators sharing ownership in order to artificially qualify for more allowances. To avoid this impact, allowances should be allocated pro rata based on output, similar to the way gas shift emission rate credits are awarded fractionally based on generation under the rate-based plan. The pro rata allocation may be weighted according to consistency of operation or some other efficiency factor, so as to avoid subsidies to intermittently operating units for whom increased production would be otherwise inefficient. This mirrors the goals expressed by EPA in its Technical Support Document elaborating on the proposed allowance allocation method, while avoiding the problems associated with use of a strict threshold.[54] Additionally, EPA could further reduce leakage by expanding the portion of allowances that are set aside in the output-based set-aside program.[55]

Renewable Energy Set-Asides

The second type of set-aside that EPA proposes is a renewable energy set-aside allocation. Under this mechanism, EPA proposes that five percent of the total initial number of allowances be set aside for allocation to eligible renewable energy generators.[56] Eligibility for the set-aside would be determined using the same criteria that set eligibility for

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[50] *See* ECONOMIC AND ALLOCATION ADVISORY COMMITTEE, ALLOCATING EMISSIONS ALLOWANCES UNDER CALIFORNIA'S CAP-AND-TRADE PROGRAM 13 (2010), *available at* www.climatechange.ca.gov/eaac/documents/eaac_reports/2010-03-22_EAAC_Allocation_Report_Final.pdf.
[51] 80 Fed. Reg. at 65,020.
[52] *Id.* (explaining that the output-based allocation allowances would be set aside from the total number of allowances permitted under the emissions cap, not added to the total).
[53] The capacity factor is a measure of effectiveness based on the ratio of how much energy a facility actually produces and the maximum amount it could hypothetically produce if it operated nonstop.
[54] EPA, Proposed Federal Plan Technical Support Document: Allowance Allocation 8, *available at* http://www2.epa.gov/sites/production/files/2015-11/documents/tsd-fp-allowance-allocations.pdf.
[55] *See* Dallas Burtraw et al., Approaches to Address Potential CO_2 Emissions Leakage to New Sources Under the Clean Power Plan: Technical Background for Public Comments to EPA 32 (2016), *available at* http://www.rff.org/files/RFF-CPP_Technical-Background.pdf.
[56] 80 Fed. Reg. at 65,024.

emissions rate credits in the rate-based program.[57] According to the proposal, these allowances would be distributed pro rata based on the proportion of total state renewable energy production represented by each eligible unit's verified projections of generation.[58] EPA should expand its criteria to include a broad range of renewable energy measures, as well as upgraded and new nuclear capacity, as long as the emission benefits are verifiable. Allowing a broad range of measures to qualify for renewable energy set-asides would provide flexibility and reduce costs of achieving emission reductions, incentivizing the growth of zero-emitting generation as opposed to shifting generation to new gas plants not covered by the regulation. Meanwhile, requiring the renewable energy set-asides to be verifiable ensures that the environmental goals of the Clean Power Plan are not diminished.

Like the output-based set-aside, the renewable energy set-aside would likely be a helpful tool in reducing leakage, but the approach can be further improved. For example, EPA could consider increasing the size of the renewable energy set-aside to ensure mitigation of leakage. In the proposed plans, EPA only touches on its rationale for designating the level of the set-aside at five percent of total allowances.[59]

The agency more thoroughly discusses its reasoning in its technical support documents. It explains that the intent of the set-aside is to promote economic parity between renewable energy projects and new natural gas units.[60] EPA proposes to set aside five percent of total allowances for this purposes because its calculations show that this would result in mitigation of leakage to new natural gas units if onshore wind were used as the benchmark technology.[61] These calculations are based on the levelized cost of electricity ("LCOE"), which is used to compare costs and determine competitiveness across different types of electricity generators.[62] Onshore wind generation has the lowest LCOE of renewable energy resources, and is thus the most competitive with traditional steam-generating and natural gas units.[63] To calculate a maximum set-aside amount, the same model shows that a ten percent set-aside would be required to mitigate this leakage if utility-scale solar (which has the highest LCOE of eligible renewable sources) were used as the benchmark technology.[64]

EPA should consider increasing the set-aside to an amount between five and ten percent of total allowances in the final rule to ensure that potential leakage to new generators is

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[57] *Id.*
[58] *Id.*
[59] 80 Fed. Reg. at 65,022.
[60] EPA, Proposed Federal Plan Technical Support Document: Renewable Energy (RE) Set-Aside 4, *available at* http://www.epa.gov/sites/production/files/2015-11/documents/tsd-fp-re-setaside.pdf.
[61] *Id.*
[62] *Id.*; *see also* Energy Information Administration, Levelized Cost and Levelized Avoided Cost of New Generation Resources in the Annual Energy Outlook 2015, at 1, *available at* https://www.eia.gov/forecasts/aeo/pdf/electricity_generation.pdf.
[63] *See* Rick Tidball et al., National Renewable Energy Laboratory, Cost and Performance Assumptions for Modeling Electricity Generation Technologies 61 (2010), *available at* http://www.nrel.gov/docs/fy11osti/48595.pdf; *see also* International Renewable Energy Agency, Renewable Power Generation Costs in 2014, at 2 (2015).
[64] *Id.*

mitigated by increased renewable generation. The eligibility of a variety of renewable energy sources means that the allowances actually contributing to mitigation of leakage would fall somewhere between five and ten percent. Increasing the size of the allocation set-aside may better account for a variety of potential eligible renewable energy sources that may currently have greater LCOEs than onshore wind energy.

In Order to Promote Cost-Effectiveness, Market Transparency, and Equity, EPA Should Recommend That States Use Auctions to Distribute Allowances When Implementing a Mass-Based Trading Approach

After it is determined how many allowances will be available to the system and to particular types of sources, the entity administering the trading system will have to determine how to allocate those allowances to individual sources. These allocation decisions have important implications for both the efficiency and equity of the trading program, and evidence shows that allocation by auction will help to promote both of these ends.

Often the allocation of allowances in environmental policy is treated as a distributional issue. It is assumed that a free allocation of allowances, while constituting a wealth transfer to electricity generators from consumers, would not have a detrimental effect on efficiency. However, this assumption holds only in a first-best setting with no pre-existing distortionary policies, such as income or sales taxes. Further, it is assumed that the relevant markets are perfectly competitive and hence, the market prices reflect both the marginal costs of the generators and the marginal willingness to pay of customers. A deviation from such idealized market conditions necessitates an evaluation of policy instruments in a second-best setting.

If there are pre-existing taxes, when an environmental policy drives up the price of polluting goods, it tends to compound the inefficiencies created by these taxes and raise the social costs of all environmental policies.[65] If, however, the allowances are auctioned, the revenue collected can be used to reduce these distortions caused by pre-existing taxes, eliminate some of the inefficiency, and hence lead to a lower social cost of regulation compared to non-auctioned allowances.[66]

In addition, in many states, there is an inherent economic inefficiency in the electricity markets, as the electricity price is regulated, and therefore there is a difference between the marginal cost of electricity and the consumers' willingness to pay. A free allocation of allowances based on historical generation would in effect serve as an output subsidy, potentially amplifying the inefficiencies caused by electricity pricing.[67]

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[65] Lawrence H. Goulder et al., *The Cost-Effectiveness of Alternative Instruments for Environmental Protection in a Second-Best Setting*, 72 J. PUB. ECON. 329, 330 (1999).
[66] *Id.* at 352.
[67] Dallas Burtraw et al., Resources for the Future, The Effect of Allowance Allocation on the Cost of Carbon Emission Trading 4, Discussion Paper 01-30 (2001).

Efficiency of allowance trading can be increased if allowances are distributed initially through a revenue-raising auction. Research shows that, in a second-best world, failure to raise revenues using auctions and to use those revenues to offset distortionary taxes can squander the savings in compliance costs that are achieved by flexible trading systems.[68]

When states conduct auctions, the revenue raised from emission credit sales can be used for public programs, redistributed to ratepayers, or used to lower other distortionary taxes, reducing the social costs of regulation.[69] The potential for redistributing auction revenue to households or using it to lower pre-existing taxes makes auctions "dramatically more cost effective" than a historical generation approach.[70] Indeed research indicates that allocating allowances by auction will achieve a given level of emission reduction at roughly half the cost of other approaches, even when the least efficient means of revenue redistribution is used.[71] Even though consumer expenditures might increase more as a result of auctions, using auction revenues to redistribute directly to consumers, or reduce other distortionary policies, would result in lower overall costs to society compared to alternative free allocations of allowances.[72]

Further, auctioning allowances can reduce or eliminate the problematic distributional effects associated with free allocation schemes, including allocation based on historical generation.[73] Given that electricity is a regulated sector, with guaranteed cost-based rates of return for utilities, and with relatively inelastic demand, an increase in electricity prices could result in undesirable distributional impacts, especially for low-income customers who have limited ability to further reduce their electricity consumption. If the allowances are auctioned off, part of the revenue can be redistributed to low-income consumer groups to mitigate the effects of increased electricity prices.

In addition, auctions may allow participation of non-emitting third parties subject to tracking rules, which would further improve market liquidity.[74] Moreover, auctions are

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[68] *Id.* at 21.
[69] See Markus Ahman et al., *A Ten-Year Rule to Guide the Allocation of EU Emissions Allowances*, 35 ENERGY POL'Y 1718, 1719 (2007); Dallas Burtraw et al., Resources for the Future, Economics of Pollution Trading for SO_2 and NOx 45, Discussion Paper 05-05 (2005). Auction revenues may also be used to offset distortions, such as the negative effects of taxes on labor. *See* Burtraw et al., *supra* note 67, at 21.
[70] Dallas Burtraw, *Carbon Emission Trading Costs and Allowance Allocations: Evaluating the Options*, 145 RESOURCES 13, 14 (2001).
[71] *Id.* at 14-15.
[72] *Id.* at 16.
[73] See Burtraw et al., *supra* note 67, at 29.
[74] *See* Judson Jaffe, Matthew Ranson, & Robert N. Stavins, *Linking Tradable Permit Systems: A Key Element of Emerging International Climate Policy Architecture*, 36 ECOLOGY L.Q. 789, 800 n.50 (2009). This is already permitted in existing mass-based schemes; for instance, about 25% of participants in allowance auctions administered by the California Air Resources Board were non-emitting companies. *See* Katherine Hsia-Kung et al., Environmental Defense Fund, Carbon Market California: A Comprehensive Analysis of the Golden State's Cap-and-Trade Program 8 (2014).

more transparent and send a clearer price signal regarding the value of allowances than free allocation would.[75]

Several auction frameworks exist that states may use as guidance, and that EPA can draw lessons from in crafting a model recommendation for states. For instance, a number of the participating states in the Regional Greenhouse Gas Initiative ("RGGI") auction their allowance budgets.[76] The reinvestment of RGGI auction proceeds into energy efficiency and renewable energy programs has resulted in significant social benefits and gains to customers despite electricity price increases in some states.[77]

Given all of the advantages of auctioning over historical allocation of allowances, EPA should encourage states adopting the mass-based model trading rule as a state plan to distribute their allowances by auction to the extent permitted by state law. Similarly, where states take over administration of initial allowance allocation in a mass-based federal plan, EPA should encourage them to use auctions. Finally, to aid states in implementing allowance auctions, EPA should offer a model auction format in the mass-based model trading rule, just as it already provides a model framework for allocating free allowances to affected generators based on historical generation.[78]

C. EPA Should Design Its Model Rate-Based Trading System to Maximize Flexibility, Avoid Increasing Emissions, and Incentivize the Appropriate Level of Gas Generation

EPA's final model trading rules for a rate-based system should allow for a wide range of sources of ERCs, as should any rate-based final federal plan. In addition, for both the final model trading rules and any final federal plan with a rate-based system, EPA should study the possibility of requiring a minimum percentage of ERCs not generated by natural gas resources. In addition, EPA should allocate Gas Shift ERCs ("GS-ERCs") to natural gas generators using its proposed approach, which properly gives consistent incentives to natural gas generators.

EPA Should Allow a Broad Range of Compliance Options in a Rate-Based System

A wide range of sources should be eligible to produce ERCs, provided those sources are truly carbon-neutral and their output can be verified with reasonable certainty. The wider the range of options that affected generators will have for compliance, the lower compliance costs will be, and the more investment will flow to cheaper sources of zero-

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[75] *See* Economic and Allocation Advisory Committee, Allocating Emissions Allowances Under California's Cap-and-Trade Program 3 (2010), *available at* http://www.climatechange.ca.gov/eaac/documents/eaac_reports/2010-03-22_EAAC_Allocation_Report_Final.pdf.

[76] *See* Charles Holt et al., Auction Design for Selling CO2 Emission Allowances Under the Regional Greenhouse Gas Initiative 3 (2007), *available at* https://www.rggi.org/docs/rggi_auction_final.pdf.

[77] *See* PAUL J. HIBBARD ET AL., ANALYSIS GROUP, THE ECONOMIC IMPACTS OF THE REGIONAL GREENHOUSE GAS INITIATIVE ON NINE NORTHEAST AND MID-ATLANTIC STATES 7 (2015), *available at* http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/analysis_group_rggi_report_july_2015.pdf.

[78] *See* 80 Fed. Reg. at 65,018.

emission energy. As long as their emission reductions can be verified, the potential sources of ERCs should include utility-scale renewable energy sources such as solar, wind, hydropower, and geothermal; new nuclear generators and capacity upgrades; carbon-neutral biomass generators; tidal or wave power resources; combined heat and power generators and waste heat power generators; and distributed renewable resources and demand-side energy efficiency. While nuclear energy may provoke opposition from some groups on environmental grounds, it is a proven source of zero-emission baseload power that plays a major role in the national supply of electricity.[79] The proper way to account for the particular environmental risks of nuclear power is through regulation specifically aimed at managing its risks rather than through policies on greenhouse gases.

EPA Should Avoid Incentives That Could Lead to Increased Emissions

EPA should consider requiring coal-fired generators to use a minimum percentage of ERCs from zero-emission sources (as opposed to GS-ERCs) for compliance, in order to avoid the potential problem of increased generation from existing natural gas plants being substituted for retiring nuclear or renewable capacity. Since existing natural gas generation is subject to a constraint on the rate of its carbon emissions per megawatt-hour generated rather than an absolute cap on its total carbon emissions, as it would be under a mass-based system, existing natural gas generation would be easily able to fill any void left by retiring zero-emission resources, which could undermine the goals of the Clean Power Plan by preventing the system from achieving the full projected emission reductions. This problem, which is illustrated in the Technical Addendum to these comments, is analogous to the "leakage" problem with a mass-based trading system, and EPA should study the possibility of using a mechanism analogous to the set-aside mechanism in the rate-based system to reduce these risks. By requiring a minimum percentage of ERCs from sources other than natural gas generators, EPA could better ensure that new renewable capacity is built and that increased natural gas generation does not increase total greenhouse gas emissions.

EPA Should Properly Incentivize Existing Natural Gas Generation Through GS-ERCs

EPA's proposal for awarding GS-ERCs to existing natural gas generators provides appropriate incentives, and should not be modified to award GS-ERCs to natural gas plants only after "a threshold of electric generation for the year is exceeded," as EPA suggests in an alternative proposal.[80] EPA's primary proposal provides smooth and consistent incentives to natural gas generators by awarding fractional GS-ERCs for each megawatt-hour generated.[81] In contrast, using a generation threshold would provide uneven incentives to natural gas generators, and problematic incentives to owners of multiple natural gas generators. If a natural gas generator expects that it will not surpass its generation threshold for the year, it will lack any incentive to increase generation, while natural gas generators that expect to surpass the threshold may dramatically increase

[79] Nuclear power has supplied about 20% of national electric generation since the early 1990s. Energy Information Administration, November 2015 Monthly Energy Review, tbl.7.2a.
[80] 80 Fed. Reg. at 64,994.
[81] 80 Fed. Reg. at 64,992-93.

generation. If a firm owns multiple natural gas generators, it could gain GS-ERCs by shifting generation from one generator to another, without increasing total generation.[82] In addition, EPA should calculate GS-ERC emission factors on an individual unit basis, rather than using a uniform rate "based on the least stringent region's baseline 2012 average emission rate."[83] As EPA notes, using an individual generator calculation of the GS-ERC Emission Factor would "reward the better-performing NGCC units within the subcategory,"[84] which would ensure that GS-ERCs incentivize the lowest-carbon natural gas generators and maximally reduce emissions.

III. EPA's Use of Flexible, Trading-Based Mechanisms in the Proposal Is Well Within EPA's Authority Under the Clean Air Act

The flexible trading systems that EPA has proposed for the federal plan and model state plans are well within the scope of, and have substantial precedent under, the Clean Air Act. EPA described the legal basis for using trading-based compliance approaches in the main Clean Power Plan rule, and is not reopening this issue for comment here.[85] However, EPA does address several legal issues specific to the proposed federal plan that do warrant further discussion.

Some Clean Power Plan opponents have argued that the proposed federal plan exceeds EPA's authority under the Clean Air Act. In fact, both the mass- and rate-based approaches to the proposed federal plan fit squarely within EPA's statutory authority.

A. As the Statute Instructs, the Proposed Federal Plan Employs an Approach Consistent with the Federal Implementation Plan Process for Criteria Pollutants

Opponents of the Clean Power Plan have challenged EPA's promulgation of a federal plan that involves market-based components that are "outside the fenceline" of an individual generating unit.[86] However, the statutory framework, case law, and regulatory history of the relevant Clean Air Act sections demonstrate that the use of market-based mechanisms, rather than technological requirements at individual plants, is within EPA's discretion under a federal plan.

Section 111(d)(2) lays out the scope of EPA's authority to promulgate federal standards of performance in those cases where a state fails to submit a satisfactory state plan.[87] The statute indicates that EPA "shall have the same authority" to "prescribe a plan for a State in cases where the State fails to submit a satisfactory plan as [the agency] would under section [110(c)] in the case of failure to submit an implementation plan."[88] Section 110(c),

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[82] EPA appears to be aware of this potential problem. *See* 80 Fed. Reg. at 64,992-93.
[83] 80 Fed. Reg. at 64,993.
[84] *Id.*
[85] *See* 80 Fed. Reg. at 64,986.
[86] *See, e.g.*, David B. Rivkin, Jr. et al., Does EPA's Clean Power Plan Proposal Violate the States' Sovereign Rights?, 16 ENGAGE 36, 39 (2015).
[87] 42 U.S.C. § 7411(d)(2).
[88] 42 U.S.C. § 7411(d)(2).

in turn, provides that EPA "shall promulgate a Federal implementation plan at any time within 2 years after the Administrator" finds that a state has failed to submit an adequate state plan.[89] EPA may use "economic incentives, such as marketable permits or auctions of emissions allowances" as tools in such a federal implementation plan.[90] Therefore, EPA may also use such economic incentives in its analogous federal plans under section 111(d).

Case law is also consistent with EPA being able to use market-based mechanisms in its federal plan. Courts have held that when EPA promulgates a federal implementation plan under section 110(c), the agency "stands in the shoes of the defaulting state, and all of the rights and duties that would otherwise fall to the state accrue to EPA."[91] In other words, EPA is permitted to employ the same regulatory techniques that a state is allowed to use under the statute, including the "economic incentives such as fees, marketable permits, and auctions of emissions rights" that section 110(a)(2)(A) indicates that state plans may use.[92]

EPA has substantial experience, over decades and through administrations of both parties, instituting federal implementation plans that include flexible, market-based mechanisms under sections 110 and 111. EPA discusses this regulatory history in its proposed rule.[93] Most recently, EPA promulgated the Cross-State Air Pollution Rule, which consists of a federal implementation plan designed as a multi-state mass-based trading system.[94] The Supreme Court upheld that rule in *EME Homer City*.[95]

The statutory framework, case law, and regulatory history strongly support EPA's discretion to use flexible, market mechanisms that reach beyond the fenceline of individual plants in federal plans that it promulgates under Section 111(d).

B. EPA Properly Considers the Remaining Useful Lives of Affected Sources in Its Proposed Federal Plan

Section 111(d) also instructs EPA to "take into consideration, among other factors, remaining useful lives of the sources in the category of sources to which such standard applies."[96] Opponents may argue that EPA fails to adequately consider the remaining useful

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[89] 42 U.S.C. § 7410(c)(1).
[90] 42 U.S.C. § 7602(y).
[91] Central Arizona Water Conservation District v. EPA, 990 F.2d 1531, 1541 (9th Cir. 1993). See also South Terminal Corp. v. EPA, 504 F.2d 646, 668 (1st Cir. 1974) (refusing to limit EPA's powers under a federal implementation plan to "less than those necessary measures allowed by Congress to a state to accomplish federal clean air goals").
[92] 42 U.S.C. § 7410(a)(2)(A). Note that, similar to the cross-reference from the section 111(d)(2) federal plan instructions to the NAAQS federal implementation plan process, the section 111(d)(1) state plan process also cross-references the approach to developing state plans under section 111(d). 42 U.S.C. § 7411(d)(1) ("The Administrator shall prescribe regulations which shall establish a procedure similar to that provided by section [110].").
[93] *See* 80 Fed. Reg. at 64,987, 64,989.
[94] 76 Fed. Reg. 48,208, 48,210 (Aug. 8, 2011).
[95] *EPA v. EME Homer City Generation, LP*, 134 S. Ct. 1584 (2014).
[96] 42 U.S.C. § 7411(d)(2).

lives of sources for which a federal plan applies, most notably the remaining useful lives of coal plants that may be induced to retire under the rule.[97]

Contrary to these arguments, EPA thoroughly considers the remaining useful lives of regulated sources in its proposed federal plan. The agency refers to legislative history in reaching its assessment that, when it enacted this provision in 1977, "Congress viewed 'remaining useful lives' as a consideration for facilities with relatively little remaining useful life."[98] EPA further indicates, "We are confident the proposed federal plan will not force costly pollution control investments at older plants with short remaining useful lives."[99] In particular, EPA explains that the "that the federal plan adequately considers 'remaining useful lives' of affected [sources] by providing for trading and other flexibilities authorized in the [emission guidelines]," including "[r]elatively long periods for affected [sources] to come into compliance, the ability to credit early action, the use of emissions trading, the use of multi-year compliance periods, and the ability to link to other federal or state plans to create larger emissions markets."[100] EPA also considers how it has addressed the remaining useful lives of sources in prior rulemakings under analogous statutes. With the similarly worded statute involving Best Available Retrofit Technology for the regional haze program,[101] EPA found that the relevant inquiry was "whether the time period associated with amortizable costs of compliance will exceed the remaining useful lives of the sources in question."[102] EPA finds the same inquiry relevant here and determines that the proposed federal plan would be permissible after that assessment.[103]

Additionally, although, as EPA indicates, the language involving the consideration of remaining useful lives of sources is similar between the section addressing state plans and the section addressing federal plans,[104] the phrasing is not exactly the same. Section 111(d)(2) instructs EPA to consider "remaining useful lives of the sources in the category of sources to which such standard applies," while section 111(d)(1) indicates that EPA shall permit a state in developing its plan to consider "the remaining useful life of the existing source to which such standard applies."[105] This wording suggests that EPA need only consider the lives of the sources at a category-wide level, while providing states with the option of considering sources in a more granular fashion. Nothing in the statute suggests that EPA must ensure the survival of every coal plant in the country, many of which have already operated decades longer than originally intended.[106] All that is required is that EPA consider, among other factors, the remaining useful lives of the category of regulated

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[97] *See, e.g.*, John J. Novak, The National Rural Electric Cooperative Association, Oral Testimony: Federal Plan Requirements for Greenhouse Gas Emissions From Electric Utility Generating Units Constructed on or Before January 8, 2014, at 4 (Nov. 18, 2015).
[98] 80 Fed. Reg. at 64,982-83.
[99] *Id.* at 64,983.
[100] *Id.* at 64,983.
[101] *See* 42 U.S.C. § 7491.
[102] *See* 80 Fed. Reg. at 64,983.
[103] *See id.*
[104] *See* 80 Fed. Reg. at 64,982.
[105] *Compare* 42 U.S.C. § 7411(d)(2) *with* 42 U.S.C. § 7411(d)(1).
[106] *See* RICHARD L. REVESZ & JACK LIENKE, STRUGGLING FOR AIR: POWER PLANTS AND THE "WAR ON COAL" 29-35 (2016).

sources as a whole. EPA's approach easily satisfies this interpretation of the statutory requirement.

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Technical Addendum: Rate-Based Trading System Scenario, Illustrating the Problem of Existing Zero-Emission Resource Retirements

Assume State A currently generates its electricity as follows: 100 MWh from one coal-fired generator, 100 MWh from one natural gas generator (which is only at 50% capacity), and 100 MWh from one nuclear plant. The coal generator emits 2,000 lbs. of CO2 per MWh, the natural gas generator emits 1,100 lbs. per MWh, and the nuclear plant emits nothing. State A's total carbon emissions are therefore 310,000 lbs. of CO2.

The coal generator must meet a standard of 1,500 lbs./MWh, and the natural gas generator must meet a standard of 1,000 lbs./MWh. Therefore, for each MWh it generates, the coal plant needs:

$$\frac{(EGU\ Standard - EGU\ Operating\ Rate)}{EGU\ Standard} = \frac{1{,}500 - 2{,}000}{1{,}500} = -0.333$$

(This formula is found on p. 64,991 of the Proposed Federal Plan. Note that a negative number means the generator requires ERCs, while a positive number would mean it was creating ERCs.) For its own compliance, the natural gas unit will need some ERCs as well for each MWh it generates:

$$\frac{(EGU\ Standard - EGU\ Operating\ Rate)}{EGU\ Standard} = \frac{1{,}000 - 1{,}100}{1{,}000} = -0.1$$

At the same time, the natural gas unit will be creating ERCs it can sell to the coal unit. The GS-ERC Emission Factor is:

$$1 - \frac{NGCC\ Emission\ Rate}{Steam\ Standard} = 1 - \frac{1{,}100}{1{,}500} = 0.2667$$

(This formula is found on p. 64,992 of the Proposed Federal Plan.) Let's assume the incremental generation factor is 0.25. (This is within the range used by EPA during the different compliance periods, as shown on p. 64,992 of the Proposed Federal Plan.) Therefore, the natural gas unit gets GS-ERCs as follows for each MWh it generates:

$$Incremental\ Generation\ Factor * GS\text{–}ERC\ Emission\ Factor = 0.25 * 0.2667 = 0.0667$$

(This formula is found on p. 64,992 of the Proposed Federal Plan.) Now let's assume the nuclear plant retires, because it was old, and now the state needs to replace the 100 MWh of load from 2 sources: increased generation from the existing natural gas unit, and new renewable energy capacity. Let's further assume that gas is much cheaper than renewable energy is this future, so the existing natural gas unit increases its generation to its full capacity of 200 MWh. As a result, the natural gas unit requires 20 ERCs, but it also creates 13.33 NG-ERCs. The coal plant reduces generation, because its operational costs

have increased, so now the coal plant generates only 70 MWh, and therefore it requires 23.33 ERCs.

The coal plant can buy all of the 13.33 NG-ERCs from the natural gas plant, and it will still need 10 more ERCs, while the natural gas plant still needs 20 ERCs. The two plants together are now generating 270 MWh as a result of their changed generation levels, but State A has 300 MWh of load. To fill the 30 MWh gap, utilities in State A construct new renewable generation that generates 30 MWh, and also creates 30 ERCs. These 30 ERCs are exactly enough to meet the compliance needs of both the coal plant and the natural gas plant.

In this scenario, even though coal generation has been reduced and natural gas generation has increased as intended, and both sources were able to meet their compliance needs, total CO2 emissions have significantly increased. The coal plant now emits 140,000 lbs. of CO2, but the natural gas plant emits 220,000 lbs. of CO2, so State A's total emissions are now 360,000 lbs. instead of 310,000 lbs.

Unfortunately, the general characteristics of the scenario above are plausible. Natural gas may continue to be cheap and plentiful, while barriers may remain for new renewable or nuclear energy, and aging nuclear plants and renewable generators may shut down.

In contrast, under a mass-based system, the above scenario could not take place, because the affected generators could not increase their total emissions, as happened above. Instead, the risk would be that the retiring nuclear unit would be replaced by *new* natural gas generation, which would not be subject to the total emissions limit. However, EPA has proposed several mechanisms to address this problem, by incentivizing existing natural gas generation (which is subject to the total emissions limit) and new renewable energy through allowance set-asides. In contrast, EPA's proposed rate-based system does not take this problem into account, and as a result, the proposed federal plan contains no mechanism to address this.

One possible way to address this problem would be to require that coal-fired generators obtain a certain minimum percentage of ERCs that are not GS-ERCs. However, this could create a problem in the market for GS-ERCs, which could reach a very low trading price if firms think the supply of GS-ERCs might exceed the potential of coal plants to use them. In addition, applying that mechanism to the scenario above shows that may not make a major difference in reducing greenhouse gas emissions, as shown below.

Assume that, in the scenario above, State A requires the coal plant to meet 90% of its compliance with non-GS-ERCs (a very high percentage). The coal plant still generates 70 MWh. In that case, the coal plant can only use 2.33 GS-ERCs (from its total compliance need of 23.33 ERCs), so it has a residual need of 21 ERCs from non-gas sources. As a result of its inability to sell all of its GS-ERCs, the natural gas plant reduces generation to 190 MWh, and requires 19 ERCs as a result, while creating 12.66 GS-ERCs (most of which will go unused). The renewable generation now increases to 40 MWh, which meets the

combined ERC need of both the coal plant and the natural gas plant, and also completes the load requirements of State A (70 MWh coal + 190 MWh natural gas + 40 MWh new renewables = 300 MWh of load). State A now has carbon emissions of 349,000 lbs. (140,000 lbs. from coal and 209,000 lbs. from natural gas), still higher than the pre-nuclear-retirement level of 310,000 lbs. but not as high as the 360,000 lbs. emitted without the 90% requirement. Even if GS-ERCs were not even created or used at all, that would only result in a shift of about 2.1 MWh from natural gas to renewables, and carbon emissions would remain much higher than the pre-nuclear-retirement level.

Alternatively, assume that the 90% non-GS-ERC requirement causes the coal plant to reduce its generation, while the natural gas stays at 200 MWh. In that case, to balance load, the coal plant will generate 61.5 MWh and require 20.5 ERCs, of which only 2.05 can be GS-ERCs. Renewable generation will increase to approximately 38.5 MWh, which will meet the gas plant's compliance requirements of 20 ERCs and the coal plant's compliance requirements of about 18.5 non-GS-ERCs. With this mix of generation (61.5 MWh coal, 200 MWh natural gas, and 38.5 MWh new renewables), State A will have carbon emissions of 343,000 lbs. (123,000 from coal and 220,000 from natural gas), which is still higher than the pre-nuclear retirement level of 310,000 lbs. of carbon. If GS-ERCs are not created or used at all, this would only shift the coal plant to 60 MWh and increase renewable generation to 40 MWh (as both the coal plant and the natural gas plant would need 20 ERCs each), and carbon emissions would be 340,000 lbs.