AEE INSTITUTE

A PERFORMANCE-BASED APPROACH TO ALLOWANCE ALLOCATION FOR CLEAN POWER PLAN COMPLIANCE

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The Advanced Energy Economy Institute (AEE Institute) is a 501(c)(3) charitable organization whose mission is to raise awareness of the public benefits and opportunities of advanced energy. AEE Institute provides critical data to drive the policy discussion on key issues through commissioned research and reports, data aggregation, and analytic tools. AEE Institute also provides a forum where leaders can address energy challenges and opportunities facing the United States. AEE Institute is affiliated with Advanced Energy Economy (AEE), a 501(c)(6) business association, whose purpose is to advance and promote the common business interests of its members and the advanced energy industry as a whole.

A PERFORMANCE-BASED APPROACH TO ALLOWANCE ALLOCATION FOR CLEAN POWER PLAN COMPLIANCE

Executive Summary

Under the final Clean Power Plan (CPP), the U.S. Environmental Protection Agency (EPA) gives states flexibility to reduce carbon dioxide (CO_2) emissions from existing affected units in a way that best suits their individual circumstances and policy goals. One key choice for states is whether to meet these targets through a mass-based or a rate-based plan. Advanced Energy Economy Institute (AEE Institute) believes that, under either approach, states can develop a plan that results in cost-effective (and even cost-saving) emission reductions while delivering additional system benefits. However, optimal outcomes are not a guarantee, but rather depend on a number of key decisions in plan design. To that end, AEE Institute will release this spring a paper on *Best Practices for State Compliance Plans*, covering both mass-based and rate-based state plans. In advance of the *Best Practices* paper, this paper considers in detail one aspect of mass-based compliance: allowance allocation.

For states choosing to comply using a mass-based approach, the question of how to allocate emission allowances looms larger than any other policy decision. Allocation is an area where states have wide latitude to choose among different options because how allowances are initially distributed does not generally affect emission reduction outcomes. However, the initial allocation *will* have a significant impact on a state plan when measured against other metrics, including compliance cost, consumer impact, state economic competitiveness, energy system security and reliability, and investment certainty.

Weighing such considerations, allocation to affected units on the basis on historical generation—the proposed approach outlined in EPA's proposed Federal Plan and Model Trading Rules—is the least attractive of the many approaches available to states. For states that decide to adopt it, the *historical generation approach* to allocation will result in market failures that will limit competition and favor more expensive compliance options. In particular, the historical generation approach would introduce a "tragedy of the commons," causing affected units to undervalue beyond-the-fence compliance measures. In doing so, it would also inhibit fair competition across all available measures, locking in a costlier status quo. Furthermore, allocation based on historical generation would offer utilities no incentive for early compliance activity, while failing to overcome existing market barriers that discourage deployment of cost-effective measures today. Ultimately, the historic generation approach is likely to drive higher costs for electricity customers relative to other allocation systems.

Fortunately, the historical generation approach is not required, even for states subject to the Federal Plan, and there are many preferable allocation alternatives that states can implement under mass-based plans. This paper describes one such alternative, *performance-based allocation*, which awards allowances on a technology-neutral basis according to actual emissions reduced.

While certainly not the only option for states to consider, performance-based allocation of allowances would deliver several key benefits over the historical generation approach. Most importantly, by allowing all eligible emission reduction measures to participate on the basis of cost and value, this approach would create an open and competitive marketplace. It would eliminate market barriers that would otherwise impede the deployment of many low-cost compliance options. The performance-based approach would therefore send clear market signals to utilities, project developers, and other market participants about the value of projects and programs they could develop for Clean Power Plan compliance. Furthermore, it would reward those utilities that are taking the most action, rather than those that have done the least. For states that use the performance-based approach, the outcome would be lower compliance costs, benefitting affected units and ratepayers alike.

Introduction and Background

The Advanced Energy Economy Institute (AEE Institute) is a nonprofit educational organization promoting greater public understanding of new opportunities to make the energy we use secure, clean, and affordable. Thanks to technological advances and innovation, we now have more options for meeting our energy needs than ever before in history. We call these options "advanced energy."

AEE Institute is affiliated with Advanced Energy Economy (AEE), a national business association whose purpose is to advance and promote the common business interests of its members and the advanced energy industry as a whole. AEE and its state and regional partner organizations, which are active in 26 states across the country, represent more than 1,000 companies and organizations that span the advanced energy industry and its value chains. Technology areas represented include energy efficiency, demand response, natural gas electric generation, solar, wind, hydro, nuclear, electric vehicles, biofuels, and smart grid. Together, these technologies and services will create and maintain a higher-performing energy system—one that is reliable and resilient, diverse, cost-effective, and clean—while improving the range and quality of services available to customers.

AEE and AEE Institute have been active in proceedings involving the Environmental Protection Agency's (EPA's) Clean Power Plan (CPP), with a focus on improving outcomes for states by increasing access to all cost-effective measures for compliance purposes. To that end, this paper advises states considering mass-based compliance plans to avoid allocating allowances on the basis of historical generation, the proposed approach under EPA's proposed mass-based Federal Plan and Model Trading Rule (MTR). The historical generation approach is not required for state plans, and even states subject to a mass-based Federal Plan can choose to replace whatever allocation approach EPA finalizes. The historical generation approach will likely create market barriers that limit competition and skew choices among the available compliance options, thus raising compliance costs and reducing flexibility.

This paper explores the disadvantages of the historical generation approach to allocation in greater detail, but also shows that there are many preferable approaches available to states. Specifically, the paper provides detail on one straightforward alternative—performance-based allocation—that avoids picking winners and instead fosters technology-neutral competition between all eligible emission reduction measures, both inside and outside the fenceline of affected units. Allocating allowances on the basis of performance, rather than past generation, would lower costs for consumers, provide market certainty for utilities and advanced energy providers alike, and allow cost and value in emission reduction to determine the relative deployment of different compliance measures.

Historical Allocation: Anti-Competitive, Increases Cost

States considering mass-based CPP compliance should not award allowances to affected electric generating units (EGUs) on the basis of historical generation as the primary allocation method.[1] This is the proposed

[1] While this paper focuses on approaches for state plans, the shortcomings of upfront allocation to affected EGUs on the basis of historical generation (as outlined in this section) and the allocation methodology described in detail below both apply equally to EPA's mass-based Federal Plan and Model Trading Rule (MTR). This paper builds off AEE's comments to EPA, which outline in greater detail the disadvantages of allocation to affected EGUs on the basis of historical generation, and describe how EPA could implement the allocation methodology described below in the context of the Federal Plan. *See* Advanced Energy Economy, Comments on the Proposed Federal Plan and Model Trading Rules for the Clean Power Plan, Docket ID No. EPA-HQ-OAR-2015-0199 (Jan. 21, 2016), http://info.aee.net/comments-proposed-federal-plan-and-model-trading-rules.

[2] *See* 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; Proposed Rule, 80 Fed. Reg. 65015 (October 23, 2015) [hereinafter "Proposed Federal Plan and MTR"].

[3] The rapid deployment and cost-effectiveness of advanced energy measures are well evidenced by existing projects and consistent industry trends. Renewable

primary approach outlined by EPA for the mass-based Federal Plan and MTR, but it is not required for states—even states subject to a Federal Plan can choose alternate allocation methods.[2] On the surface, a historical generation approach seems to present a simple and cost-effective method of distributing allowances, but it is not the best choice for states when compared to available alternatives. Specifically, it is likely to create a number of market barriers that will limit available compliance options, introduce investment uncertainty, and dampen competition among the providers of emission reduction measures. Restricted compliance options, uncertainty, and lack of competition will quickly translate to increased compliance costs for EGUs and consumers alike—an outcome antithetical to most states' goals for CPP compliance. This section explores several market barriers that will raise compliance costs and reduce flexibility under the historical generation approach to allowance allocation.

Allocation based on historical generation introduces a "tragedy of the commons" that will cause utilities to overlook the value of cost-effective beyond-the-fenceline measures. As rapidly deployable and cost effective resources, beyond-the-fence measures—including advanced energy technologies and services such as renewable energy generation and energy efficiency—are key to both the short-term and long-term impact of compliance in states. In the short-term, the widespread availability, short deployment timelines, and low cost of these compliance options will help ease the transition into the compliance period while reducing ratepayer impacts.[3] In the long-term, increased deployment of advanced energy technologies will contribute to continuous technology performance and price improvements, reducing compliance costs.[4] In theory, limiting emissions in a state should induce utilities to examine all emission reduction options and choose those that are most cost effective. Unfortunately, allocation of allowances on the basis of past generation would discount the emission-reduction value of beyond-the-fenceline measures and distort utility choices for compliance.

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[2] *See* 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; Proposed Rule, 80 Fed. Reg. 65015 (October 23, 2015) [hereinafter "Proposed Federal Plan and MTR"].

[3] The rapid deployment and cost-effectiveness of advanced energy measures are well evidenced by existing projects and consistent industry trends. Renewable energy projects can be developed quickly from initial assessment to completion—often in less than two years, even for utility-scale plants. Meanwhile, energy efficiency measures in existing programs can be deployed almost immediately, and entirely new programs or projects can become operational within one to two years. These resources are also cost-effective. For example, in 2015, Lazard estimated that the unsubsidized levelized cost of electricity (LCOE) of wind was $32-$77/MWh, and that of utility-scale solar PV was $50-$70/MWh, while the unsubsidized LCOE of new coal was $65-$150/MWh. *See* Lazard, *Lazard's Levelized Cost of Energy Analysis—Version 9.0.* (Nov. 2015), https://www.lazard.com/media/2390/lazards-levelized-cost-of-energy-analysis-90.pdf In 2013, the latest year for which data is available for the United States from the Department of Energy, the average wind power purchase agreement (PPA) price was $24/MWh—lower than costs of electricity from NGCC and coal-fired plants. *See* Lawrence Berkeley National Laboratory, *2014 Wind Technologies Market Report* (Aug. 2015), https://emp.lbl.gov/publications/2014-wind-technologies-ma. Similarly, solar PPAs have declined from $125-$150/MWh in 2008 to current levels of $50-$75/MWh. *See* GTM Research, *The One Chart That Shows Why 2014 Was a Breakthrough Year for Utility-Scale Solar in America,* available at http://www.greentechmedia.com/articles/read/the-one-chart-that-shows-why-2014-was-a-pivotal-year-for-us-solar. Energy efficiency is also a cost-effective resource, with Lazard estimating a LCOE for energy efficiency between zero and $50/MWh. Lazard's LCOE for energy efficiency measures the cost of avoided electricity, not the cost of generation, but is an appropriate point of comparison as an alternative to generating a unit of power. *See* Advanced Energy Econ. Inst., *Competitiveness of Renewable Energy and Energy Efficiency in U.S. Markets,* at 9, 13 (June 2015), http://info.aee.net/competitiveness-of-renewable-energy-and-energy-efficiency-in-us. In addition, the Lawrence Berkeley National Laboratory recently estimated that the U.S. average "total cost of saved energy" by customer-funded utility energy efficiency programs across all sectors is $46/MWh (or $0.046/kWh), based on an analysis of programs in 20 states from 2009-2013. Lawrence Berkeley Nat'l Lab., *The Total Cost of Saving Electricity through Utility Customer-Funded Energy Efficiency Programs,* at 11 (April 2015), https://emp.lbl.gov/sites/all/files/total-cost-of-saved-energy.pdf. Unsurprisingly, these measures lead the way for cost-effective compliance options, according to regional transmission operator/independent system operator (RTO/ISO) studies, and AEE Institute's modeling using the State Tool for Electricity Emissions Reduction ("STEER"), which consistently finds that measures such as reducing energy waste, renewable energy sources like solar and wind, and cogeneration combined with natural gas dominate under least-cost optimization scenarios for CPP compliance. *See* PJM Interconnection, *Economic Analysis of the EPA Clean Power Plan Proposal* (Mar. 2015), https://www.pjm.com/~/media/documents/reports/20150302-pjm-interconnection-economic-analysis-of-the-epa-clean-power-plan-proposal.ashx; Southwest Power Pool, *SPP Clean Power Plan Assessment* (Apr. 2015), http://www.spp.org/publications/SPP%20Regional%20Compliance%20Assessment%20Report.pdf; Advanced Energy Economy Inst., *AEE's State Tool for Electricity Emissions Reduction* (2016), http://info.aee.net/steer.

[4] *See* Advanced Energy Econ. Inst., *Markets Drive Innovation*, at 28 (July 2015), http://info.aee.net/market-response-to-epa-clean-power-plan. "The relationship between cost and deployment is often referred to as the *learning rate* and visualized as an *experience curve* or *learning curve*. Quite simply, the learning rate refers to cost reductions that accompany every doubling in the market deployment of a technology due to economies of scale and technological improvements." *Id.* For instance, "[w]ind turbine efficiency has improved by 260% since 1999, and general efficiency of flat plate solar PV is expected to increase from 16% in 2011 to 25% by 2030, reducing costs by 35%." *Id.*

Under mass-based compliance, beyond-the-fenceline emission reductions have a beneficial impact on the grid overall. A new wind farm, for example, would reduce demand for fossil fuel-fired generation on the entire grid, thus contributing to aggregate compliance. However, no single utility, EGU owner, or investor could capture all the emissions reductions achieved by the project (see Figure 1). Rather, the value of these emission reductions would be broadly "shared" by all interconnected EGUs, while the costs would be borne solely by the project's investor(s). Under an allocation system that does not directly recognize the emission reduction contributions of measures outside of the power plant, utilities and other EGU owners or operators will not see the true value of these measures, no matter how cost effective. Thus, under the historical generation approach, utilities will discount the emission reduction value of beyond-the-fenceline measures, distorting their compliance decisions. EGUs will instead gravitate toward options that benefit them more directly, even when these options are more costly, with the higher costs passed through to ratepayers.

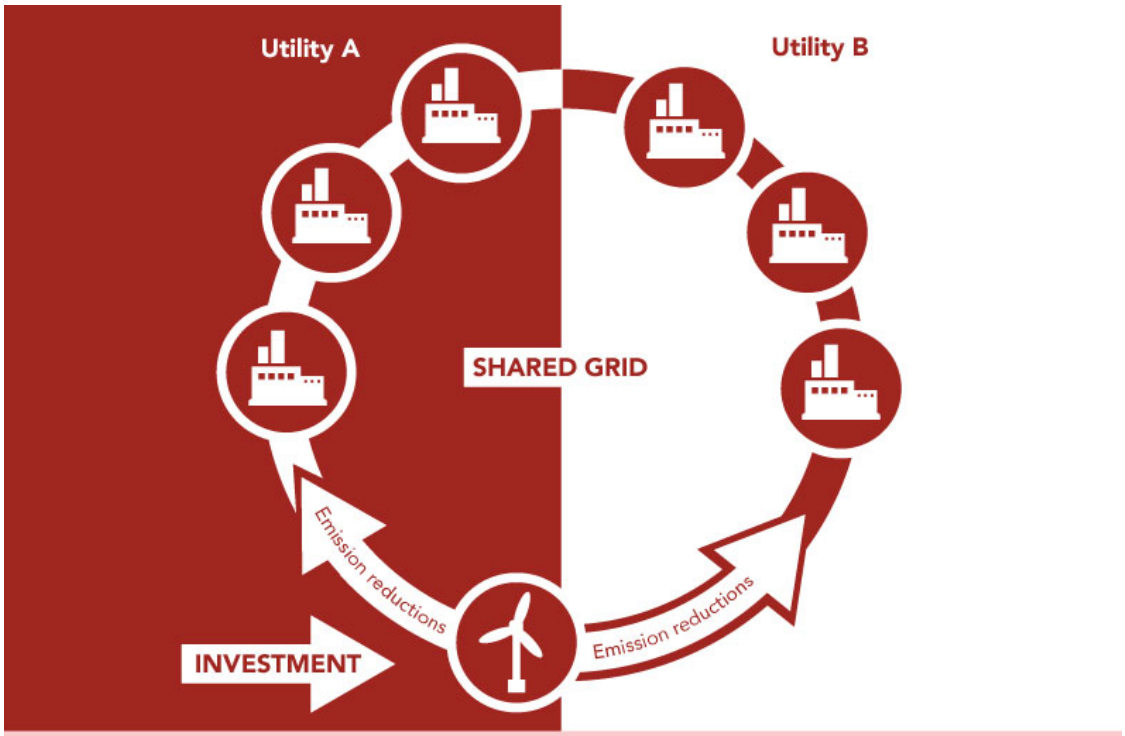

Figure 1: "Tragedy of the commons" under the historical generation approach.

Allocation based on historical generation works to lock in the status quo, discouraging operators of EGUs from choosing least-cost emission reductions. In theory, no matter how allowances are allocated, cost should dictate what measures are deployed to reduce emissions; in reality, economic literature establishes that upfront allocation to affected EGUs is less cost-effective than other options.[5] When EGUs start out with allowances that cover a major portion of their emissions, they have little need to investigate the wide array of readily available emission reduction possibilities or to trade with other market actors, even though these options may be more

[5] See Cramton and Kerr, Tradable Carbon Allowance Auctions: How and Why to Auction (1998), Center for Clean Air Policy. See also, National Commission on Energy Policy, Allocating Allowances in a Greenhouse Gas Trading System (Mar. 2007), http://bipartisanpolicy.org/library/allocating-allowances-greenhouse-gas-trading-system/.

cost-effective. This reduces activity in trading markets and forces EGUs to make compliance decisions without regard for the cost-effectiveness of alternatives. Naturally, under these conditions, the market for emission reductions fails to deliver optimal solutions. In addition, this approach provides affected units, particularly those in competitive markets, excess profit—that is, it would more than compensate incumbent EGUs for the costs of compliance at the expense of consumers.[6] These unnecessary profits would raise overall compliance costs.

Allocation based on historical generation fails to sufficiently reward utilities for actions taken toward compliance. Upfront allocation to existing EGUs based on historical generation—or worse, historical emissions—unfairly penalizes utilities that have taken action towards compliance relative to those that have not. As shown in Figure 2, this is because utilities that decreased their reliance on fossil fuel-fired generation prior to the baseline period (i.e., the period used for determining the level of historical generation or emissions) would receive fewer allowances than they would have, had they not shifted their generation portfolio. Similarly, taking action that reduces emissions after the baseline period would also not benefit the utility in terms of the allowances they receive. Such treatment is not only inequitable, but also is likely to hamper any progress that could take place leading up to the start of the compliance period.

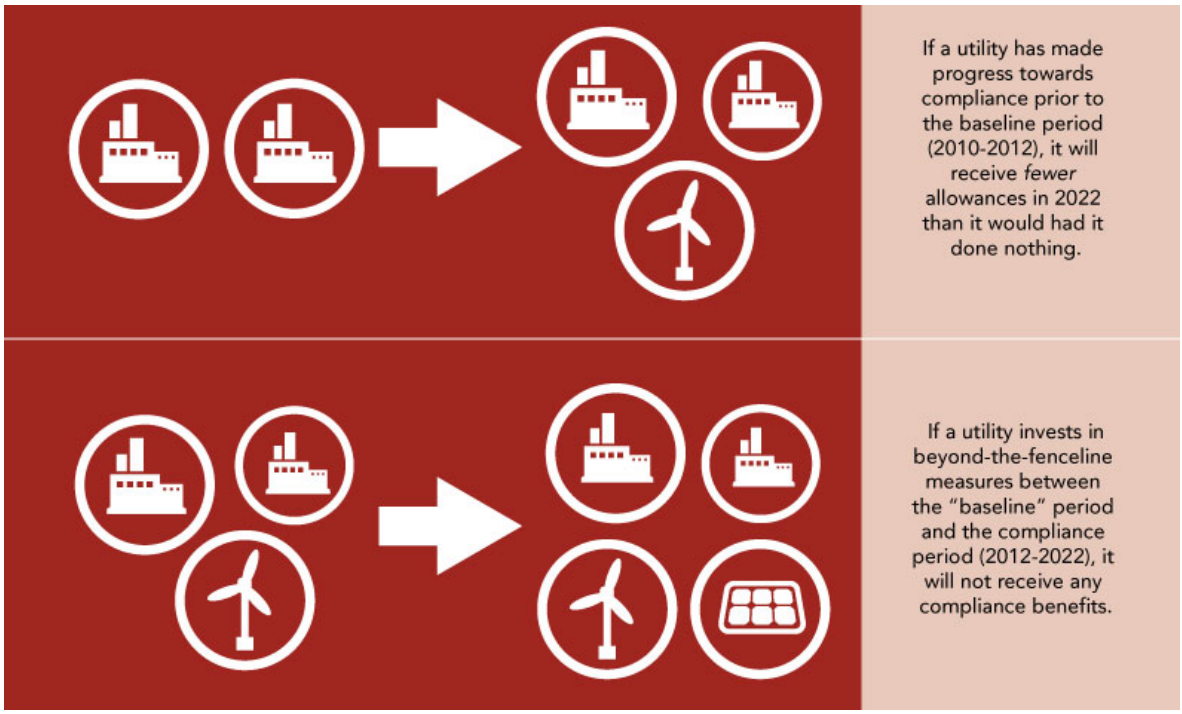

Figure 2: Misaligned incentives under the historical generation approach.

[6] An analysis by the Congressional Budget Office concluded that, "…giving away allowances (or the proceeds from selling allowances) to certain parties would lower their costs, but at the expense of missing the opportunity to greatly reduce the total cost to the economy… In essence, such a strategy would transfer income from energy consumers—among whom lower income households would bear disproportionately large burdens—to shareholders of energy companies, who are disproportionately higher-income households. *See* Congressional Budget Office, *Trade-Offs in Allocating Allowances for CO_2 Emissions*, at 3 (Apr. 2007), https://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/89xx/doc8946/04-25-cap_trade.pdf. *See also* Goulder et al., *Impacts of alternative emissions allowance allocation methods under a federal cap-and-trade program*, (Aug. 2010), Journal of Environmental Economics and Management, vol. 60, p. 161-181, http://web.stanford.edu/~goulder/Papers/Published%20Papers/Impacts%20of%20Alternative%20Emissions%20Allowance%20Alloc%20Methods%20(Goulder-Hafstead-Dworsky,%20JEEM%202010).pdf. This has also played out in practice: in Phase I of the European Union emission trading system (EU ETS), windfall profits for the coal, gas, and oil power sectors were an estimated $16.6 billion, equal to 1.5% of the total value of the European utilities market. Windfall profits were especially high in areas where higher-emitting sources often set the marginal price, since it is the marginal unit that will determine the embedded cost of carbon in the price of the electricity. *See* Lucas Merrill Brown, Alex Hanafi, and Annie Petsonk, Environmental Defense Fund, *The EU Emissions Trading System: Results and Lessons Learned*, at 19-21 (2012), https://www.edf.org/sites/default/files/EU_ETS_Lessons_Learned_Report_EDF.pdf.

Allocation based on historical generation leaves in place existing market barriers to the deployment of the most cost-effective compliance solutions. In addition to the market barriers created by the historical generation approach, several *existing* market barriers already prevent beyond-the-fenceline measures from competing on equal footing. First, the well documented "throughput incentive"—utility revenue increasing with greater sales volume—discourages investment in technologies that decrease sales, including energy efficiency and distributed energy resources.[7] Second, utilities in many states face a profit-maximizing incentive to pursue regulated capital investments over investments in resources not owned by the utility. Third, resources like energy efficiency face multiple non-cost market barriers that increased wholesale prices cannot overcome, such as split incentives between landlord and tenant.[8] By preventing such measures from direct participation in emission reduction markets, the historical generation approach does not adequately address these existing market barriers. Unless these barriers are overcome, beyond-the-fenceline measures will not be used to their full cost-effective potential, resulting in higher compliance costs.

Performance-Based Allocation: Competitive, Lower Cost

There are a number of alternative approaches to allowance allocation for states to consider that could, if designed appropriately, address the issues with the historical generation approach.[9] This section outlines one such solution, *performance-based allocation*, which would effectively address all of the challenges discussed above. Specifically, performance-based allocation would allow all eligible measures to compete equally in a technology-neutral market. There would be no picking winners, no incentive for EGUs to favor on-site measures, and no market barriers to drive up costs.[10]

In the specific performance-based allocation method described below, allowances would be awarded through a four-step process, with the primary allocation going to *all* eligible zero- and low-emitting technologies in direct proportion to their emission reduction benefits. This would be analogous to the assignment of credit for emission reductions under rate-based plans. Primary allocation based on emission reduction creates a level

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[7] Regulatory Assistance Proj., *Electricity Regulation in the U.S.: A Guide,* at 60 (Mar. 2011), http://www.raponline.org/document/download/id/645. This is true unless the state has adopted revenue decoupling, whereby utility revenues are no longer tied to volumetric electricity sales. Although decoupling represents a good interim solution to the throughput incentive, it has limitations as the level of energy efficiency and distributed generation deployment rises. Specifically, it results in cost shifting from customers that have deployed energy efficiency and distributed generation to those that have not. As the level of energy efficiency and distributed generation deployment rises, the degree of cost shifting becomes more severe.

[8] For example, there are several barriers to the uptake of energy efficiency measures that are independent of the cost of the resource, including access to information, split incentives (e.g., the landlord-tenant problem), imperfect competition, "bounded rationality" (i.e., imperfect decision-making), and the tendency to overemphasize upfront costs and de-emphasize operational savings. Am. Council for an Energy Efficient Economy, *Overcoming Market Barriers and Using Market Forces to Advance Energy Efficiency* (Mar. 2013), http://aceee.org/sites/default/files/publications/researchreports/e136.pdf.

[9] For example, a recent paper by AJW proposes two alternative approaches that both bear many similarities to AEE Institute's approach as outlined in this white paper. Namely, AJW proposes either a direct allocation to energy efficiency on the basis of verified tons of emissions reduced (which could also be applied to other zero- or low-emitting resources), or an output-based allocation to zero-emitting resources on the basis of emission reductions compared to a state-specific average fossil emission rate, with the remainder going to affected EGUs through an updating output-based allocation. *See* AJW, Inc., *Simplifying Energy Efficiency for States* (Dec. 2015), http://ajw-inc.com/wp-content/uploads/2015/12/151210-Mass-based-Allocation-White-Paper-FINAL.pdf. A research paper by Resources For the Future advises against upfront allocation to affected units on the basis of historical generation, and provides several alternatives that would improve CPP outcomes and reduce leakage to new units, such as allocation based on updating generation shares rather than historical baseline, use of the new source complement, allocation to load serving entities, and required consignment sales for any allowances distributed upfront based on historical generation. *See* Dallas Burtraw, Joshua Linn, Karen Palmer, Anthony Paul, Kristen McCormack, and Hang Yin, *Approaches to Address Potential CO2 Emissions Leakage to New Sources under the Clean Power Plan,* Resources For the Future (Jan. 2016), http://www.rff.org/files/document/file/RFF-Rpt-CPPCommentstoEPA160121_1.pdf.

[10] As stated previously in *supra* note 1, this approach would apply equally to EPA's mass-based Federal Plan and MTR. However, because this white paper is focused on state plans, it does not detail how this methodology would be implemented under the Federal Plan. For more on that topic, see AEE's comments to EPA, Advanced Energy Economy, Comments on the Proposed Federal Plan and Model Trading Rules for the Clean Power Plan, Docket ID No. EPA-HQ-OAR-2015-0199 (Jan. 21, 2016), http://info.aee.net/comments-proposed-federal-plan-and-model-trading-rules..

playing field for all solutions, increases competition on a technology-neutral basis, encourages least-cost compliance, and rewards utilities for progress made prior to the compliance period.

Outlined below is the four-step approach to performance-based allocation (see also Figure 3), which is described in greater detail in the sections that follow:

1. **Clean Energy Incentive Program (CEIP) Allocation:** During the first step period,[11] states should set aside an allocation sufficient to support early action under the CEIP.
2. **Competitive Emission Reduction Allocation:** Under this, the primary allocation method, allowances would be provided to *all* eligible zero- and low-emitting technologies (including EGUs operating below their relevant subcategorized emission performance rate) in direct proportion to their emission reduction benefits. The allowance quantity would be based on the number of megawatt hours (MWh) each resource generated or saved in the previous year.
3. **Prevent Leakage:** All states are required to avoid the risk of emissions leakage from existing EGUs, which are regulated under the CPP, to new EGUs, which are not. Adopting the CPP's New Source Complement (NSC) is the most seamless way to reliably and predictably meet this requirement. Any states that do not adopt the NSC should set aside a certain number of allowances for low- and zero-emitting technologies representing the *minimum* number necessary to prevent leakage to new emitting units. (EPA has identified allocation to these resources as a mechanism to address leakage.) These allowances would be distributed via the Competitive Emission Reduction Allocation (Step 2) and would constitute a "floor" and not a "cap" on the total allowances available to these measures. States, including those that adopt the NSC, could also increase this "floor" to achieve other policy goals, such as accelerated deployment of cost-effective advanced energy measures.
4. **Distribute Remaining Allowances:** Allowances not yet awarded after the first three steps would be sold at auction, or allocated through some other approach. An auction would help eliminate the downsides of upfront allocation to affected EGUs on the basis of historical generation, and instead create a more efficient market for emission reductions. State officials would determine, likely through legislation, the most effective use of the revenue from the allowance auction, which could serve numerous policy goals. For states in which auction is not an option, there are several alternatives, including allocation to load serving entities (LSEs), or an updating output-based allocation.

[11] Under the final CPP, there are three "step periods" within the interim compliance period, running from 2022-2024 (the first step period), 2025-2027 (the second step period), and 2028-2029 (the third step period). States must demonstrate to EPA at the end of each step period that affected EGUs are on track for compliance. *See* Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64851 (Oct. 23, 2015) [hereinafter "Final CPP"]. In the Proposed Federal Plan and MTR, EPA proposes that allowances can be banked for use in future step periods, but cannot be borrowed from future step periods. *See* Proposed Federal Plan and MTR at 65012.

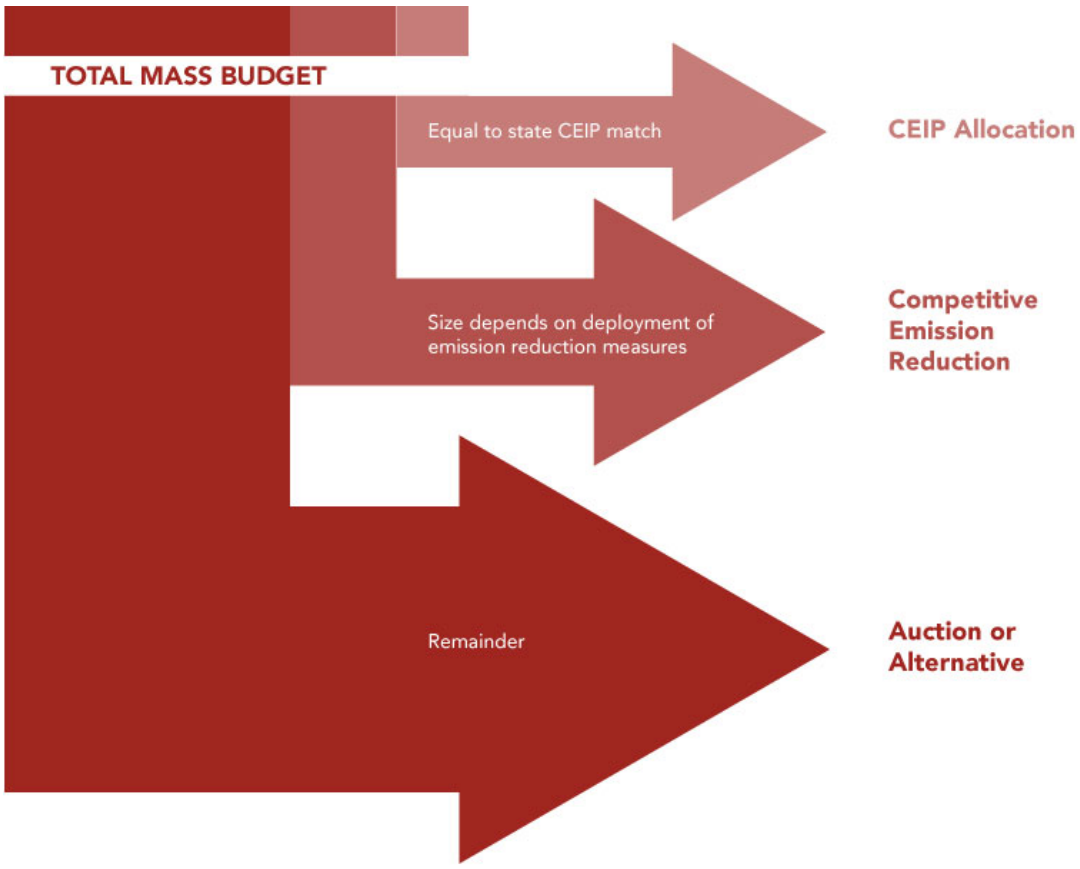

Figure 3: Breakdown of allowance allocation under performance-based approach.

1. CEIP Allocation

The CEIP is an optional program that presents states with the opportunity to receive additional allowances from EPA while also achieving early and lasting emission reductions that will ultimately lower the cost of compliance. States may participate in the CEIP whether they choose rate- or mass-based compliance, and participation is entirely voluntary. The CEIP makes compliance easier for states by allowing participating states to start awarding credits to eligible projects before the compliance period begins. At the start of the compliance period, project providers holding CEIP credits will be able to sell them to affected EGUs, giving those units an easy way to begin meeting their emission reduction requirements.

In addition, projects receiving credit under the CEIP will go twice as far towards helping the state meet its compliance obligations. This is because EPA is establishing a fund of EPA-issued matching credits; participating states will issue credits of their own to eligible projects, and EPA will issue matching credits from its CEIP fund.

Specifically, EPA will create a fund of 300 million short tons of extra compliance credits from which it will match credits that participating states can award to eligible projects, which include energy efficiency in low-income

communities and wind and solar installations.[12] EPA proposes to divide the fund of federal credits among participating states based on their relative share of total emission reductions required over the compliance period, meaning states will have access to enough "extra" credits from EPA to jumpstart compliance.

In order to use its respective share of additional allowances, a mass-based state would take an equivalent number of allowances out of its total state budget for the first step period.[13] States adopting the performance-based allocation methodology outlined in this paper may choose to take the state CEIP allowances out of the mass budget for 2022, the first year of the first step period, because there will be no allowances distributed via the Competitive Emission Reduction Allocation until the following year, as described below.[14]

It is important to note that certain aspects of the CEIP have not yet been finalized.[15] However, regardless of changes to the details of the CEIP, the program presents states an opportunity to get matching credits from EPA. It also makes compliance easier by letting states spread emission reductions over a longer period of time. Due to the low cost and high rewards of participation, the first step in any allocation should be a state allocation to the CEIP.

2. Competitive Emission Reduction Allocation

After the CEIP allocation, the next step in performance-based allocation methodology would be the Competitive Emission Reduction Allocation. In this step, states allocate allowances on a technology-neutral basis according to the emission reduction contributions of eligible compliance measures. Specifically, allowances go to all eligible zero- and low-emitting resources based on their MWh generation (or savings, as applicable) on a technology-neutral basis, adjusted to reflect their emission profile.[16] In addition, affected EGUs are awarded allowances to the extent that their emission rate is lower than the applicable subcategory-specific rate.[17] This technology-neutral allocation approach mirrors the distribution of Emission Rate Credits (ERCs) to zero- and low-emitting sources under rate-based plans, and directly recognizes both inside-the-fenceline *and* outside-the-fenceline emission reduction actions by utilities and other market actors.

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[12] *See* Final CPP at 64829-64830.

[13] In the final CPP, EPA requires that a participating state "must demonstrate in its plan that it has a mechanism in place that enables issuance of ERCs or allowances from the state to parties effectuating reductions in 2020 and/or 2021 in a manner that would have no impact on the aggregate emission performance of affected EGUs required to meet rate-based or mass-based CO_2 emission standards during the compliance periods." *See* Final CPP at 64830-64831. Mass-based states can do so by including "a set-aside of early action allowances from an emissions budget that itself reflects the state goals." *Id.* In the proposed Federal Plan and MTR, EPA proposes that this set-aside would apply to the first step period only. *See* Proposed Federal Plan and MTR at 65016.

[14] Allocating all the state CEIP credits to eligible measures during the first year of the first step period would balance out the 'remainder' to be allocated via the fourth step of the Performance-Based Allocation methodology (auction or alternative method) across the three years of the first step period. Because there are no allowances allocated via the Competitive Emission Reduction Allocation until 2023, the 'remainder' would otherwise account for a much larger share of the total allowances in 2022 than in subsequent years.

[15] EPA is still taking comments on the final design of the CEIP. EPA took initial comments on the CEIP in December 2015, and the Agency took more comments in January as part of the Federal Plan comment process. EPA has announced an intent to open a regulatory docket to develop final design elements, such as program implementation. U.S. EPA, *CEIP Future Notice and Comment Opportunity* (January 2016), http://www.epa.gov/cleanpowerplan/ceip-future-notice-and-comment-opportunity-january-2016. It is unclear whether the Supreme Court decision to stay the CPP while litigation is ongoing will impact EPA's work to finalize the CEIP. *See* West Virginia et al. v. EPA et al., (2015), http://www.supremecourt.gov/search.aspx?filename=/docketfiles/15a773.htm.

[16] "Eligible measures" refers to post-2012 installations that meet all the eligibility requirements under the final CPP. *See* Final CPP at 64950.

[17] For affected coal and oil/gas steam units, the subcategory-specific rate is 1,671 lb/MWh during the first step period (2022-2024), 1,500 lb/MWh during the second step period (2025-2027), and 1,380 lb/MWh during the third step period (2028-2029). For affected NGCC units, the subcategory-specific rate is 877 during the first step period, 817 during the second step period, and 784 during the third step period. *See* U.S. EPA, *Emission Performance Rate and Goal Computation Technical Support Document (TSD), Appendix 4* (Aug. 2015), http://www.epa.gov/cleanpowerplan/clean-power-plan-final-rule-technical-documents.

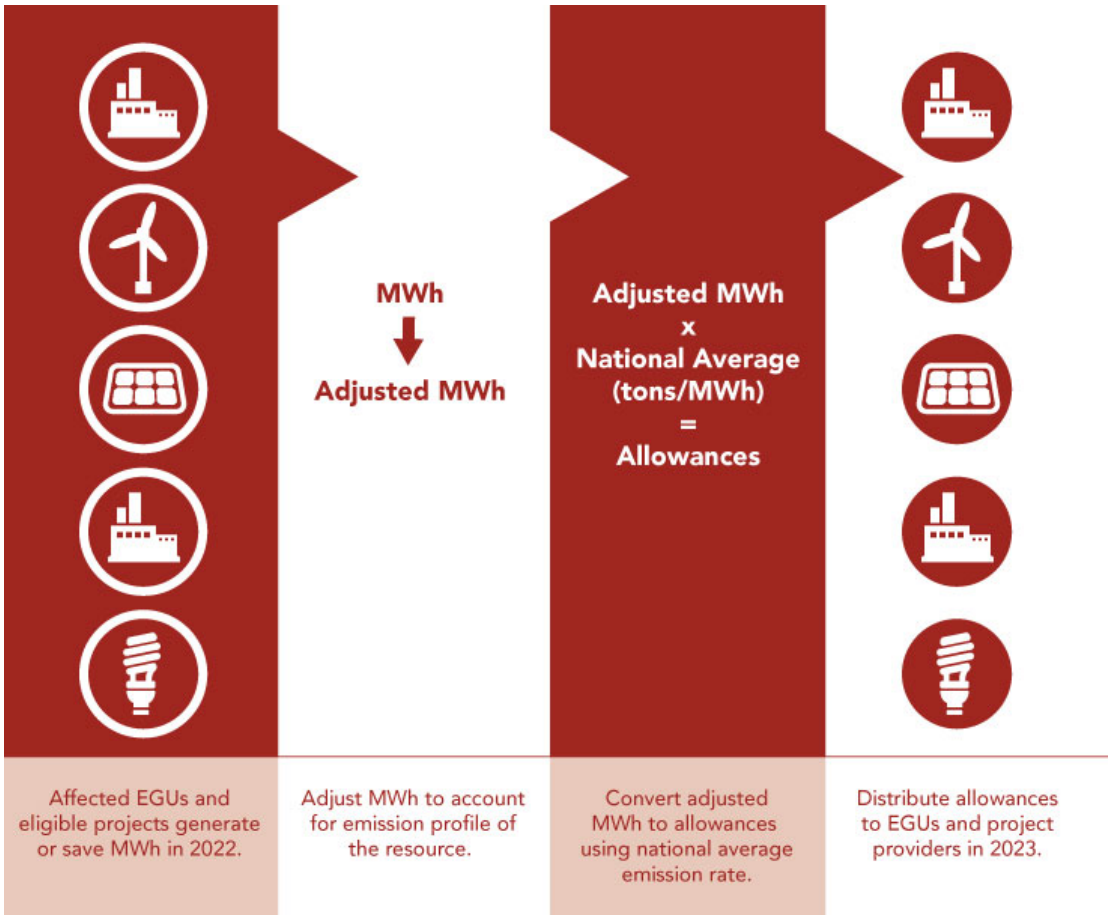

Figure 4: Allowance distribution via the Competitive Emission Reduction Allocation.[18]

Eligible zero-emitting sources of generation and energy efficiency would receive full credit for every MWh of generation or savings, i.e., the total MWh generation from each resource would count towards the resource's allowance allocation. Under the Competitive Emission Reduction Allocation, low-emitting resources would receive credit similar to the way they receive ERCs under rate-based plans, i.e., the number of MWh these resources generate would be adjusted to reflect the fact that they are low-emitting rather than zero-emitting. As defined in the CPP, eligible low-emitting resources include qualified biomass, fuel cells, non-affected combined heat and power (CHP), and some waste heat power (WHP). EPA proposes methodologies for pro-rating the MWh of each of these resources in the rate-based MTR.

EGUs that perform at a rate that is better than their subcategory-specific rate would also be eligible for allowances, based on the number of ERCs they would be eligible for under the rate-based Federal Plan and MTR.[19] States could also choose to include an additional incentive for the shifting of generation from existing

[18] This diagram shows how allowances would be distributed in 2023 based on performance of eligible measures in 2022, the first year of the interim step period; all subsequent years would follow the same steps. There is no allocation via the Competitive Emission Reduction Allocation in 2022.

[19] *See* Proposed Federal Plan and MTR at 64991 (providing the formula for the number of ERCs an affected EGU would receive under a rate-based plan if it performs below the subcategory-specific rate). For affected CHP units, the unit's emission rate would reflect the additional MWh of generation associated with useful thermal output, equivalent to the treatment of affected CHP under a rate-based plan. *See* Final CPP at 64756. Furthermore, these units would be required to hold allowances *only* for emissions associated with electric output.

coal-fired units to existing natural gas combined cycle (NGCC) through a crediting methodology analogous to that for gas shift ERCs (GS-ERCs) under a rate-based system. Rather than earning pro-rated GS-ERCs for each MWh of generation as they would under a rate-based plan, existing NGCC units would be eligible for pro-rated allowances for each MWh of generation (on top of allowances for performing below their subcategorized rate, if applicable).[20]

The necessary tracking and accounting infrastructure required to measure and record performance of eligible measures and affected EGUs will for the most part already be required in mass-based states. For compliance purposes, states will need to measure and track generation and emissions of affected EGUs; similarly, for the CEIP and set-asides to address leakage, states will need to track generation or savings of eligible beyond-the-fence measures. AEE Institute will discuss tools and practices to streamline these processes in our forthcoming *Best Practices* paper.

Once the MWh of generation or savings from a project have been adjusted to reflect the emission profile of the project, this MWh total must be translated into allowances, measured in short tons. In other words, eligible zero and low-emitting resources receive allowances equal to their number of adjusted MWh multiplied by a conversion factor representing the number of emissions avoided per MWh, as shown in Table 1. In order to appropriately recognize emission reduction contributions while maintaining simplicity, the Competitive Emission Reduction Allocation uses a national tons/MWh conversion rate based on historic carbon intensity of the electric sector in the prior step period.[21] The allowance rate for the first step period would be 0.8 tons/MWh because this was the U.S. carbon intensity in 2012—the baseline year for the CPP—and as such it is also the tons/MWh conversion rate that EPA used to determine the size of the CEIP.[22] In the second step period, this conversion rate would be updated to reflect the average national carbon intensity during the first step period. The allocation rate should stay constant for the duration of each step period in order to provide certainty to project providers and to reduce the administrative burden when allocating allowances. This updating process would be repeated for every subsequent step period in order to correctly recognize the reduction in carbon intensity that will occur over time during the CPP.

The number of allowances for which each resource is eligible under this approach would be determined on an annual, *ex post* basis. At the beginning of each year, states would award allowances based on emission reductions from eligible generation or savings verified in the preceding compliance year. For example, in 2023 states would award allowances based on qualifying emission reductions in 2022, as explained in Figure 4 and further delineated in Table 1. There would be no allowances allocated via the Competitive Emission Reduction Allocation during 2022. [23] Annual allocation of allowances does not erode the flexibility within and across the step periods, because EGUs would not be required to retire allowances for compliance purposes until the end of each step period, and would be allowed to bank allowances for future use.

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[20] Provisions to address leakage to new units not covered under the CPP are intended to ensure that the relative incentives for generation by existing NGCC units is equal to that of new NGCC units. Any allocation to affected NGCC units should be designed with this goal in mind.

[21] Each MWh of generation or savings need not receive allowances in exact proportion to its individual actual emissions reductions in order to maintain the integrity of the mass-based program, because the overall cap on emissions, *i.e.* the state goal, will ensure the overall integrity of the program.

[22] Final CPP at 64830.

[23] For the first year of the program, there is no preceding compliance year, so states would need to distribute allowances in a somewhat different manner. AEE Institute recommends that states distribute the allowances that remain after allocation to the CEIP allocation directly through whatever mechanism the state chooses for Step 4, described below.

Table 1: Allowance allocation to eligible measures via the Competitive Emission Reduction Allocation.

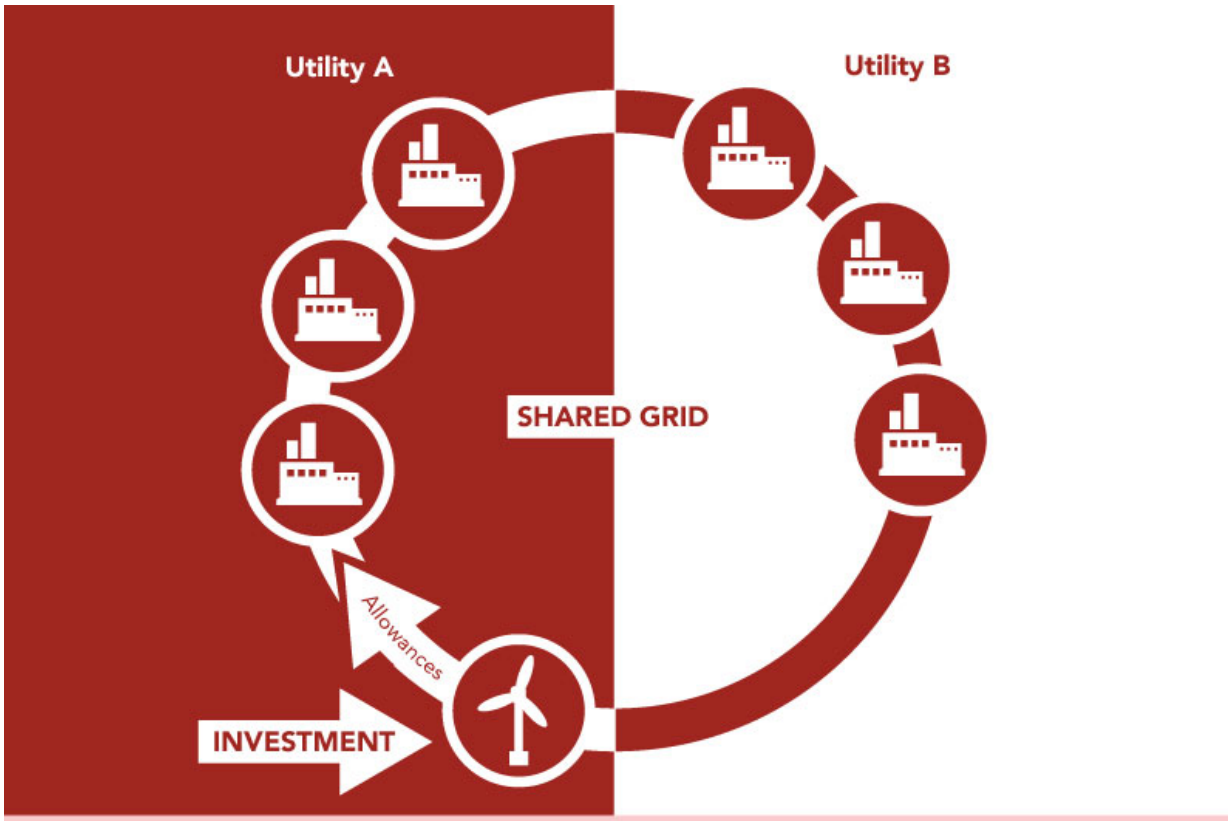
	Generation or Savings in 2022 (MWh)	Emission rate of sample project (lbs/MWh)	Relevant sub-categorized rate (lbs/MWh)*	Adjusted Generation/ Savings in 2022 (MWh)	Allowances allocated in 2023 (tons)†
Zero-emitting generation	1,000 MWh	0	N/A	1,000	1,000 x 0.8 = 800
Zero-emitting savings	1,000 MWh	0	N/A	1,000	1,000 x 0.8 = 800
Low-emitting (e.g., non-affected CHP)	1,000 MWh	Varies[α]	Depends on crediting methodology	1,000 x 50% = 500	500 x 0.8 = 400
Affected EGU – Coal-fired	1,000 MWh	1,600	1,671	$\left[\frac{1,671-1,600}{1,671}\right]$ x 1,000 = 42	42 x 0.8 = 34
Affected EGU – Gas-fired[β]	1,000 MWh	800	877	$\left[\frac{877-800}{877}\right]$ x 1,000 = 88	88 x 0.8 = 70

*Sub-categorized rate is for the first step period. †Calculated using 0.8 short tons/MWh as a conversion factor. [α]For non-affected CHP, EPA's proposed methodology is not finalized, and for purposes of these illustrative calculations we have assumed that approximately 50% of CHP output is credited, based on a wide range of values calculated by the Alliance for Industrial Efficiency for different unit types and reference rates.[24] β The allowance calculation for affected NGCC does not include an allocation of pro-rated allowances based on the number of GS-ERCs the unit would earn under a rate-based system.

The total number of allowances issued to low- and zero-emitting technologies under this methodology would be determined by the actual emission reduction activity produced by the market rather than any type of artificial cap. The only limitation on the available allowances would be the state's total mass-based budget, i.e., the number of allowances issued could not exceed the state's total mass-based goal minus the CEIP allocation discussed above.

As designed, the Competitive Emission Reduction Allocation would provide clarity for utilities, developers, investors, and other owners or operators of eligible advanced energy measures, offering assurance that investments in these resources will directly result in compliance benefits, as illustrated in Figure 5. In turn, by providing a clear pathway for cost-effective advanced energy measures to deliver emission reductions, this approach would foster competition amongst all emission reduction measures, ultimately lowering the cost of compliance.

[24] See Alliance for Industrial Efficiency, Comments on Model Trading Rules: Federal Plan Requirements for Greenhouse Gas Emissions From Electric Generating Units Constructed on or Before January 8, 2014, at 12 (Jan. 2016), http://alliance4industrialefficiency.org/wp-content/uploads/2016/01/Alliance-Comments-_MTR-and-Fed-Plan_1_21_16-2.pdf. The actual number of ERCs would vary by unit and would be calculated by a formula. See Proposed Federal Plan and MTR at 64996.



Utility A invested in the wind farm, and directly benefits from the emission reductions in the form of allowances.

Figure 5: The Competitive Emission Reduction Allocation avoids the "tragedy of the commons"

Furthermore, as illustrated in Figure 6, this allocation approach would appropriately reward those utilities that have made the most progress towards compliance by awarding allowances to these utilities on the basis of generation (or savings) by eligible emission reduction measures. Additionally, it would provide an opportunity for utilities to earn allowances during the compliance period for measures installed between now and 2022. This approach therefore allows utilities and other project providers to make investment decisions prior to the compliance period that would aid their compliance efforts. By providing a clear pathway to benefit from early investments, this approach would incentivize such actions to ease the transition into the compliance period.

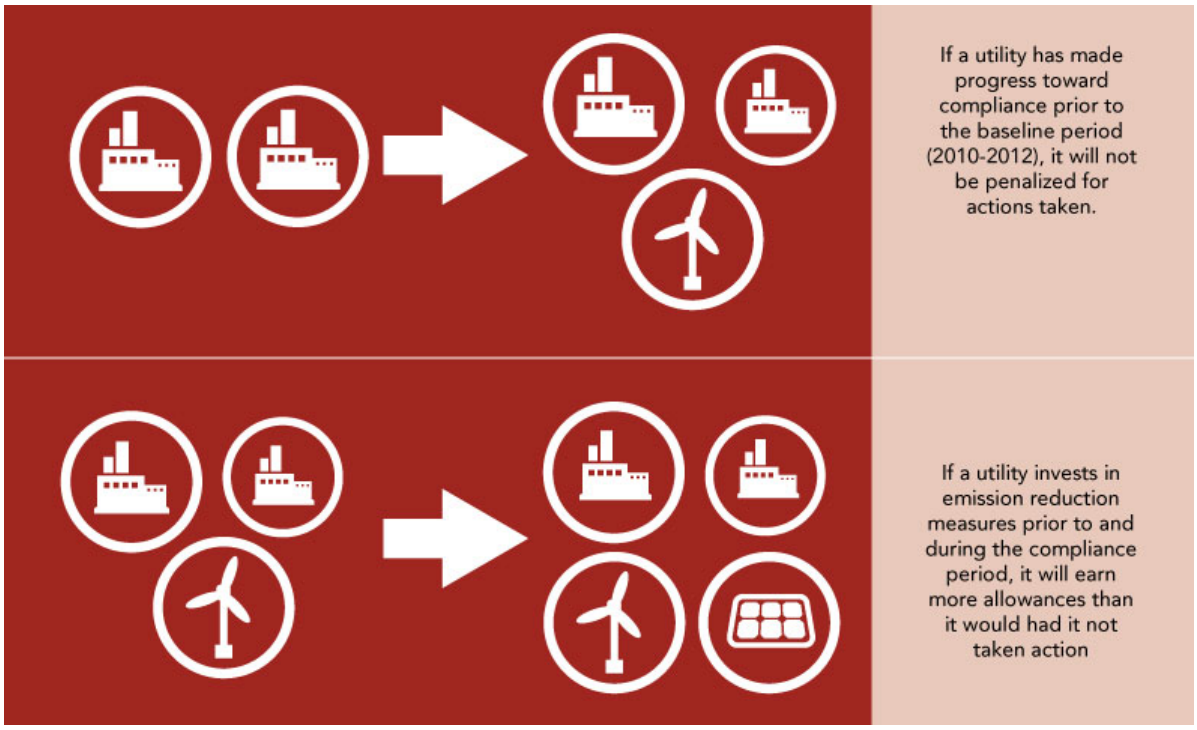


Figure 6: Aligned incentives under performance-based allocation.

3. Prevent Leakage

Shifting some generation from existing affected EGUs to new fossil fuel-fired EGUs may seem like an easy way to reduce emissions and meet the state goal, but in reality a state plan that *avoids* leakage is more beneficial to EGUs, electricity consumers, and the state. This is true not only because states must demonstrate to EPA that they have adequately addressed leakage for compliance purposes, but also because addressing leakage prevents market distortions, provides affected EGUs with market certainty, and minimizes future risk of stranded assets and fuel price fluctuation.

In order to maximize these benefits and ensure that leakage is adequately addressed, states should opt to address leakage by incorporating new EGUs into their mass-based trading plan, in which case the state's mass-based goal would expand to include the "new source complement" (NSC). This approach is entirely consistent with performance-based allowance allocation. Specifically, adopting the NSC:

1. **Avoids electricity market distortions and ensures a consistent price signal for emission reductions.** By establishing a uniform regulatory landscape for both new and existing fossil-fired EGUs, the NSC allows a uniform compliance marketplace to develop. In contrast, uneven regulation risks putting financial stress on owners of existing EGUs as they compete against new units under different regulatory requirements, increasing the risk of stranded assets. Furthermore, differential treatment of

new and existing units could distort the marginal price in wholesale electricity markets, which may in turn increase the overall costs of delivering power.[25]

2. **Minimizes future compliance risk.** There are a number of circumstances under which EPA may require states to incorporate new units into their CPP compliance plans at a future date—because, at some point, those "new" units will become "existing" units under the Clean Air Act.[26] This creates uncertainty in the investment market for new NGCC units in states that do not include these units under the NSC, potentially driving up costs. Moreover, it risks creating stranded assets in the future, for which ratepayers may be on the hook. The potential for future stranded assets may be exacerbated by the incentive to over-build new NGCC units if leakage is not properly addressed.

3. **Maximizes trading flexibility.** By raising the total emission budget and bringing new sources into the trading pool, the NSC increases flexibility for existing EGUs by expanding the total market of allowances and giving affected units a wider array of options to reduce emissions.

4. **Ensures that leakage is addressed without guesswork.** While EPA allows states to address leakage through set-asides, the appropriate design and size of any set-aside to address leakage are subject to estimation and projections that are unlikely to result in a certain or optimal result. The NSC is the only way to completely eliminate the potential to over- or under-compensate for the perverse incentive for emission leakage.

Nevertheless, states that do not adopt NSC for any reason can still avoid some of the "guesswork" associated with addressing leakage through set-asides. Specifically, instead of adopting the set-asides proposed by EPA in the mass-based Federal Plan and MTR,[27] states can address leakage by modifying the Competitive Emission Reduction Allocation (described in Step 2, above). Specifically, states would reserve a minimum number of allowances for distribution to low- and zero-emitting resources in any given year, with the minimum number, or "floor," set at a level adequate to avoid leakage. States can lean on EPA's designation of the appropriate number of allowances needed to adequately avoid leakage when setting the size of their "floor." EPA is currently considering an appropriate level based on feedback it received on the Federal Plan and MTR.[28]

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[25] Sarah Adair and David Hoppock, Nicholas Institute at Duke University, *New Sources and the Clean Power Plan: Considerations for Mass-Based Plans,* at 10-11 (Dec. 2015), https://nicholasinstitute.duke.edu/sites/default/files/publications/ni_pb_15-06_0.pdf.

[26] Section 111 of the Clean Air Act divides regulation of source categories between "new" and "existing" sources. However, a source that meets the definition of a "new source" might not meet that definition indefinitely. Section 111 defines "new source" as "any stationary source, the construction or modification of which is commenced after the publication of . . . proposed regulations . . . *prescribing a standard* of performance under this section *which will be applicable* to such source." CAA § 111(a)(2), 42 U.S.C. § 7411(a)(2) (emphasis added). An existing source, on the other hand, is defined as "any stationary source other than a new source." CAA § 111(a)(6), 42 U.S.C. § 7411(a)(6). EPA has interpreted these definitions to mean that once a source is no longer a "new source" with respect to a *particular* set of regulations—such as through the issuance of a new emission standard under section 111(b) for new sources in that category—it becomes an existing source with respect to those regulations. *See* Emission Guidelines, Compliance Times, and Standards of Performance for Municipal Solid Waste Landfills; Proposed Rules, 80 Fed. Reg. 52099, 52110 (Aug. 27, 2015). Under this interpretation, if and when EPA revises its section 111(b) standards for new EGUs, those EGUs subject to the 2014 Carbon Pollution Standards Rule will also become "existing sources" and so may become subject to a section 111(d) standard. Because EPA is directed to at least consider revising its section 111(b) standards every eight years, CAA § 111(b)(1)(B), 42 U.S.C. § 7411(b)(1)(B), EPA's interpretation implies that, at some later date, those fossil fuel-fired EGUs that are constructed before and over the course of the Clean Power Plan compliance period will become existing sources also subject to section 111(d) standards at a later date.

[27] Because EPA has determined that it cannot implement the NSC as part of the Federal Plan, the Agency uses two set-asides to address leakage: a renewable energy set-aside (RE set-aside), and an output-based allocation to existing NGCC units. *See* Proposed Federal Plan and MTR at 65016.

[28] The "floor" approach described here is analogous to EPA's proposed RE set-aside, and states could borrow from the size and eligibility requirements as determined by EPA in the final MTR. EPA proposes to allocate 5% of allowances in each step period to eligible renewable energy measures. EPA has taken comment on the appropriate list of eligible measures and the appropriate level of allowances to adequately overcome the perverse incentive to rely on new NGCC units, such that the actual level of allowances required to address leakage is likely to change. *See* Proposed Federal Plan and MTR at 65023.

Allowances from this "floor" would go to qualifying low- and zero-emitting resources that have been identified by EPA as measures that address leakage, i.e., all eligible renewable energy, energy efficiency, demand-side management, transmission and distribution efficiency, CHP, and WHP.[29] Consistent with EPA's renewable energy (RE) set-aside, affected EGUs would not be eligible for allowances from this reserve.[30]

Despite similarities, this alternate approach to address leakage under performance-based allocation departs from EPA's set-asides in one important and beneficial way: namely, the "floor" under the performance-based allocation would be a minimum, while EPA's set-asides represent a maximum number of allowances that would go to these resources.[31] Under the performance-based allocation outlined in this paper, if low- and zero-emitting resources would otherwise be eligible for *less* than the "floor" under the Competitive Emission Reduction Allocation (Step 2, discussed above), then each eligible resource would receive a pro rata share of the reserved allowances, similar to the proposed RE set-aside.[32] This approach would ensure that eligible low- and zero-emitting resources are adequately incentivized to address leakage, particularly at the beginning of the interim compliance period. However, if low- and zero-emitting resources would otherwise be eligible for a *greater* number of allowances under the Competitive Emission Reduction Allocation, those resources would not be arbitrarily limited to a pre-determined "maximum" allocation.

States could expand the size of this "floor" to achieve other policy goals, such as accelerated deployment of cost-effective advanced energy measures. The use of the "floor" to achieve non-leakage policy goals would apply equally in states that have adopted the NSC.

4. Distribute Remaining Allowances

After states distribute allowances to all qualifying resources according to the steps discussed above, states need a final allowance distribution method for any remaining allowances, which could be large, especially in the early years of CPP compliance. Allocating these allowances by auction would achieve a number of objectives. As with the Competitive Emission Reduction Allocation, an auction creates an active trading marketplace that allows EGUs to make compliance decisions based on accurate price and performance information, favoring the deployment of least-cost compliance options.[33] Auctioning allowances would therefore keep compliance costs

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[29] EPA has not yet finalized a list of measures eligible to address leakage in state plans. In the final CPP, EPA specifically explains that both renewable energy (RE) and energy efficiency (EE) can mitigate the risk of leakage. *See* Final CPP at 64890. ("The increased availability of RE generation can serve as another source of generation to satisfy electricity demand. Increased demand- side EE will reduce the demand that sources need to meet. Therefore, both RE and demand-side EE can serve to reduce the incentive that new sources have to generate, and therefore align their incentives with affected EGUs.") In the proposed Federal Plan and MTR, while EPA limits eligibility for the RE set-aside to "on-shore wind, solar, geothermal power, and hydropower," the Agency is also taking comment on including "other RE measures, incremental nuclear, demand-side EE measures, CHP and any other emission reduction measures beyond those mentioned here, as long as they meet the eligibility requirements outlined in the final [CPP]... for rate-based crediting, as eligible measures to receive set-aside allowances." *See* Proposed Federal Plan and MTR at 65023.

[30] Affected EGUs are not included in the proposed RE set-aside, nor is EPA considering including them. Proposed Federal Plan and MTR at 65023.

[31] States choosing to use set-asides are free to allocate additional allowances to these resources above the levels set by EPA.

[32] *See* Proposed Federal Plan and MTR at 65024.

[33] Economic literature generally agrees that an auction is an economically efficient method to distribute allowances. *See* Dallas Burtraw, Carbon Emission Trading Costs and Allowance Allocations: Evaluating the Options, at 13-16, *Resources* (Fall 2001), http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-Resources-145-c02emmis.pdf; *see also* National Commission on Energy Policy, *Allocating Allowances in a Greenhouse Gas Trading System,* (Mar. 2007), http://www.energycommission.org/site/page.php?report=32; *see also* Peter Cramton and Suzi Kerr, *Tradable Carbon Allowance Auctions: How and Why to Auction* (Mar. 1998), http://ccap.org/assets/Tradable-Carbon-Allowance-Auctions-How-and-Why-to-Auction_CCAP-March-1998.pdf; *see also* Goulder et al., *Impacts of alternative emissions allowance allocation methods under a federal cap-and-trade program,* (Aug. 2010), Journal of Environmental Economics and Management, vol. 60, p. 161-181, http://web.stanford.edu/~goulder/Papers/Published%20Papers/Impacts%20of%20Alternative%20Emissions%20Allowance%20Alloc%20Methods%20(Goulder-Hafstead-Dworsky,%20JEEM%202010).pdf; *see also* Proposed Federal Plan and MTR at 65,018 ("Another allowance allocation approach that could minimize

low, benefitting both EGUs and ratepayers. In addition, the auction would provide a source of revenue that state legislators could use for a number of different policy goals, such as driving advanced energy deployment to lower compliance costs and ratepayer impacts.

States could also adopt an alternative approach for distributing the remaining allowances within the framework of performance-based allocation. Other allocation approaches for states to consider include allocation to load-serving entities (LSEs) or an updating output-based allocation. Any of these approaches is preferable to anti-competitive upfront allocation to existing EGUs on the basis of historical generation, or even worse, historical emissions. It is worth noting that these alternatives could still include auctioning some portion of allowances in order to partially realize the benefits of auction.[34]

With the proper design, providing allowance value to LSEs can help insulate electricity consumers from any price impacts from compliance. In order to accomplish this policy goal, the distribution of allowances to LSEs should be coupled with the requirement that LSEs pass on the value of allowances to ratepayers by investing in resources that will benefit ratepayers, and should not be used to increase profits. This can be enforced through existing regulatory frameworks, as implemented by state public utility commissions. States should *not* permit allowance value to be used to limit electricity *rate* increases. While this approach may appear protective of consumers, it will drive up the overall cost of compliance with little benefit. Instead, allowance value should be spent on activities that reduce consumer electricity *bills*, such as through energy efficiency and other demand-side energy projects and programs, or through periodic lump-sum payments to ratepayers.

States can also choose an updating output-based allocation that would award allowances to all affected EGUs, or to all measures on the basis of output (or savings) during the previous year. Under this approach, states would take the total pool of remaining allowances and split them up pro-rata among all resources on the basis of generation (or savings) achieved during the prior year.

It is important to note that while mechanisms such as an allowance auction are important tools in the state arsenal to mitigate any cost impacts on consumers, these options alone will not necessarily reduce non-price market barriers to cost effective beyond-the-fenceline emission reduction measures, nor are they a guaranteed means to facilitate technology innovation and cost reductions. In order to provide these benefits, additional provisions—such as targeted investment of auction revenues and/or adoption of the Competitive Emission Reduction Allocation described above—are also necessary.

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the difference between the initial allowance allocation and the ultimate distributional pattern of allowance use for compliance is to conduct an auction, a process whose express intent is to align the allocation of a scarce good (in this case, the limited authorization to emit CO_2) with the parties most willing to pay for its use. Many ascribe benefits, in terms of economic efficiency, to the use of auctioning as a means of allocating allowances.").

[34] Including at least a small auction would help facilitate the formation of an active and efficient allowance trading market. The Title IV Acid Rain Program, established as part of the 1990 Clean Air Act Amendments, serves as a useful example regarding the importance of allowance auctions in the initial setup of emission budget trading programs. Section 416(d)(2) of the CAA requires EPA to hold an annual auction of a small percentage (approximately 3%) of the allowances distributed under the Acid Rain Program. *See* 2 U.S.C. § 7651*o*(d)(2). Economic research suggests that even this relatively small auction was critical for allowance price discovery and reducing the hording of allowances based on initially high estimates of the cost of emission reductions, ultimately facilitating the emergence of an effective private allowance market. *See* Richard Schmalensee, Paul L. Joskow, A. Denny Ellerman, Juan Pablo Montero, & Elizabeth M. Bailey, *An Interim Evaluation of Sulfur Dioxide Emissions Trading, J. of Econ. Perspectives*, Summer 1998, at 53, 66 ("the allowance auctions that the EPA was required to conduct seem to have facilitated both the price discovery process and the development of the allowance market").

Conclusion

Choosing to allocate allowances to affected EGUs upfront on the basis of historical generation would likely introduce market barriers that risk raising compliance costs relative to other available allowance allocation approaches. This runs contrary to the interests of states in finding the lowest-cost way of complying with the Clean Power Plan. Luckily, there are a number of other approaches to allowance allocation for states to consider that, when appropriately implemented, eliminate the issues associated with the historical generation approach. For instance, by choosing to adopt the performance-based allocation approach as outlined in this paper, states will put in place a market mechanism that allows all emission reduction measures to compete on equal ground, ensuring that the measures deployed by the market will be chosen on the basis of cost and performance.

Specifically, performance-based allocation avoids the "tragedy of the commons" that exists under the historical generation approach by allowing compliance benefits to flow to the entity responsible for implementing a given emission reduction measure. Furthermore, by avoiding upfront allocation, performance-based allocation will ensure that affected EGUs can look to the marketplace and make compliance decisions based on reliable information about the costs of all available emission reduction measures. Performance-based allocation also appropriately rewards utilities for actions taken towards compliance either before or during the compliance period. Additionally, by providing a mechanism for beyond-the-fenceline measures to compete equally, the performance-based allocation approach will help to overcome existing market barriers that often prevent even cost-effective measures from competing to deliver electricity generation or savings. Ultimately, by removing existing barriers and opening compliance markets to the full suite of measures available to EGUs, performance-based allocation will lower the cost of compliance in states that implement this approach, saving money for electricity customers.

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