

RGGI and CO₂ Emissions Trading Under the Clean Power Plan:

Options for Trading Among Generating Units in RGGI and Other States

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Overview

The RGGI states have over seven years of experience running a voluntary multi-state program to limit emissions of CO₂ through a mass-based, allowance trading program. The states have administered a liquid and efficient market for trading emission allowances and have directed the proceeds from allowance auctions to achieve economic benefits and meet the public policy objectives important to each individual state.

Now, in the second major phase of RGGI program review, the RGGI states are considering program changes in the emerging national context for CO₂ control under the EPA's Clean Power Plan. The latter introduces the potential for the development of a much broader market for the trading of CO₂ allowances in response to EPA requirements. In this context, the RGGI states have a unique opportunity to shed light on the function and benefits of mass-based CO₂ allowance trading and to open the door to expanded trading opportunities for power plants located inside and outside the RGGI states.

We believe it is timely for the RGGI states to consider issues that could facilitate the creation of a broad market for the trading of CO₂ emission allowances and to help establish a framework for efficient, low-cost achievement of EPA's CO₂ emission reduction mandate. In this report, we assess the core issues around emission-allowance trading that RGGI states could consider during the current program review and identify principles and objectives for program design changes that RGGI states might incorporate given the emerging national context.

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Executive Summary

Background: RGGI and the Clean Power Plan Context

The Regional Greenhouse Gas Initiative (“RGGI”) is the first mandatory carbon-dioxide (“CO₂”) emission-allowance trading market affecting fossil-fuel power plants in the U.S. and has been in operation since 2009. Under RGGI, total CO₂ emissions from fossil-fuel fired power plants across the nine-state region may not exceed an amount of emissions (called the RGGI program budget). That emissions budget amounted to 91 million short tons of CO₂ in 2014 and declines by 2.5 percent annually through 2020. The RGGI program was built on voluntary commitments and mutual cooperation by the RGGI states to limit CO₂ emissions from the electric sector across the Northeast region through an efficient emission-allowance trading program.

The RGGI states periodically conduct a program-design review process. They completed a comprehensive review in 2012, and the 2016 review process is currently underway. Program reviews include a full evaluation of the program through stakeholder input, analysis, and RGGI state deliberations. In the past, the review process has led to major changes in the RGGI program reflecting the region’s changing understanding of the climate challenge and the changing industry and regulatory landscape in which power plants operate.

The current RGGI program review takes place in an important context – namely, states’ planning for controlling power plant CO₂ emissions in the future in a way that will allow for compliance with the Environmental Protection Agency’s (“EPA”) Clean Power Plan (“CPP”). Presuming the CPP goes forward after review by the federal courts, it will be the first mandatory national program to regulate emissions of CO₂ from existing power plants. The many states with power plants covered by the CPP – including eight of the nine RGGI states – will need to have a compliance strategy under the CPP beginning in 2022.

This heightens the importance of the current RGGI program review, which is aimed at identifying any changes in RGGI for the post-2020 period – a timeframe that overlaps with state plan development and implementation periods for the CPP. Generating units covered under RGGI are, for the most part, the same power plants covered by the CPP. The RGGI states may wish to incorporate a CPP lens into their current assessment of the need for and value of changes to RGGI in the post 2020 period. Clarifying the alignment of the two programs will undoubtedly provide a critical measure of stability, predictability and efficiency in the investment decisions affecting the region’s power sector, in government administration, and in minimization of the overall cost of environmental compliance paid for by electricity consumers in the nine-state RGGI region.

This current RGGI review is also timely for considering the possibility of expanded trading of CO₂ allowances under the CPP and the role that RGGI's experience could play in facilitating a broader trading market. EPA has shaped the CPP in ways that create the opportunity for states and their fossil-fuel power plants to participate in multi-state trading plans, whether by agreement among the states, by adoption of state plans with compatible trading platforms, or by selection of the trading-ready elements of EPA's model rule. It is widely accepted that expanding the universe of affected sources within an air-emission trading program lowers the collective cost of meeting emission performance standards and improves the efficiency of compliance outcomes.

Both RGGI states and other states thus have an interest in the policies the RGGI states will adopt in this current program review. Given their seven-plus years of experience and a body of assessments of how RGGI has performed, the RGGI states' perspective on the CPP is important. RGGI has the opportunity to establish a path forward for states seeking to capitalize on the benefits of a broader geographical footprint for meeting their own compliance obligations.

Purpose and Focus of the Report

In this report, we investigate key questions being addressed by RGGI states in the current program review. We focus on (1) how to harmonize the region's ongoing trading program with EPA compliance requirements, and (2) how to create an open architecture for expanding the trading opportunities for power plants located inside and outside the Northeast. Although we recognize that these are not the only questions that RGGI faces in this review process, our focus on these issues reflects our view that proactive and timely attention to these questions may help the RGGI states and other states achieve better CO₂ emission-control programs in the CPP context.

For the purposes of this report, we presume that the CPP will eventually move forward in largely the same form as is set forth in EPA's final regulations published in the Federal Register in October 2015. We also assume that RGGI remains a functioning program going forward, and that current RGGI states may use it as a framework for developing CPP-compliant state plans and for achieving compliance starting in 2022.

Our report has several parts. First, we analyze technical or threshold issues that RGGI states need to address so that RGGI's framework is capable of complying with the CPP. Second, we present key principles to guide RGGI states' consideration of program elements most important to facilitating effective and efficient trading between RGGI and non-RGGI states. Third, we review a host of "second tier" issues that may be of interest to various RGGI states and stakeholders but that are less critical specifically from a trading point of view. With this

approach, we hope to shine a brighter light on the key topics that could enable broader allowance trading.

Observations

We describe issues that are closely tied to enabling broad trading and that are important to consider in the current regulatory context. These are described throughout the report and summarized in Table ES-1. Based on our review of these issues, we make the following observations:

We encourage the current RGGI deliberations to focus on what matters: the long-run efficiencies and cost savings that result from participating in a broad, regional allowance-trading market

Achieving power-plant emission-control objectives through a multi-state, mass-based emission control program that permits power plant owners to trade emission allowances provides low-cost compliance. It helps to send appropriate signals for investment in and operation of power system infrastructure and achieves social objectives in the most economically efficient manner. This has been demonstrated time and again through national programs such as the Title IV SO₂ allowance trading program as well as state and regional programs (like RGGI). This tradeable-allowance structure operates well in both regulated and competitive electric-industry contexts and integrates seamlessly with electricity market operations. A broader market with more participants creates the opportunity to lower overall costs of compliance.

We encourage the RGGI states to not lose sight of these higher-level objectives and benefits of broad allowance-trading markets during this period of transition. A focus on these objectives is important as the nation moves towards a national program of CO₂ emission performance standards for existing power plants and as states decide which compliance paths to select (e.g., mass-based or rate-based, single-state-only or multi-state approaches).

In the long run, RGGI states will benefit from the broadest possible system of allowance trading across the U.S.

The CPP includes national performance standards for existing power plants, but provides states significant flexibility in their implementation plans to meet their state-specific targets. It is easy in this context for each state to focus on what appears to be the best short-term compliance path assuming current market conditions, rather than what is most likely to be the best long-term strategy for CPP compliance. A broad and liquid market for allowance trading under a mass-based program that covers the widest geographic scope has been shown time and again to be the least-cost path to compliance. We encourage RGGI states to recognize that their best interest

lies in maximizing the number of states with power plants eligible to trade with RGGI generators.

We encourage RGGI states to focus some attention outward in the current program review, in addition to considering near-term and state priorities

The CPP state plan and power-plant compliance deadlines extend over many years, and the ultimate deadlines and compliance obligations remain the focus of litigation. Nonetheless, many states are actively considering compliance options, trying to understand the relative costs and benefits of different approaches, evaluating whether to adopt a mass-based trading program, and assessing the steps they might need to take to enable the power plants in their states to trade with those in RGGI states and/or other states. The RGGI states are uniquely positioned to demonstrate the successful history of workable, multi-state CO₂ allowance-trading regimes and to take the lead on adapting the RGGI program structure to stand out as a CPP compliance-ready program design and allowance-trading platform. We encourage the RGGI states to make the most of this opportunity to identify, consider and embrace RGGI program design changes that would create an open trading architecture with which other states could align their own plans (without necessarily ‘joining’ RGGI *per se*).

RGGI states will need to address several technical program issues to enable RGGI to align with Clean Power Plan requirements

The CPP allows states to exercise discretion among many options for state plan elements, including between rate- or mass-based approaches, whether and if so how to enable multi-state compliance, and so forth. The CPP framework specifically leaves the door open for the RGGI states to design compliance around continuation of the existing RGGI framework and for other states to join RGGI or to otherwise enable their power plants to trade emission allowances with those in the RGGI region. RGGI’s current program details, however, are not fully consistent with all CPP requirements, in part because the CPP had to be designed within the structure and requirements of the Clean Air Act (“CAA”). In contrast, RGGI was designed based on voluntary and cooperative deliberation among member states and was not restricted in any way by the CAA itself. As a result, there are several “technical” or “threshold” elements that need to be addressed if the RGGI states want to use RGGI for compliance with the CPP (not taking into account other changes RGGI states might want to adopt in order to expand the geographic boundaries of trading for RGGI generators). These major threshold issues include:

- **Source Definition and Program Budget(s)** – RGGI now applies to all fossil-fueled power plants (existing and new) with capacity of at least 25 Megawatts (“MW”). The CPP does not apply to a subset of these fossil-fuel power plants (i.e., combustion

turbines). RGGI's emission budget covers existing and new fossil plants as they enter service, while the CPP only directly covers existing plants (leaving states an *option* to include new sources in a mass-based state plan). RGGI will need to address whether and how to continue to include sources not meeting the EPA definition of affected units within the RGGI framework. Such issues will need to be addressed by RGGI and individual RGGI states in order for the program to align with the CPP.

- **Allowance Value** – Like RGGI, the CPP requires that an allowance in a mass-based program be equivalent to one short ton of CO₂. The RGGI states will need to demonstrate, however, that the future design of the RGGI program associated state plans will lead to a CO₂ allowance equivalent to a CO₂ allowance under the CPP.
- **Term** – The CPP requires that state plans establish provisions to reduce emissions during interim periods and up through 2030. RGGI exists as a voluntary program currently extending only through 2020. The RGGI states will need to address how they envision continuation of the RGGI program for the full term of CPP compliance. If the RGGI program does not address CPP compliance through 2030, RGGI states will need to identify how CPP compliance will be met through 2030.
- **Offsets and Banking** – RGGI allows for the limited application of emission offsets for compliance, but a mass-based plan under the CPP may not rely on offsets. RGGI states may need to eliminate the applicability of offsets for compliance starting in 2022. Both the CPP and RGGI allow for unlimited banking of allowances, for use in future years, though RGGI states may need to resolve the disposition of pre-2022 RGGI allowances in 2022 and beyond.
- **Emission and Allowance Tracking System** – RGGI must conform its current CO₂ Allowance Tracking System ("COATS"), or adopt an EPA-administered (or other approved) tracking system for allowance trading starting in 2022.

Beyond threshold technical elements, RGGI states should address several "first tier" considerations to facilitate a broad geographic market for allowance trading

It would be natural for RGGI states and stakeholders to focus their attention in the current program review on the RGGI program itself and on the same core issues that have been addressed in prior program reviews. However, it would be a missed opportunity if the current program review did not actively consider and resolve what changes might be needed to facilitate expanded emission trading in a broader geographic region under the CPP. We encourage this to be a primary goal in this program review.

In this context, it is important for the RGGI states to consider several fundamental issues now rather than waiting until a subsequent program review and to send a clear message to states and stakeholders within and outside of RGGI about the desire to find ways to align trading

options for mutual benefit in the years ahead. Some of these foundational issues may present tradeoffs with RGGI states' traditional goals and objectives. To sharpen their focus, RGGI states might pose the following standard question with respect to any structural element of the RGGI program and any potential condition being contemplated for interstate trading: would this element (or condition) facilitate emission-trading between generators inside and outside of RGGI? If so, are the benefits associated with incorporating this element (or condition) worth the potential drawbacks to including it from the perspective of the RGGI states?

Key issues in this context include the following:

- **Auction Revenues to RGGI States** – Studies have conclusively demonstrated the substantial economic and policy benefits to the RGGI states of (1) disbursing nearly all allowances into the market through a central auction mechanism, (2) returning auction revenues to the RGGI states, and (3) using those revenues in various ways to further greenhouse gas (“GHG”) reduction goals, address electricity cost concerns, and meet other economic and energy policy objectives (such renewable energy and energy efficiency investments). Expanding the allowance trading platform to include other states will almost certainly affect the initial level of auction proceeds to the RGGI states. This could result from changes in the value of allowances. Expanding the compliance footprint may lower the marginal cost of CO₂ control and thus lower the clearing prices for allowances in RGGI’s auction. Such a change could result from the ability of generators in RGGI states being able to obtain allowances in other states that do not have a floor price on allowances. Without reliable forecasts of these and other potential impacts on RGGI allowance auction proceeds over time, the RGGI states will need to explicitly recognize this potential impact and weigh the potential risk of dampened allowance proceeds against the longer-run benefits of a broader allowance trading footprint.
- **Allowance Distribution** – In theory, the RGGI states could seek to require that allowances used for compliance in the RGGI states be distributed initially into the market through a single- or multi-state auction mechanism. We recommend against such a requirement because the manner in which allowances move into the market – whether they are auctioned or, for example, given away for free – affects neither the cost of allowances in power production nor the ultimate level of reduction in CO₂ emissions. Even in the RGGI states where the auction is the main means of moving allowances into the market in the first instance, RGGI allowances now trade in the secondary market, at prices buyers and sellers of allowances are willing to pay at any point in time. The ultimate price of all allowances is driven by the marginal cost to meet the aggregate

mass-based limit on affected sources across the trading region, which is not affected by the party that captures the value of allowances through initial distribution. We do not think that the efficiency gains of supporting trading among electric generating units (“EGUs”) in a broader region will be undermined by these differences in allowance-allocation mechanisms or industry structure. In fact, RGGI’s current agreements allow each state to decide who gets the value of the CO₂ allowance currency, and we encourage the RGGI states to continue this fundamental element of the program design.

- **Market Monitoring** – RGGI’s auctions are conducted with the oversight of a market monitor, who has provided a body of evaluations and assessments that have enabled the RGGI states to have confidence in the prices and allowance-disbursement outcomes resulting from the allowance auctions. Effective market monitoring has given RGGI states comfort about underlying market-power considerations in the central market for allowances. The market monitoring structure in RGGI was established due to concerns over hoarding of allowances and other potential forms of market manipulation that could affect compliance opportunities and cost, as well as the competitiveness and efficiency of the allowance trading system. With the potential expansion of allowance trading across many states with different combinations of auctions, allocations, and trading rules, RGGI may want to ensure that any allowances used for compliance in RGGI states be subject to the same or similar monitoring requirements (especially in the secondary market).

The RGGI states will need to consider a number of “second tier” aspects of allowance trading programs that, while important, are not explicitly relevant to trading with other states

There are a number of “second tier” policy issues that the RGGI states are considering that could have an impact on RGGI allowance prices and revenues, but that – in our view – do not represent key decision points affecting the ability of sources inside and outside RGGI to engage in trading. For example, the RGGI states may individually or collectively adopt a more stringent cap for the RGGI states. RGGI may conform state budgets to CPP levels, maintain the cap trajectory as it now stands, or increasing the stringency of power-sector CO₂ reduction requirements in RGGI states going forward. Different cap levels in the RGGI states could have an impact on the price and value of allowances as well as on overall levels of CO₂ emissions in RGGI (and in the U.S.), depending on how the associated allowances are disbursed, set aside, or retired by the RGGI states. But this issue need not be central to a program design aimed at facilitating broad trading. We encourage the RGGI states to consider in this review period the potential implications of continuing the RGGI program at various cap levels relative to state CPP requirements.

Table ES-1: Summary of RGGI-CPP Trading-Related Issues

Threshold Issue	Description	Key Considerations
Trading Perspective	RGGI faces a number of design decisions which, in the CPP context, may affect RGGI states' ability or desire to trade with other states.	Increasing trading lowers compliance costs for all, enabling more cost-effective and/or deeper CO ₂ emission reductions over time. RGGI should consider – and we hope pursue – an architecture for trading that is as broad possible in order to lower the cost of compliance with CO ₂ emission reduction.
Compliance Approach	Individual RGGI states will need to adopt a particular state plan for CPP compliance.	Assuming a mass-based approach, RGGI states will need to decide whether to select a performance-standard or state-measures approach.
Compliance Timing	If RGGI states want to use RGGI as the foundation of their state plans for the CPP, they will need to align compliance timing.	CPP requires state plans through 2030; RGGI has a shorter timeframe. RGGI states will need to address this discontinuity.
Affected Sources	EPA CPP does not cover CO ₂ emissions from combustion turbines ("CTs"); RGGI does.	RGGI state plans could retain coverage of CTs, by including them within the state budgets as a matter of state policy and within CPP budgets (which has the effect of lowering the amount useable by EGUs under federally enforceable limits) or by adopting a state measures approach.
New Units	RGGI includes new units; CPP does not require (but allows) inclusion of new units.	RGGI states will have to address leakage of CO ₂ from existing units to new units if new units are not retained in RGGI program (or in the plans of states seeking trading with RGGI generating units).
Offsets	CPP does not allow offsets in state Performance Standard plans.	RGGI could retain the use of offsets through a state measures approach that ensures CPP EGU budget integrity.
Banking	RGGI and CPP allow banking of allowances.	RGGI states should clarify treatment of pre-2022 banked RGGI allowances during a post-2022 CPP compliance period.
Emission/ Allowance Tracking System	CPP requires EPA approval of an emission/allowance tracking system.	EPA approval of RGGI COATS or a similar tracking system would enable trading with other states that use an EPA-approved state plan and EPA-administered or approved tracking system.
Minimum Allowance Price	CPP does not include or require minimum prices for allowances.	RGGI's minimum price provides revenue certainty but may restrict trading or lead to inefficient allowance purchase incentives.
Allowance Distribution	Neither RGGI nor the CPP dictate how allowances are initially distributed, though in practice, nearly all RGGI allowances are auctioned.	The objective of enabling a broad allowance-trading market would caution against RGGI conditioning trading upon allowance distribution requirements.
Market Monitoring	The CPP contains no market monitoring requirements.	RGGI's market monitoring provides important certainty for RGGI states; RGGI may want to consider linking trading to market oversight in partner states.

Introduction¹

The Regional Greenhouse Gas Initiative (“RGGI”) is the first mandatory carbon-dioxide (“CO₂”) emission allowance trading market for fossil-fueled power plants in the U.S. and has been in operation since 2009. Some or all of the nine states that now participate in RGGI – Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont – may eventually seek to propose that RGGI constitute the core feature of their State Plans filed with the U.S. Environmental Protection Agency (“EPA”) in compliance with the Clean Power Plan (“CPP”). RGGI states may seek to change RGGI’s program design not only to ensure its use as a CPP compliance mechanism but also to open the door to broadening the geographic footprint for a CO₂-emission trading program, enabling the owners of power plants in the RGGI region to trade with generators in certain non-RGGI states, and vice versa.

This report addresses the elements of RGGI program design that could facilitate a broad emission allowance-trading market, with the intention of providing this information to the RGGI states as they consider any changes in RGGI and to non-RGGI states, should they seek to enable their power plants to trade with RGGI-state generators.

Purpose and Overview

Premises and Context for the Report

We were asked to assess and comment on various program-design issues that might come before the RGGI states as they consider whether and, if so, how to revise elements of RGGI to ensure CPP compliance and to participate in an expanded market for CO₂-emission-allowance trading.² In doing so, we also set out to assess and comment on various issues that other states might take into account as they consider how to structure their state plans under the CPP in order to enable generators in their states to participate in interstate CO₂-emission trading programs, including RGGI.³

Our assessment starts with the following premises and context:

- As the first carbon-emission-allowance trading market in the U.S., RGGI has successfully operated since 2009 and has produced net positive economic outcomes for consumers and for the economies of the participating states.⁴ The success of the RGGI program to date suggests that states will continue to view the RGGI program as an effective approach to controlling emissions of CO₂ and meeting state climate goals.

- EPA's Clean Power Plan is not fully aligned with RGGI's structure and design but provides an opportunity for expansion of the benefits of emission-allowance trading experienced by RGGI states and for realization of those benefits by a broader set of states with Clean Power Plan compliance obligations.
- As we discuss further in this report, the RGGI states will likely need to take action on various program-design issues if the participating states want to (a) use RGGI to comply with the EPA's Clean Power Plan, and (b) create a structure that will enable (and potentially encourage) trading among generators in RGGI and non-RGGI states.
- The universe of potential CO₂-emission allowance trading partners includes EGUs⁵ in states with a variety of structural conditions (e.g., states with competitive electric industry structures versus states with vertically integrated electric industries); states whose power plants operate in regional wholesale power markets regulated by the Federal Energy Regulatory Commission ("FERC") versus those that do not; and states with varying electric-industry market circumstances and trends (e.g., different and changing fuel mix, technologies, and price; different levels of additions and retirements of generating capacity; flat versus increasing growth in electricity demand). These differences have the potential to affect the ease and/or cost of reducing CO₂ emissions in each state, as well as the opportunities for and impacts associated with emission compliance trading across states.
- EPA has provided states with many options under the CPP – including state plans that adopt "rate-based" compliance approaches,⁶ "mass-based" compliance approaches,⁷ or "state measures plans,"⁸ or administration of a Federal Plan⁹ in the event that a state chooses not to propose a state plan. We assume that some states may seek specifically to prepare their state plans or choose to fall under a Federal Plan, in order to provide opportunities for generators in those states to trade CO₂ emission allowances with entities in the RGGI states (and other states), even without 'joining' RGGI.
- Although the implementation of the CPP is currently stayed pending court review, the RGGI states are independently and separately undergoing a major program review to consider whether they need to or should adopt any changes for program implementation in the post-2020 period. Given the pending litigation, the RGGI states may want to consider and adopt changes in RGGI for the post-2020 period prior to knowing the outcome of the court's review of the Clean Power Plan.

- For the purpose of this report, we presume that the CPP will eventually move forward largely in the form set forth in EPA's final regulations for controlling emissions from existing units adopted in August 2015 and published in the Federal Register in October 2015¹⁰ and with the features of the Federal Plan and Model Rules (also proposed in August 2015 and published in October 2015).¹¹
- Also for the purpose of this report, although we recognize that RGGI is a voluntary program and that the RGGI states have a variety of CPP compliance options, we assume for the purpose of this Report that RGGI remains in place going forward, and that some or all of the states will remain in RGGI, and use the RGGI framework for Clean Power Plan compliance. We make this assumption about the period between now and 2022 (when the CPP would commence), but beyond 2022 as well.¹²

Purpose of the Report

We are aware that during the current RGGI program review, the participating states are examining a myriad of issues that have been put forward by states or stakeholder groups as important elements of the next phase of the RGGI program. A number of issues relate to or affect the viability of allowance trading among states within and outside RGGI in the context of CPP compliance. These issues are the focus of this Report. Specifically, we highlight RGGI program design features that can facilitate or prevent enabling generators in the RGGI states from trading CO₂ emission allowances with others outside the RGGI footprint.

First, we evaluate program features that, at a minimum, are necessary to align RGGI's program elements with requirements set forth in EPA's Clean Power Plan. For the most part, these are relatively technical changes to the RGGI program design, but some are threshold issues that RGGI states must address to enable the use of the RGGI construct as the foundation of CPP-compliant State Plans.

We also discuss other policy choices that RGGI states will likely want to consider in order to satisfy a variety of objectives, with a focus on those tied to CPP compliance obligations and/or closely related to allowance trading issues. These include, for example, facilitating a broad geographic footprint for allowance trading; addressing leakage of CO₂ emissions (either to other states or to new sources not covered by the Clean Power Plan); achieving low-cost compliance; maintaining integrity of CO₂ emissions reductions and allowance-trading markets; sustaining revenue streams from sales of CO₂ allowances in RGGI auctions for public purposes in the RGGI states, among other objectives.

We conclude with recommendations for states if they seek to facilitate CO₂-emission-allowance trading across as broad a geographic footprint as possible, while also supporting other goals of the RGGI states.

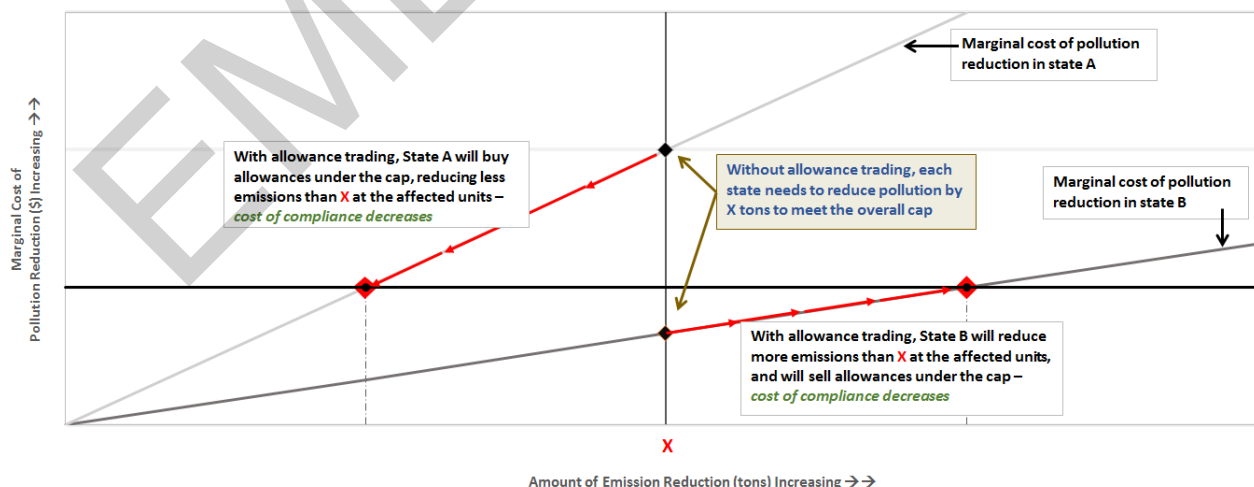
Background/Context for CO₂-Emission Trading Under RGGI and Under the Clean Power Plan

Emission-Allowance Trading: The Economic Rationale and Experience to Date

From an economic perspective, emission-allowance trading programs represent an efficient mechanism for pollution control. Such programs rely on market forces rather than administrative approaches to identify the least-cost pathway to reducing emissions and comply with environmental requirements. A market-based approach to pollution control enables innovation in regulated entities' search for the lowest-cost means of compliance without disrupting energy-market dynamics and without many of the complexities associated with other emissions-control programs.¹³

The currency in an emission-trading program – an emission allowance – allows some power plant owners to emit above their plant's presumptive emission limits by buying allowances to cover emissions, at a lower total cost of compliance than what it would incur to reduce emissions to the point of compliance at that plant. Conversely, the lowest-cost outcome for other power plant owners may be to physically reduce an affected unit's emissions more than required for compliance, which can minimize compliance costs by reducing total allowance costs and/or generating offsetting revenue through the sale of excess allowances at clearing prices that exceed the cost to achieve additional emission reductions. See Figure 1. This design

Figure 1: Allowance Trading Impacts on Sellers and Purchasers



of allowance-trading programs leads to a market-based process of price formation for emission allowances, with price equal to the marginal cost of compliance across all generators in the trading region, regardless of generator characteristics (e.g., age, generating-unit efficiency). This is a proven method of minimizing the collective cost of compliance across a set of affected units and achieving the highest level of efficiency in meeting state and federal emission control goals or requirements.

The efficiency of emission-trading programs has been demonstrated through industry experience and through empirical studies of past programs. The first instance of an emission-trading program was EPA's Acid Rain Program, designed to reduce sulfur-dioxide ("SO₂") emissions across a fleet of power plants owned by different companies. This program successfully achieved SO₂ emission reduction goals more quickly and at a cost much lower than estimated in analyses conducted before the program was implemented, and lower than those typically observed under alternative emissions approaches.¹⁴ Two other instances of successful emission-trading programs include the multistate RGGI and California's AB32, which is the first economy-wide carbon-emissions trading program.

These other programs have paved the way for the pollution-control structures in EPA's Clean Power Plan, which will allow states to incorporate emission trading into their state plans and which will introduce an emission-trading framework into a federal plan for any state that elects not to propose its own State Plan.¹⁵

RGGI: Background

Starting in 2003, public officials from ten Northeast states¹⁶ met to consider how they could collectively reduce emissions from power plants in those states. The states had multiple objectives, including taking a lead on controlling CO₂ emissions through changes in power production and end use consumption, investing in clean energy, and demonstrating the feasibility of an emission-trading program for CO₂. Planning for RGGI took place over several years, with participating states signing a Memorandum of Understanding over the 2005-2007 time frame. Guided by a common Model Rule of the RGGI program design, each state voluntarily implemented its own enabling authority to participate in the program, and program requirements took effect at the start of 2009.

Although initiated voluntarily by each state, the program is a mandatory emissions-control program for all existing and new fossil-fuel power plants with a generating capacity of 25 megawatts or more in participating states. RGGI has a regional CO₂ mass-based emission limit, which is apportioned to the participating states through state allowance budgets.¹⁷ A state's allowance budget establishes the amount of emission allowances allocated to that state but does

not introduce a binding limit on the actual emissions that can occur at power plants in that state. The regional cap is, however, binding, and power plants in the RGGI states in total may not emit above that limit. Every power plant must acquire and surrender allowances equal to their actual CO₂ emissions across a four-year control period.

The multi-state emissions cap was originally set to 188 million short tons of CO₂ per year in 2008 and was reduced to 91 million short tons in 2014, following a comprehensive program review in 2012. Under this revised program, the RGGI cap declines by 2.5 percent annually through 2020.¹⁸

RGGI requires that each covered source possess a tradable emission allowance for each short ton of CO₂ it emits. The original program design granted each state the ability to decide the manner in which its state allowance budget would be allocated to affected generating units in the state; however, states agreed to use at least 25 percent of the value of the allowances for consumer benefit or other strategic energy purpose such as energy efficiency or renewable resource development. In the end, all of the participating states decided to participate in a central auction process for the initial dispersal of most allowances. Approximately 90 percent of allowances are sold initially through quarterly central auctions¹⁹ administered by RGGI, Inc. The proceeds from the auctions, totaling \$2.4 billion through March 2016, are distributed to the states in proportion to the number of allowances each state elects to distribute through the auction.

RGGI rules allow for the use of offsets and banking (and later use) of allowances.²⁰ There is a floor price (or “minimum reserve price”) for allowances sold in the quarterly auctions, which increases by 2.5 percent annually, starting at a floor price of \$2.05 per allowance in 2015. There is also a “trigger price” at which a specific quantity of additional allowances (i.e., the Cost Containment Reserve (“CCR”)) is released into the market by the RGGI states. The CCR is designed to moderate allowance prices when they would otherwise exceed the trigger price. The CCR holds 10 million allowances, annually, and the trigger price was set to \$4.00 in 2014, increasing each year through 2020.²¹ Allowance tracking is conducted through the RGGI CO₂ Allowance Tracking System (i.e., RGGI COATS).

RGGI also includes a periodic program-design review process established in the RGGI Model Rule. The states conducted and completed the first comprehensive review in 2012, and the 2016 review process is underway. Program reviews include a full evaluation of the program, supported by stakeholder participation from regulated entities, environmental nonprofits, consumer and industry advocates, and others. The current review is soliciting stakeholder input on program design elements and on considerations for EPA CPP compliance, including

discussing perspectives on the approach RGGI should take regarding trading with eligible states under the CPP.

One set of issues under discussion includes potential features and/or limitations of trading between RGGI and non-RGGI states, including the following approaches: (a) trading only with generators in states that have mass-based state plans that include both existing and new sources; and (b) requiring that all trading partners adhere to specific program design rules included in RGGI (e.g., price floors, CCR, auctions).

Emission Trading under the EPA's Clean Power Plan

The CPP, developed by EPA under Section 111(d) of the Clean Air Act, establishes CO₂ emission performance rates for all existing “electric utility generating units”, defined as fossil-fired steam generating units and natural gas combined-cycle (“NGCC”) units with generating capacity greater than 25 MW. There is a national, standard emission-rate established for each of those two plant types. Based on the EPA’s calculation of “best system of emissions reduction” (“BSER”) in each state and on characteristics of the electric system in the state, EPA has provided a specific average emissions rate goal for each state.

The CPP allows states to submit a series of documents starting in 2016, with a plan submitted by 2018, for how they intend their generating units to comply with the emission performance standards starting in 2022. EPA will apply a federal plan in any state that does not submit an approvable state plan or that elects not to submit a state plan. Implementation of the CPP is formally stayed, pending review by the federal courts.²²

In state plans, states may choose to apply the standard emission limits to each EGU in the state, either as rate-based goals, measured in pounds of CO₂ per megawatt hour, or as statewide, mass-based goals, measured in total short tons of CO₂ emissions.²³ Generating units in a state with a rate-based plan may trade with EGUs in other states with rate-based plans that satisfy various conditions set forth in the CPP.²⁴ Under mass-based plans, EGUs may trade emissions allowances with EGUs in any other state implementing a similar mass-based approach without entering into a formal trading agreement, as long as each state meets “trading ready” requirements, including the use of an EPA-approved or administered tracking system and equivalent emission allowance definitions (e.g., allowance worth one short ton of CO₂ emissions).

States that do not include new sources in their mass-based plan must specifically address the risk of leakage from existing sources (covered under Section 111(d)), to new sources of emissions (covered under the new source rules).²⁵

States have flexibility to determine how they intend to distribute allowances into the market – such as, for example, (1) allocating them for free to EGUs based on their historical or updated emissions or generation, (2) distributing them for free to all load-serving entities (e.g., electric utilities) or to all power producers (including renewables and nuclear units), or (3) auctioning some or all allowances. Regardless of the approaches selected for initial dispersal, allowances could be traded/sold in secondary markets by and among allowance market participants.

In conjunction with finalizing its CPP rule, EPA has also proposed a model rule for each type of plan (i.e., a rate-based model rule and a mass-based model rule) that provide guidelines for states in developing either type of plan.²⁶ These model rules serve as templates that states may customize and are similar to EPA's proposed Federal Plan.

The mass-based model rule would provide a "trading-ready" platform, rely upon an allowance-allocation method tied to EGUs' historical generation, and include several set-asides—two set-asides to address leakage²⁷: one for renewable energy, and another with output-based allocations to natural gas combined cycle ("NGCC") plants, and a third set-aside related to the Clean Energy Incentive Program ("CEIP").

Under the mass-based Federal Plan, EPA would distribute allowances within each state budget to affected EGUs for free, based on their historical generation. EPA would reserve some allowances for the three set-asides included in the model rule, with mandatory set asides for the CEIP. States that participate in the Federal Plan may trade with any state that is also covered by the Federal Plan or that meets trading-ready conditions. States using the federal plan will use EPA's existing Allowance Tracking and Compliance System ("ATCS").²⁸

Program Design Issues to Support Emission-Trading by Generators Inside and Outside of the RGGI States

Introduction

In order to facilitate trading between generating units in RGGI states and EGUs located elsewhere, as well as to enable RGGI to qualify for Clean Power Plan compliance, there are many issues that RGGI states need to consider. Some of these are very important technical and policy issues in RGGI's program design, while others – though still important to one or another constituency involved in the RGGI program review – may be less important from the perspective of fostering a broadened universe of potential trading partners.

The discussion here is thus divided into three categories:

Threshold issues for Clean Power Plan compliance – There are a number of considerations related to differences between the CPP and the RGGI program design which, at a minimum, need to be addressed for RGGI to align with the requirements of the CPP. Examples of such issues include: the definition of affected sources; the size of the RGGI cap; the program period; and the RGGI tracking platform. Although several of these topics may not introduce complicated policy questions, they are important program design issues simply because they must be addressed for RGGI to align with the CPP. While the need to address these changes may not be urgent at this time, these issues will need to be addressed eventually. Confronting these issues now can provide certainty to RGGI state affected sources and encourage other states to consider CPP program design concepts favorable to the establishment of a broader trading region.

Key policy/program design considerations – Beyond the threshold CPP compliance issues, there are a number of design features that RGGI states will need to address should they wish to foster a broad region for interstate trading of CO₂ allowances. These factors are important for developing conditions for a vibrant interstate allowance market, for enabling states to determine who receives the value of emission allowances distributed in their state, and for increasing the likelihood of lowest-cost compliance.

Other considerations from a trading point of view: the RGGI Cap – There are a number of issues that the RGGI states – individually and collectively – may be interested in and wish to address in the context of program design changes to enable compliance and facilitate trading but which will not materially or directly affect the trading platform itself. The most important of these issues under current review relates to the amount of emissions that may occur under the RGGI cap relative to the aggregate emission reduction obligations of the RGGI states under the CPP.

These topics are described in the sections below, including an overview of each issue and a discussion of alternative ways to address the issue.

Threshold Issues Related to RGGI and the Clean Power Plan

In developing the Clean Power Plan, EPA included enough flexibility to enable the implementation of multi-state, mass-based emission-allowance trading programs that are in many ways similar to the trading program that has been implemented by the RGGI states since 2009. Nevertheless, to be consistent with the applicable provisions of the Clean Air Act, EPA's mass-based program contains meaningful differences from the RGGI program design. The RGGI states will need to address these threshold issues in order to rely upon the RGGI program to meet CPP compliance obligations and to establish a trading program that enables participation by sources in non-RGGI states.

Some potential changes are mostly administrative – such as formal adoption of a mass-based compliance path and establishment of a program term consistent with CPP requirements. Other elements are either less clear or will require potentially important changes in RGGI program design elements. The latter includes items such as the treatment of which power plants are covered (or “affected sources”) under the CPP vis-à-vis RGGI affected source definitions; the form of the allowance tracking system (or development of interoperability between RGGI COATS and EPA’s allowance tracking design/requirements); determination of RGGI states’ caps relative to EPA mass-based standards; development of a mechanism for addressing leakage if needed; and potential adjustments to RGGI’s treatment of offsets and banking.

Specifically, threshold issues for RGGI’s design to meet CPP compliance eligibility are summarized in Table 1 and described in the following sections.

(1) Election of a Mass-Based State Plan and Compliance Timeline

As noted earlier, the CPP provides states the flexibility to meet compliance requirements through a number of mechanisms, including (1) emission performance rates (in pounds of CO₂ emitted per MWh generated) established by EPA to be applied to each affected source; (2) emission performance rates applied on a state-wide basis (with trading among affected sources); (3) mass-based state budgets (in tons of CO₂ emitted, established by EPA in a manner consistent with the emission rate performance standards for each state); or (4) state-defined approaches through a “state measures plan.”²⁹

None of these mechanisms presents technical requirements that are necessarily difficult for the RGGI states to achieve, but the CPP nonetheless does require the selection of either a mass-based or state measures approach. It also requires that one allowance equal one short ton of CO₂ emitted.

The RGGI states will also be required to establish program design details through 2030, well beyond the current term of RGGI program design elements. While RGGI is a regional program, it is administered through individual state laws and regulations, and key programmatic details have only extended to the time of the next review period. Consequently, CPP state plans will need to stand on their own as trading-ready programs or have a back-stop process for individual state administration of CPP compliance programs.

Table 1: Threshold Compliance Issues

Threshold Issue	Description	Key Considerations
Mass-Based Approach	RGGI states may elect to submit either a mass-based and/or state measures approach.	A state measures approach may be required to allow for continuation of key current RGGI design features (e.g., inclusion non-CPP sources, use of offsets).
Compliance Timing	RGGI sets program requirements for a few years at a time; the CPP requires that state plans identify compliance through 2030.	RGGI states must define compliance in plans through the CPP term (to 2030); RGGI framework will need to conform to these compliance terms, or state plans will need to separately address compliance beyond the current RGGI term.
Affected Sources	CPP does not cover combustion turbines; RGGI does. RGGI must determine whether and, if so, how to continue to include combustion turbines in CPP RGGI state plans.	RGGI state plans could retain coverage of CTs, by including them within the state budgets as a matter of state policy and within CPP budgets (which has the effect of lowering the amount useable by EGUs under federally enforceable limits) or by adopting a state measures approach.
New Units	CPP does not require inclusion of new units; RGGI does. New units may be included in CPP state plans through new source complement budget additions.	Unless new units continue to be included through the use of NSCs by RGGI states, state plans will have to demonstrate that “leakage” to new sources is addressed through an EPA-approved mechanism.
Offsets	RGGI allows the limited use of offsets, but offsets are not allowed under a state performance standard plan under the CPP.	RGGI states could abandon the use of offsets and use a performance standard approach. Alternatively, RGGI could retain the use of offsets through a state measures approach that ensures CPP EGU budget integrity.
Banking	RGGI and CPP allow banking, but RGGI may lead to the banking of allowances prior to the first CPP compliance year (2022).	RGGI states may want to identify soon how pre-CPP (i.e., pre-2022) banked allowances will be addressed to provide certainty for the regulated community and RGGI auction participants.
Emission/Allowance Tracking System	CPP requires EPA approval of an emission/allowance tracking system, with guidance still under development.	EPA approval of the RGGI COATS or a similar tracking system would enable trading with other states that use an EPA-approved state plan and EPA-administered or approved tracking system.

(2) Definition of Affected Sources and Determination of State and Regional Budgets

Ultimately, individual states and/or RGGI as a whole will need to set budgets that comply with source definitions and compliance standards under the CPP. With modest adjustments, extending the current RGGI program budgets and budget reduction trajectory through 2030 would allow RGGI states to meet the baseline, state, mass-based budget determinations in the CPP through interim and final compliance obligations. In fact, given the emissions targets under the CPP *for 2030*, RGGI states likely would have to do little beyond current 2020 RGGI budget requirements to meet those CPP budget requirements. However, the decision on RGGI budget trajectory will need to consider related CPP mass-based program requirements.

For example, reconciliation of the RGGI program to CPP source and budget requirements needs to address how affected sources are defined under each program. Under RGGI, affected sources include fossil-fuel generating units capable of providing 25 MW of output (with certain exceptions) across the RGGI states. Under the Clean Power Plan, EGUs include only existing fossil steam and natural gas combined cycle units over 25 MW in size. The RGGI program thus covers additional existing units beyond CPP sources, including gas- or oil-fired combustion turbines (“CTs”). For the purpose of submitting compliant state plans under the CPP, RGGI states will need to ensure that inclusion of CTs under the cap will not cause EGUs to emit more than their CPP targeted amounts. One option for compliance would be to simply retain CTs under the CPP cap, thereby – in effect – reducing the number of allowances that could be used by EGUs. The RGGI states may also consider altering their definition of affected sources or demonstrate how the implementation of a trading program with a broader set of affected units in a state measures plan ensures that CPP affected sources are subject to emission performance standards at least as stringent as required by EPA.

Second, RGGI includes all existing *and new* affected fossil units in the RGGI states. Under the CPP, a state is not required, but has the option, to combine existing and new sources. If a state includes new sources, it must accept EPA’s calculation of the “new source complement” as part of its state budget.³⁰ For the purpose of submitting compliant state plans under the CPP, RGGI states will need to determine whether one or all RGGI states will continue to include new sources in the trading program. If so, the states will either need to adopt the EPA (or state-derived and EPA-approved) new source complement as part of state budgets or, if not, demonstrate how the states will address the potential for emission leakage to new sources. In addition, RGGI states will need to explicitly consider whether a non-RGGI trading-ready state’s decision on whether to include new sources as part of its state plan will affect whether allowances generated in that state may be used for compliance in the RGGI states.

Ultimately, the RGGI states' decisions with respect to definitions of affected sources will be critical inputs to the RGGI states' determination of whether to pursue a mass-based emissions standards or state measures approach, and ultimately what to set for state and regional budgets. The current RGGI budget and budget reduction trajectory provides the RGGI states a certain degree of flexibility in making these decisions.

For example, RGGI states may consider whether and to what extent they should hold a pool or pools of allowances back (i.e., as set asides) – possibly representing the difference between CPP compliance quantities and a more stringent RGGI-specific emissions budget – to be available for various purposes. During the course of implementing the program in the 2020s, for example, the RGGI states could determine how to use such set asides to eliminate compliance obstacles or address compliance obligations under the CPP. Options could include retaining the Cost Containment Reserve for price mitigation, meeting a higher level of stringency than implied by the CPP state budgets, addressing CPP issues related to affected sources and new units, or otherwise using set-asides to meet state economic, energy or environmental policy objectives.

(3) Offsets and Banking

RGGI allows for the limited application of emission offsets for compliance. Because the CPP does not allow for offsets under a mass-based plan, RGGI states may need to eliminate the applicability of offsets for compliance starting in 2022 or otherwise address how, under a state measures plan, an allowance for offsets does not reduce the effective emission performance requirement for affected EGUs.

The CPP does allow for unlimited banking of allowances, for use in future years, as does the RGGI program. Consequently, starting with the first CPP compliance year (2022), there should be little need to include in state plans provisions for banking of allowances different from those in place today for the RGGI program. Nevertheless, since RGGI sources will also have an opportunity to bank RGGI allowances between now and 2022, the RGGI states may need to resolve what the disposition of pre-2022 RGGI allowances will be in 2022 and beyond. The RGGI states should provide clarity around the treatment of pre-2022 banked allowances as soon as practicable in order to reduce uncertainty for affected sources during the transition period between now and the commencement of CPP compliance obligations in 2022.

(4) Emission and Allowance Tracking Systems

Under the CPP, states selecting a mass-based plan must include specific emission allowance monitoring and tracking provisions. The CPP establishes minimum obligations for state monitoring and reporting of CPP compliance activities, including indication of how, under a mass-based plan, emission allowances will be tracked from the moment of issuance through

retirement. EPA requires that states complete this through a joint tracking system, through inter-operable tracking systems, or through an EPA-administered tracking system. EPA will evaluate the monitoring and tracking provisions in state plans to ensure that the tracking system or interoperable tracking systems used across states are properly designed to maintain the integrity of the linked emission trading programs.³¹ Notably, once EPA has approved a given tracking system for a state, no further approval of the system is needed for other states to trade using the same tracking system.

The RGGI CO₂ Allowance Tracking System (COATS) is the electronic platform that records and tracks data for each RGGI state's CO₂ budget trading program. COATS is currently used for public reporting and compliance, and tracks allowance transactions, offset projects, CO₂ emissions, and various other account information and compliance data. The COATS allowance tracking and trading platform enables market participants to engage in all forms of allowance transactions, while providing all of the data necessary for monitoring market and compliance activities. COATS likely already includes many of the designs and functionality that EPA will require of compliant tracking systems.

Since EPA approval of a tracking system implies interoperability with other EPA-approved tracking systems, EPA approval of COATS or a similar tracking system would enable EGUs in the RGGI states to trade with EGUs in other states that use an EPA-approved state plan and EPA-administered or EPA-approved tracking system. The RGGI states will need to decide whether to seek approval of COATS or adopt an EPA-administered or other approved tracking system for allowance trading starting in 2022. However, continuing to rely on an EPA-approved version of COATS does not appear to create any barriers to trading with trading-ready non-RGGI states, since such states can either choose to use COATS or will otherwise use a tracking system deemed interoperable with COATS.³²

Key Policy/Program Design Considerations to Facilitate Interstate Trading

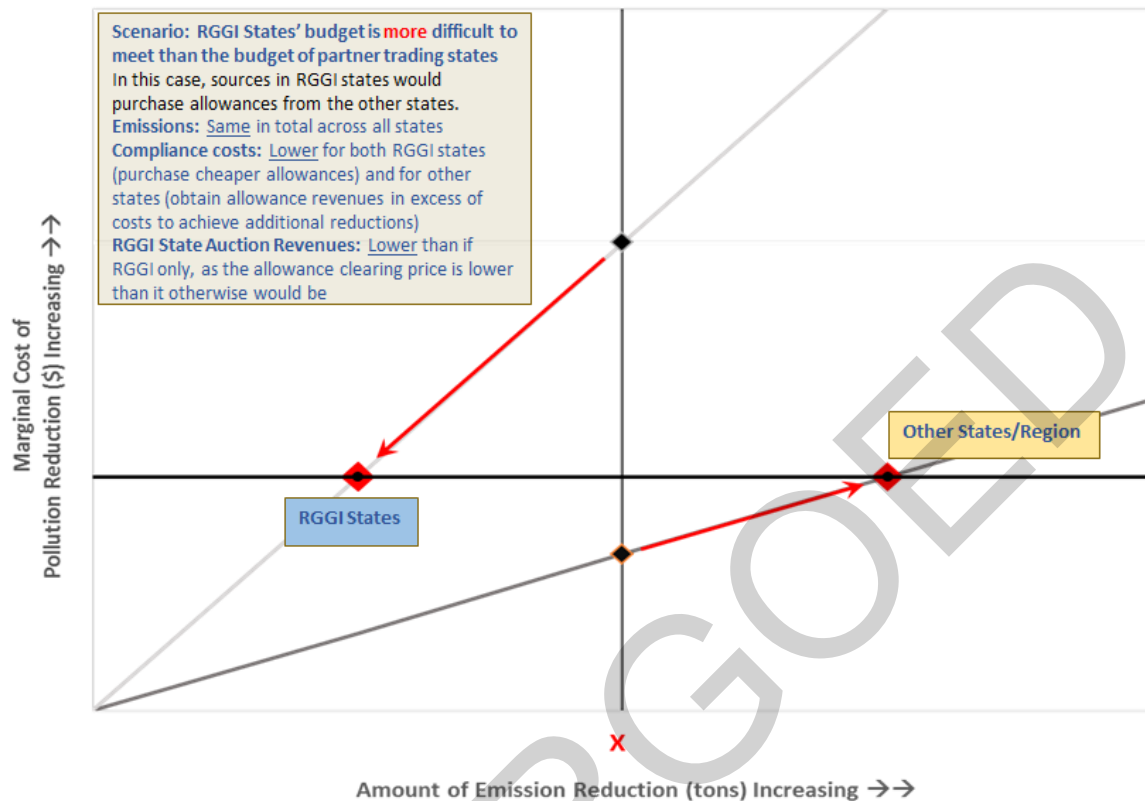
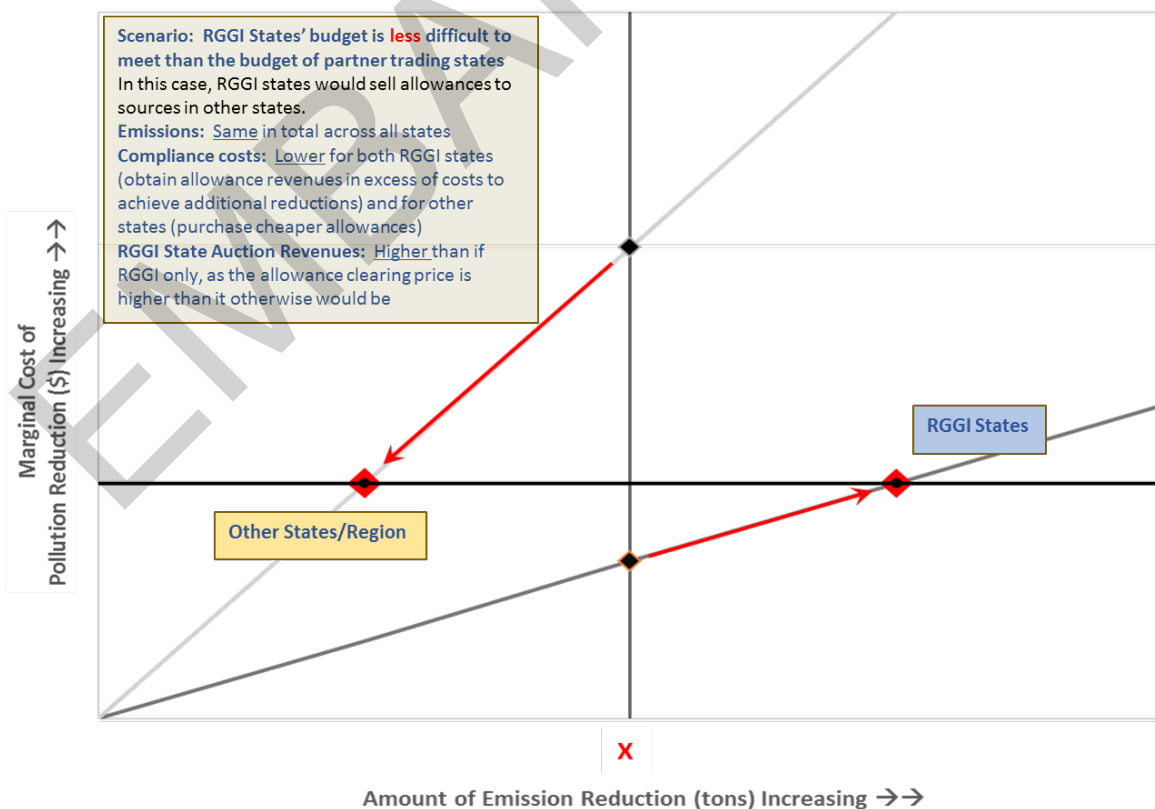
Beyond addressing the specific threshold/technical issues needed to comply with the CPP, the RGGI states may also want to incorporate program changes that are specifically intended to enable or support emission allowance trading between EGUs inside and outside of the RGGI region. Doing so, however, may introduce tensions between achieving the efficiency benefits of an expanded trading market and retaining RGGI program elements to achieve other state and regional environmental, public health, economic, or energy policy goals. There are a handful of key considerations that are relevant to this challenge.

First, real-world experience, combined with conclusions in the academic literature, tell us that the broader the region for trading, the greater the likelihood that the total costs of environmental compliance with air regulations will go down. Consider, for example, two scenarios in which RGGI states allow their EGUs to trade freely with EGUs in other states: in

one scenario, meeting the collective RGGI states' budget alone would be more difficult (in terms of cost per ton of CO₂ reduced) than it would be if EGUs had access to lower-cost allowances in other states; and in the other scenario, it would be less difficult. Figures 2 and 3 depict these two scenarios. In both cases the total emissions of CO₂ are the same, and the total cost of compliance for the RGGI states would be lower than it would be if RGGI did not allow EGUs to trade with the other states. However, in the first scenario, where the cost of compliance is higher in a RGGI-only trading program than it would be in a broader trading region, the decision to open to trading with the other states could reduce auction revenues for the RGGI states. This could occur because trading will lower the allowance price in the broader trading region relative to what the price would have been in the RGGI region without trading, which could tend to motivate EGUs in the RGGI region to prefer purchasing allowances in the broader secondary allowance-trading market than in directly in the RGGI auctions.

In our prior section on "Emission-Allowance Trading: The Economic Rationale and Experience to Date," we reviewed the literature and empirical experience on the relative efficiency gains that have resulted from market-based emission-trading programs covering broad geographic regions. This strongly suggests that any state that seeks a broad trading market should avoid erecting barriers to trading. To support broad trading, the states may want to pose a standard question with respect to any structural element of the RGGI program and any particular condition being contemplated for interstate trading. Such a framework or standard question might be: Would this element (or condition) facilitate emission-trading between generators inside and outside of RGGI? If so, are the benefits associated with incorporating this element (or condition) worth the potential drawbacks of including it from the perspective of the RGGI states?

That said, expanding trading to other states may alter the dispatch of power plants within the RGGI footprint and alter allowance auction revenues collected by the RGGI states. The broader the region, the more likely it is that there will be unpredictable shifts in generation output inside and outside of the RGGI boundary. This could positively or negatively affect the RGGI states' auction proceeds.³³

Figure 2**Figure 3**

For example, if trading were allowed between RGGI and other mass-based states, there could be opportunities for generators within RGGI's boundaries to pursue lower-cost compliance options than are available through RGGI auctions, purchasing emission allowances at prices that are lower than they would be if trading were limited to the RGGI footprint. This could result in lower demand for allowances sold in RGGI auctions, lower auction prices, and lower sales and revenues collected by states in the RGGI auctions. Additionally, a broader trading footprint could lead to a different dispatch of EGUs within RGGI states compared to what would have occurred in the absence of such inter-regional trading (given the impact of broader trading on power plant operational costs). This introduces a potentially important tradeoff: while such a scenario would tend to lower state auction revenues, it would also likely lead to lower compliance costs for RGGI states over time, reducing impacts on prices in the wholesale electricity markets serving RGGI states.

Several key considerations that can encourage or deter broad trading among RGGI and other states are summarized in Table 2 and described below.

(1) Minimum Allowance Price

The RGGI states might be inclined to mitigate this potential outcome by establishing a minimum price for allowances sold in the RGGI auction and requiring that allowances from outside the RGGI region used by sources in RGGI states also come with similar minimum-price characteristics to the extent that such allowances are included in an allowance auction process. Doing so, however, would likely create a barrier to trading with any state adopting both a mass-based state plan and giving allowances away for free (whether to EGU generators, to load-serving entities, or even to all power generators in the state). This would reduce the potential geographic scope of the allowance trading region and increase compliance costs in RGGI. In addition, requiring other states to set a minimum price for distribution of allowances into the market or attempting to establish a price floor in the secondary market for emission allowances would be difficult and cumbersome to execute and enforce and would likely serve as a barrier to trading with generators in RGGI states.

Table 2: Key Perspectives and Features to Enable Broad Trading

Threshold Issue	Description	Key Considerations
Trading Perspective	There are likely a number of design issues that the RGGI states will face in the coming years, many of which may create opportunities for or barriers to broader trading. It will help to establish a framework for considering such tradeoffs.	Increasing the number of compliance entities included in a trading program will tend to lower overall compliance costs, enabling more cost-effective and/or deeper CO ₂ emission reductions over time. This must be weighed against the impacts of a broader trading region on potential individual state objectives (e.g., for use of RGGI auction proceeds, and/or in-state emissions).
Minimum Allowance Price	The RGGI program includes a minimum allowance price applied in initial allowance auctions; the CPP does not include or require minimum prices.	RGGI's minimum initial auction allowance price provides certainty around state allowance revenues. Yet requiring that potential trading partners include a minimum allowance price may erect a barrier to trading, particularly in states that allocate rather than auction allowances. Retaining the minimum auction price but not requiring it of other states may reduce participation in RGGI auctions when allowances are available in other states at prices below the RGGI minimum price.
Allowance Distribution	Neither RGGI nor the CPP dictate how allowances are initially distributed, though RGGI recommends that states reserve at least a portion of allowances for public purposes. In practice, nearly all RGGI allowances are distributed initially through a central auction.	Initial disbursement of allowances does not affect the value or "opportunity cost" of allowances in the market, and thus does not affect the aggregate cost of compliance or the price of electricity generation. Thus, there is little reason to condition trading on the distribution of allowances. Allowance distribution does, however, affect the distribution of initial allowance value, which can lead to various economic outcomes (e.g., "windfall" to affected sources allocated allowances, electricity bill reductions where allocations are used by utilities to offset electricity costs, etc.).
Market Monitoring	RGGI requires careful monitoring of the allowance market to guard against hoarding or other forms of market manipulation; the CPP contains no market monitoring requirements.	RGGI's market monitoring has not been challenging or disruptive from administrative or market activity perspectives, yet it has provided a great deal of comfort to states in the program. Such oversight of market activities is arguably more important with broader trading regions and more market participants. RGGI may want to consider linking trading to some market oversight assurance mechanism in partner states.

(1) Allowance Distribution

In a similar vein, the RGGI states could add a requirement that allowances used for compliance in the RGGI states be conditioned upon some initial form of allowance distribution – e.g., requiring that some or all allowances be distributed initially through a single- or multi-state auction mechanism. While the RGGI states have benefited significantly from near-exclusive reliance on RGGI’s centralized auctioning of allowances, there is limited rationale for making this a condition on non-RGGI allowances used for RGGI state compliance. This is because the clearing price and value of allowances in the secondary market is the same whether a state decides to give its allowances away for free (regardless of the recipient) or distribute them through an auction or any other mechanism. The ultimate price of all allowances is driven by the marginal cost to meet the aggregate mass-based limit on affected sources across the trading region, which is not affected by who captures the value of allowances through initial distribution.

Economically rational actors that receive allowances for free but that do not need them to generate electricity (e.g., as would occur with allowances allocated to a wires-only utility that owns no generating assets, or to a zero-carbon-emitting generating unit) would simply monetize the value of their allowances by selling them into the secondary market. Thus, a requirement to auction allowances as a condition of their use for compliance in a RGGI state would erect a barrier to interstate emissions trading given that non-RGGI states adopting a mass-based approach may use a non-auction allowance distribution strategy.

It is likely that there will be some states in which affected units are owned by vertically-integrated utilities, and in which policy makers in the state may seek to (a) adopt a mass-based state plan, (b) enable those EGUs to trade with other EGUs in that state and with generators in RGGI and other states, and (c) give allowances away for free to those rate-based EGUs. This situation differs from that in most RGGI states (where EGUs tends to be merchant generators and where EGUs must acquire allowances through the RGGI auction or the secondary market). As a result, EGUs in RGGI may argue that EGUs should have the same opportunity across trading states to access allowances on equal terms (that is, RGGI EGUs may request a similar allocation rather than the current auction mechanism).

Similar to the perspective we shared in the prior discussion, we encourage RGGI states to overlook such differences in industry-structure and allowance-allocation methods as they consider what conditions, if any, to require in other states’ plans in order to allow RGGI EGUs to trade with EGUs outside of RGGI’s boundaries. In other words, although the situation described above could lead to *equity* considerations across EGUs inside and outside of the RGGI states – in terms of accessing allowances at different prices (e.g., ranging from a zero acquisition price for some generators to a price established in competitive allowance auctions for others) –

that difference does not necessarily lead to *inefficiencies* in a trading program that allows all of these EGUs to participate and in which the price/value/opportunity cost of an allowance is the same regardless of the initial distribution mechanism.

Even now, there are some differences within RGGI with regard to states' decisions about the portion of allowances that are distributed to the market through RGGI allowances; and the agreement among RGGI states still allows individual states to retain the discretion to determine how to distribute allowances into the market.³⁴ Enabling trading across a broader region in which there may be wider variation in allowance allocation mechanisms than exists in RGGI today would be consistent with the original program design for RGGI. We think that the efficiency gains of supporting trading among EGUs in a broader region would not be undermined by these differences in allowance-allocation mechanisms or industry structure.

Consistent with the current RGGI agreements, in which each state retains the ability to decide who gets the value of the CO₂ allowance currency, we encourage the RGGI states to continue with this fundamental element of the program design. This would mean that RGGI states would not limit trading to only those states that use an auction or any particular allowance-disbursement approach.

In making this recommendation, we are mindful of the ways in which the prices of allowances affect the price of electricity in RTO and non-RTO power markets. When a generator in a competitive wholesale market receives an allowance for free, it does not mean that that EGU will offer its supply with a zero price for CO₂-compliance costs. Rather, fundamental economic principles lead all EGUs to construct electricity offer prices that reflect the opportunity cost of a CO₂ allowance, which is equal to the value of an allowance in the market at the time it is used. This is true when a generator previously purchased an allowance at a price higher than its value in market at the time the allowance is used, or when the EGU received the original allowance for free. CO₂-allowance prices that show up in electric prices at any point in time reflect the then-current price of CO₂ allowances.

With this in mind, we encourage the RGGI states to focus on enabling an efficient emission-trading platform as a first-order design principle.

(2) Market Monitoring

A final consideration for states to take into account relates to market monitoring issues. Since the quarterly allowance auctions commenced at the end of 2008 (at the eve of start-up of the RGGI program in 2009), the RGGI states have had many years of experience in the competitive performance of the auction itself. RGGI's auctions are conducted with the oversight of a market monitor, whose body of assessments has helped the RGGI states have confidence in the prices

and allowance-disbursement outcomes resulting from the auctions. That market monitoring structure was established due to concerns over hoarding of allowances, other forms of market manipulation that could affect compliance opportunities and cost, and competitiveness and efficiency of the allowance trading system.³⁵ Effective market monitoring has given RGGI states comfort about underlying market-power considerations in the central market for allowances.

A different type of market monitoring may be important in a broader market in which EGUs in RGGI states have the opportunity to trade with EGUs in non-RGGI states with mass-based plans. A situation in another non-RGGI state that gives allowances away according to some administrative rule rather than an auction, for example, would not give rise to the same kinds of market-power considerations that could arise from a centralized auction. By contrast, however, RGGI may want to ensure that whatever CO₂-allowance tracking program is adopted for EGUs in RGGI states and in other states eligible for trading includes appropriate transparency to detect hoarding practices that could affect and undermine the competitiveness of the secondary market for allowances.

Other Considerations from a Trading Point of View: The RGGI Cap

In addition to the issues that the RGGI states may want to address to establish RGGI as a CPP compliance mechanism and to make CPP implementation in the RGGI states as open as possible to trading, there are a number of other policy issues that the RGGI states are considering. There are many such issues that could impact RGGI allowance prices and revenues but that, in our view, do not represent key decision points affecting the ability of sources inside and outside of RGGI to engage in trading. The most important of these under current review relates to the size of the RGGI cap relative to the sum of RGGI states' CPP budgets through 2030.

As in past program reviews, a key element of the RGGI program review is to assess the overall size of the emissions cap and to set its level for future years. In the last program review, this assessment led to major changes in cap levels, reflecting shifting economic, industry, and policy conditions, based on the deliberations of RGGI Commissioners at the time of the review. The stringency of the cap is currently under review, and alternative trajectories for RGGI program emissions caps are being assessed with respect to their expected impact on emissions, allowance prices, and electricity rate impacts.

What is unique in this program review cycle – given the overhang of the CPP – is the interplay of the RGGI program cap and the RGGI states' collective cap under the CPP. Under the CPP, the RGGI states are permitted to adopt a more stringent collective cap for their states, provided that they can demonstrate that the performance standards for the CPP-affected EGUs are at least as stringent as specified under the CPP.

Given the level of those standards for the RGGI states as a whole, what seems clear is that continuation of the RGGI cap and annual cap reduction targets in place today would leave the RGGI region below the RGGI states' collective CPP budget requirements, including the new source complement.

In light of the timelines involved, we encourage the RGGI states to consider in this review period the implications for continuation of the RGGI program at various cap levels relative to the RGGI states' CPP requirements. Although CPP compliance deadlines fall beyond the time of RGGI's next program review, RGGI's decisions in this cycle may inform the on-going work of states inside and outside of RGGI to consider options regarding CPP compliance, to conduct necessary stakeholder processes, and to begin to draft state plans for EPA approval. Postponement of RGGI considerations of CPP budget requirements beyond this cycle would not only increase uncertainty for the EGUs within the RGGI states but would also miss the opportunity for RGGI states to inform other states' CPP planning efforts.

RGGI states thus have several choices with respect to the cap in the current program review cycle. For example, the RGGI states could fully align the RGGI program to the source definitions and EGU budgets, including new source complements, contained in the CPP. While interim milestones would need to be developed, the CPP contains state-specific budgets for mass-based programs that could be adopted by the RGGI states to set a new path for the RGGI cap through 2030.

Many stakeholders are likely to view this as a suboptimal choice, however, because RGGI states have historically sought to address the risks of climate change in advance of EPA or other federal action, at levels generally considered among the most aggressive in the nation. Adopting the CPP source definitions and targets could thus be seen as a step backward for the RGGI states and could complicate efforts and requirements by states to address CO₂ emissions more aggressively and more comprehensively across sectors.³⁶

Alternatively, RGGI states could maintain the RGGI budget trajectory as it stands or increase the stringency of power-sector CO₂ reduction requirements going forward. In order to limit the overall emissions available from the RGGI's states' power sector, without leakage of emissions into other states, the RGGI states would need to take action to retire CPP allowances (or otherwise prevent them from moving into a broader market).

In either case, the RGGI states will need to demonstrate that the state plans will achieve reduction in CPP affected sources at least equal to the CPP EGU performance standards and may need to develop RGGI-specific mechanisms to account for continued applicability of RGGI program designs related to units not covered by the CPP. This would likely be a

straightforward demonstration provided the overall RGGI budget – including combustion turbines and new sources – remains below the CPP compliance standards.

From a trading perspective, the RGGI states will need to demonstrate that the RGGI trading program and the effective value of an allowance meets EPA's standards for allowing the trading of allowances between RGGI and non-RGGI trading-ready states. Yet how the RGGI states' cap is set could have an impact on allowance prices in RGGI states as well as in trading partner states.

Concluding Observations and Recommendations

The RGGI states have deep experience in operating a mass-based, CO₂-allowance trading program. The states have administered a liquid and efficient trading market for allowances and have repurposed allowance auction revenues to effectively achieve economic benefits and meet public policy objectives.

Now in the second major phase of RGGI program review, the RGGI states are considering program changes in the context of the EPA's Clean Power Plan and the potential for emergence of a much broader market for the trading of CO₂ allowances. This provides the RGGI states with the opportunity to shed light on the successes of mass-based CO₂ allowance trading and to open the door to expanded trading opportunities for power plants located inside and outside the RGGI states.

We encourage the RGGI states to take advantage of this opportunity to help facilitate the creation of a broad market for the trading of CO₂ emission allowances and to help establish a framework for efficient, low-cost achievement of EPA's CO₂ emission reduction mandate. Although we recognize that this is not the only objective that the RGGI states are considering in this review process, our focus on these issues in this report reflects our view that proactive and timely attention to these questions may help the RGGI states and other states achieve better CO₂ emission-control programs in the CPP context.

Based on our review, we make the following observations:

We encourage the current RGGI deliberations to focus on what matters: the long-run efficiencies and cost savings that result from participating in a broad regional allowance-trading market

Achieving power-plant emission-control objectives through a multi-state, mass-based emission control program that permits power plant owners to trade emission allowances promotes low-cost compliance. It sends appropriate signals for investment in and operation of power system infrastructure and achieves social objectives in the most efficient manner. This tradeable-allowance structure operates well in regulated and competitive industry contexts and integrates seamlessly with electricity market operations. A broader market with more participants creates the opportunity to lower the overall costs of compliance.

In the long run RGGI states will benefit from the broadest possible system of allowance trading across the U.S.

The CPP provides state-specific emission-performance targets combined with flexibility in states' compliance choices. It would be easy in this context for each state to focus on what appears to be the best short-term compliance path assuming current market conditions, rather than considering what might be the best long-term strategy for CPP compliance. A broad and liquid market for trading of allowances under a mass-based program that allows for the widest geographic scope has been shown time and again to be the least-cost path to compliance. We encourage RGGI states to recognize that their best interest may lie in a plan that maximizes the number of states with power plants eligible to trade with RGGI generators.

We encourage RGGI states to have an outward in the current Program Review, in addition to considering near-term and state priorities

Even assuming that the CPP is allowed to proceed after federal court review, the CPP's compliance deadlines extend over many years. At present, however, many states are actively considering their compliance options, seeking to understand the relative costs and benefits of different approaches, evaluating whether to adopt a mass-based trading programs, and assessing steps they might need to take to enable their power plants to trade with those in other states (including the RGGI states). The RGGI states are uniquely positioned to demonstrate the successful history of workable, multi-state CO₂ allowance-trading regimes, and to take the lead on adapting the RGGI program structure to stand out as a CPP compliance-ready program design and allowance-trading platform. We encourage the RGGI states to take advantage of this near-term opportunity to identify, consider and embrace RGGI program design changes

that would create an open trading architecture with which other states could align their own plans (without necessarily ‘joining’ RGGI *per se*).

RGGI states will need to address several threshold technical program issues to enable RGGI to line up with what the Clean Power Plan requires

The CPP framework specifically leaves the door open for the RGGI states to design compliance around continuation of the existing RGGI framework and for other states to join RGGI or to otherwise enable their power plants to trade emission allowances with those in the RGGI region. RGGI’s current program details, however, are not fully consistent with all CPP requirements, in part because the CPP was designed within the structure and requirements of the CAA. As a result, there are several “technical” or “threshold” elements that need to be addressed if the RGGI states want to use RGGI for compliance with the CPP (not taking into account other changes RGGI states might want to adopt in order to expand the geographic boundaries of trading for RGGI generators). These major threshold issues include:

- **Source Definition and Program Budget(s)** – RGGI will need to address whether and how to continue to include sources (like combustion turbines and new sources) not meeting the EPA definition of EGUs. Such issues will need to be addressed by RGGI and individual RGGI states in order for the program to align with the CPP.
- **Allowance Value** – The RGGI states will need to demonstrate that the future design of the RGGI program associated state plans will rely on a CO₂ allowance equivalent to a CO₂ allowance under the CPP (i.e., each allowance under RGGI will represent one short ton of CO₂ emissions).
- **Term** – The RGGI states will need to address how they envision continuation of the RGGI program for the full term of CPP compliance (i.e., at least through 2030).
- **Offsets and Banking** – RGGI states may need to eliminate the applicability of offsets for compliance starting in 2022. Both the CPP and RGGI allow for unlimited banking of allowances for use in future years, but RGGI states may need to resolve the disposition of pre-2022 RGGI allowances in 2022 and beyond.
- **Emission and Allowance Tracking System** – RGGI must conform its current CO₂ Allowance Tracking System (COATS), or adopt an EPA-administered (or other approved) tracking system, for allowance trading starting in 2022.

Beyond threshold technical elements, we encourage RGGI states to address several “first tier” considerations to facilitate a broad geographic market for allowance trading

We believe it would be a missed opportunity if the current RGGI program review did not consider and resolve what changes might be needed to facilitate the potential for expanded

emission trading in a broader geographic region under the CPP. We encourage this to be a primary goal in this program review.

In this context, it is important for the RGGI states to consider several fundamental issues now and to send a clear message to others outside of RGGI of the desire to find ways to align trading options for mutual benefit in the years ahead. Some of these foundational issues may present tradeoffs with RGGI states' traditional goals and objectives. To sharpen their focus, RGGI states might pose the following standard question with respect to any structural element of the RGGI program and any potential condition being contemplated for interstate trading: Would this element (or condition) facilitate emission-trading between generators inside and outside of RGGI? If so, are the benefits associated with incorporating this element (or condition) worth the potential drawbacks to including it from the perspective of the RGGI states? Key issues in this context include the following:

- **Auction Revenues to RGGI States** – Studies have conclusively demonstrated the substantial economic and other benefits to the RGGI states of (1) disbursing nearly all allowances into the market through a central auction mechanism, (2) returning auction revenues to the RGGI states, and (3) using those revenues in various ways to further GHG reduction goals, address electricity cost concerns, and meet other economic and energy policy objectives (such renewable energy and energy efficiency investments). Expanding the allowance trading platform to include other states will almost certainly affect the initial level of auction proceeds to the RGGI states. This could result from changes in the value of allowances, because allowances may be purchased at lower costs from sources outside of the RGGI region (and thus lower the demand for and clearing prices of allowances in RGGI's auction). Without reliable forecasts of these and other potential impacts on RGGI allowance auction proceeds over time, the RGGI states will need to explicitly recognize this potential impact and weigh the potential risk of dampened allowance proceeds against the longer-run benefits of a broader allowance trading footprint with lower overall compliance costs.
- **Allowance Distribution** – We encourage the RGGI states to be agnostic with regard to how other states that could be potential trading partners decide how to distribute their CO₂ allowances into the market. Other states may decide to give their allowances away for free, rather than auction them, as RGGI now does for most of the states' allowances. Today, RGGI's current agreements allow each participating state to decide who gets the value of the allowances, and allowances now trade in the secondary market at prices allowance buyers and sellers are willing to pay at any point in time. The ultimate price of all allowances is driven by the marginal cost to meet the aggregate mass-based limit

on affected sources across the trading region, which is not affected by the party that captures the value of allowances through initial distribution. We do not think that the efficiency gains of supporting trading among EGUs in a broader region will be undermined by differences in allowance-allocation mechanisms or industry structure.

- **Market Monitoring** – Effective market monitoring has given RGGI states comfort about underlying market-power considerations in the central market for allowances. With the potential expansion of allowance trading across many states with different combinations of auctions, allocations, and trading rules, RGGI may want to ensure that any allowances used for compliance in RGGI states be subject to the same or similar monitoring requirements (especially in the secondary market).

The RGGI states are considering a number of “second tier” aspects of allowance trading programs that, while important, are not directly relevant to a program design enabling broad allowance-trading with other states

There are a number of “second tier” policy issues for the RGGI states to consider that will have an impact on RGGI allowance prices and revenues but that in our view do not represent key decision points affecting the ability for sources inside and outside of RGGI to engage in trading. For example, the RGGI states may individually or collectively adopt a more stringent cap for the RGGI states that anticipated under the CPP’s targets. RGGI may conform state budgets to CPP levels, maintain the cap trajectory as it now stands, or increase the stringency of power-sector CO₂ reduction requirements in RGGI states going forward. Different cap levels in the RGGI states could have an impact on the price and value of allowances, depending on how the associated allowances are disbursed, set aside, or retired by the RGGI states. Resolution of this issue need not complicate a program that affords broad trading between EGUs inside and outside of the RGGI region.

ENDNOTES

¹¹ Sue Tierney is a senior advisor at Analysis Group, and formerly assistant secretary for policy at the U.S. Department of Energy, Massachusetts' Secretary of Environmental Affairs and a commissioner at the Massachusetts Department of Public Utilities. Paul Hibbard is a Principal at Analysis Group, and formerly Chairman of the Massachusetts Department of Public Utilities. Ellery Berk is a Senior Analyst at Analysis Group.

² In this paper we assume that the CPP will eventually be allowed to proceed after review in the federal courts, in largely the same form as EPA's final design.

³ We do not assume that all states will seek to implement mass-based allowance trading programs. Nor do we assume that if they do, those states will necessarily adopt measures to enable trading with RGGI states. However, in this paper we focus on issues that will be faced by states that wish to do so.

⁴ See our prior studies assessing the economic impacts of RGGI during its first six years of operation:

- Hibbard, Paul, Andrea Okie, Susan Tierney, and Pavel Darling, "The Economic Impacts of the Regional Greenhouse Gas Initiative on Nine Northeast and Mid-Atlantic States: Review of RGGI's Second Three-Year Compliance Period (2012-2014)," July 2015.
- Hibbard, Paul J., Susan F. Tierney, Andrea M. Okie, Pavel G. Darling, "The Economic Impacts of the Regional Greenhouse Gas Initiative on Ten Northeast and Mid-Atlantic States: Review of the Use of RGGI Auction Proceeds from the First Three-Year Compliance Period," November 15, 2011.

⁵ Under the Clean Power Plan, E.P.A. has defined affected power plants as "Electric Generating Units." "For the emission guidelines, an affected EGU is any fossil fuel-fired electric utility steam generating unit (*i.e.*, utility boiler or integrated gasification combined cycle (IGCC) unit) or stationary combustion turbine that was in operation or had commenced construction as of January 8, 2014, [\[footnote 297 in the original\]](#) and that meets the following criteria, which differ depending on the type of unit. To be an affected EGU, such a unit, if it is a fossil fuel-fired electric utility steam generating unit (*i.e.*, a utility boiler or IGCC unit), must serve a generator capable of selling greater than 25 MW to a utility power distribution system and have a base load rating greater than 260 GJ/h (250 MMBtu/h) heat input of fossil fuel (either alone or in combination with any other fuel). If such a unit is a stationary combustion turbine, the unit must meet the definition of a combined cycle or combined heat and power combustion turbine, serve a generator capable of selling greater than 25 MW to a utility power distribution system, and have a base load rating of greater than 260 GJ/h (250 MMBtu/h)." <https://www.federalregister.gov/articles/2015/10/23/2015-22842/carbon-pollution-emission-guidelines-for-existing-stationary-sources-electric-utility-generating>.

⁶ The E.P.A. has defined a "rate based" emissions standards approach as a plan that "would include federally enforceable emissions standards for affected EGUs, in the form of lb CO₂/MWh emissions standards. A rate-based 'emission standards' plan may be designed to either meet the CO₂ emission performance rates for affected EGUs or achieve the state's rate-based CO₂ emission goal for affected EGUs. A plan could be designed such that compliance by affected EGUs would assure achievement of either the CO₂ emission performance rates for affected EGUs or the state rate-based CO₂ emission goal.

To meet the CO₂ emission performance rates for affected EGUs, a plan would establish separate rate-based emission standards for affected fossil fuel-fired electric utility steam generating units and stationary combustion turbines (in lb CO₂/MWh) that are equal to or lower than the CO₂ emission performance rates in the emission guidelines. To meet a state rate-based CO₂ goal, a plan would establish a uniform rate-based emission standard (in lb CO₂/MWh) that applies to all affected EGUs in the state. This uniform emission rate would be equal to or lower than the applicable state rate-based CO₂ goal specified in the final emission guidelines.”

<https://www.federalregister.gov/articles/2015/10/23/2015-22842/carbon-pollution-emission-guidelines-for-existing-stationary-sources-electric-utility-generating>

⁷ The E.P.A. has also defined a “mass based” emissions standards approach that “would include federally enforceable emission standards for mass CO₂ emissions from affected EGUs. The plan would be designed to achieve the mass-based CO₂ goal for a state's affected EGUs (see section VII) or a level of CO₂ emissions equal to or less than the mass-based CO₂ goal plus the new source complement CO₂ emissions (see section VIII.J.2.b, Table 14). Under a mass-based approach, a state could require that individual affected EGUs meet a specified mass emission standard. Alternatively, a state could choose to implement a market-based emission budget trading program. The EPA envisions that the latter option is most likely to be exercised by states seeking to implement a mass-based emission standard approach, as it would maximize compliance flexibility for affected EGUs and enable the state to meet its mass goal in the most economically efficient manner possible.” <https://www.federalregister.gov/articles/2015/10/23/2015-22842/carbon-pollution-emission-guidelines-for-existing-stationary-sources-electric-utility-generating>

⁸ Under the CPP, E.P.A. has defined a “state measures” approach. “This plan type would allow the state to implement a suite of state measures that are adopted, implemented, and enforceable only under state law, and rely upon such measures in achieving the required level of CO₂ emission performance from affected EGUs. The state measures under this plan type could be measures involving entities other than affected EGUs, or a combination of such measures with emission standards for affected EGUs, so long as the state demonstrates that such measures will result in achievement of a state's mass-based CO₂ goal (or mass-based CO₂ goal plus new source complement), as discussed below. The EPA notes that under this plan type, a state could also choose to include any emission standards for affected EGUs, which are required to be included in the plan as federally enforceable measures, to be implemented alongside or in conjunction with state measures the state would implement and enforce.

For a state measures plan to be approvable, it must include a demonstration of how the measures, whether state measures alone or state measures in conjunction with any federally enforceable emission standards for affected EGUs, will achieve the state mass-based CO₂ emission goal for affected EGUs (or mass-based CO₂ goal plus new source complement). However, because the state measures would not be federally enforceable emission standards, the plan must also include a backstop of federally enforceable emission standards for all affected EGUs, in order for the state measures plan type to satisfy the requirement of CAA section 111(d) that a state establish standards of performance for affected EGUs. This backstop would impose federally enforceable emission standards on the state's affected EGUs in the case that the state measures fail to achieve the state mass-based CO₂ goal.”

<https://www.federalregister.gov/articles/2015/10/23/2015-22842/carbon-pollution-emission-guidelines-for-existing-stationary-sources-electric-utility-generating>

⁹ <https://www.epa.gov/cleanpowerplan/clean-power-plan-existing-power-plants#federal-plan>.

¹⁰ <https://www.federalregister.gov/articles/2015/10/23/2015-22842/carbon-pollution-emission-guidelines-for-existing-stationary-sources-electric-utility-generating>.

¹¹ <https://www.federalregister.gov/articles/2015/10/23/2015-22842/carbon-pollution-emission-guidelines-for-existing-stationary-sources-electric-utility-generating>.

¹² Our assumptions regarding the CPP litigation and the fate of RGGI are not conclusions about these outcomes. Rather, we make these assumptions in order to clearly state the potential future context for CO₂ emission controls inside and outside the RGGI states evaluated in this report.

¹³ Laws and regulations controlling pollution, emissions or discharges often include provisions that treat classes of generating units that differ by age, economics, location, and readiness of commercially available control technologies differently. For example, pollution-control programs sometimes grandfather-in existing generating units while imposing control requirements on new units. Additionally, as pollution-control technologies evolve, successive generations of new power plants may face the required application of different “best available control” technologies.

Also, the CAA authorizes EPA to use different pollution-control mechanisms for different types of pollutants. For example, emissions-controls might involve: (1) unit-specific technology requirements or emission-rate limitations (e.g., for the Mercury and Air Toxics Standard (MATS)); (2) consumption or flow limits (or performance standards) (e.g., for NSPS for criteria pollutants in new power plants); (3) emission-rate averaging or “bubbling” (e.g., across units at a single station, or among plants owned by a single owner; e.g., for volatile organic compounds and other emissions in many states’ current State Implementation Plans); (4) state, regional, or national emission caps and allowance-trading programs (e.g., the national Title IV Acid Rain Program with its cap on SO₂ emissions and emissions-trading program; the 9-state RGGI program); and (5) pollutant taxes, fees, offsets, and power-plant operating limits and other restrictions in permits.

¹⁴ The Acid Rain Program “is largely considered a successful cap-and-trade system. By 2007, the program had achieved its 2010 reduction goal at an estimated cost that was considerably lower than that of *command-and-control* regulations, which mandate that each power plant adopt a specific technology to reduce SO₂ emissions or a standard that requires each power plant to emit below a specific fraction of SO₂ emissions per unit energy produced.” Juha Siikamäki, Dallas Burtraw, Joseph Maher, and Clayton Munnings, “The U.S. Environmental Protection Agency’s Acid Rain Program,” November 2012. <http://www.rff.org/RFF/Documents/RFF-Bck-AcidRainProgram.pdf>. A recent retrospective review of various studies of the effectiveness of the SO₂-emissions trading policy compared actual costs of the program relative to predicted costs prior to the program’s implementation and discussed

“how the costs of achieving environmental objectives through cap and trade compare with those of a ‘counterfactual’ (hypothetical alternative) command-and-control regulatory approach. In addition to being less costly than traditional command-and-control policies would have been, the program’s costs were significantly below estimates generated by government and industry analysts in the debate leading up to the passage of the CAA. In 1990, the U.S. Environmental Protection Agency (EPA) estimated the cost of implementing the Acid Rain Program (with allowance trading) at \$6.1 billion. In 1998, the Electric Power Research Institute (EPRI), an industry organization, and Resources for the Future (RFF), an independent think tank, estimated that total implementation costs would be \$1.7 and \$1.1

billion respectively (based in part on actual figures for the first few years of the program...). In sum, the SO₂ allowance-trading system's actual costs, even if they exceeded the cost-effective ideal for a cap-and-trade system, were much lower than would have been incurred with a comparable traditional regulatory approach, and were much lower than the trading system's predicted costs. There is broad agreement that the SO₂ allowance-trading system provided a compelling demonstration of the cost advantages of a market-based approach."

Gabriel Chan, Robert Stavins, Robert Stowe, and Richard Sweeney, "The SO₂ Allowance Trading System and the Clean Air Act Amendments of 1990: Reflections on Twenty Years of Policy Innovation," Harvard Environmental Economics Program, January 2012.

http://www.hks.harvard.edu/fs/rstavins/Monographs_&_Reports/SO2-Brief.pdf.

¹⁵ The Clean Power Plan provides each state with the opportunity to develop a state plan to implement CO₂ emission limits for the existing electric generating units in that state. States are not required, however, to develop a state plan. If a state elects not to do so, then it is the EPA's responsibility to directly regulate the emissions of the power plants in that state, and EPA has proposed to introduce a "federal plan" in states electing not to file a state plan.

¹⁶ New Jersey originally participated in the development of RGGI and in the first three years of RGGI's implementation (2009-2011).

¹⁷ One of the more challenging aspects of the extensive negotiations that took place before the adoption of the RGGI program had to do with the relative size of each state's emission allowance budget. The states had to agree not only on the size of the cap but also on the share of allowances that would go to each state. Because this was a voluntary program, such allocation decisions were difficult and had to be informed by extensive modeling analysis and lengthy discussions among the states and stakeholders. This particular program-design hurdle has been eliminated in the Clean Power Plan, through which EPA established a specific allowance limit for each state.

¹⁸ Basic information about RGGI is sourced from the RGGI, Inc., website. RGGI, Inc. is the nonprofit organization established to administer development and implementation of the RGGI program.

<http://www.rggi.org>.

¹⁹ "Regional Greenhouse Gas Initiative (RGGI): An Emissions Trading Case Study." (2015).

Environmental Defense Fund, CDC Climate Research, IETA, and Caisse Depots Group.

http://www.ieta.org/resources/Resources/Case_Studies_Worlds_Carbon_Markets/rggi_ets_case_study-may2015.pdf

²⁰ Generating units can obtain offsets for projects within the RGGI region that reduce emissions of CO₂, methane, or sulfur hexafluoride through mechanisms such as landfill methane capture, forest projects, and avoided methane emissions from agricultural manure management options, among others. Offsets are limited to 3.3 percent of a covered entity's emissions. Unlimited banking of allowances is permitted across 4-year control periods, but banked allowances must factor into future state emissions budgets. Undistributed or unsold allowances may be retired at the end of compliance periods.

²¹ The CCR trigger price was \$4.00/allowance for calendar year 2014, \$6.00/allowance in 2015, \$8.00/allowance in 2016, \$10.00/allowance in 2017, and thereafter 1.025 times the CCR trigger price in the prior year.

²² The CPP called for initial plans in September 2016, with right to request an extension for the filing of state plans for 1-2 years. The stay suspended implementation of those deadlines pending a decision from the court of appeals.

²³ There is another option available to states: a “state measures” plan, with specific categories of actions that the state intends to use to bring emissions into compliance with the state’s targets. Also, states may adopt the Federal Plan for their state.

²⁴ This discussion does not provide detail on rate-based plan requirements, in light of the fact that the Clean Power Plan does not allow trading between generators in states with rate-based plans and generators in states with mass-based plans. In light of the RGGI program’s design as a mass-based approach, we have focused on issues relating to trading among generators in states with mass-based plans.

²⁵ Leakage to new sources could occur, for example, if existing sources incur costs to meet the compliance requirement, but new sources are not included and thus do not incur similar compliance costs. This could increase the operation of new sources whose emissions are not covered under the cap.

²⁶ <https://www.federalregister.gov/articles/2015/10/23/2015-22842/carbon-pollution-emission-guidelines-for-existing-stationary-sources-electric-utility-generating>.

²⁷ Because EPA does not believe it has the authority to require states with mass-based plans to incorporate new EGUs under the cap, EPA has proposed several options designed to address the potential for emissions from existing EGUs to new units. The approach in the mass-based model rule provides for two set-asides to address potential leakage to new sources: a renewable energy set-aside (based on 5 percent of the state’s emission budget) and an NGCC set-aside (based on the number of allowances that would be needed to increase a state’s existing NGCC EGUs to increase capacity factors by 10 percent).

²⁸ Background information on the Clean Power Plan is sourced from EPA’s web document “Clean Power Plan – Technical Summary for States.” <https://www3.epa.gov/airquality/cpptoolbox/technical-summary-for-states.pdf>.

²⁹ The State Measures option allows for continuation of flexible program elements consistent with existing or state-specific carbon reduction program goals or designs (such as RGGI). States selecting the mass-based or state measures plan option need to (1) include in their state plans the selection of a compliance approach, (2) establish the value of an allowance, and (3) create a trajectory of emissions at least as stringent as that established in the CPP, with interim and final standards through 2030.

³⁰ EPA’s new source complement for each state is based on EPA’s projected load growth within each state over the compliance period. A state may also propose an alternative estimate of a new source complement, subject to EPA’s review and approval.

³¹ <https://www.federalregister.gov/articles/2015/10/23/2015-22842/carbon-pollution-emission-guidelines-for-existing-stationary-sources-electric-utility-generating> (at 64892).

³² See NACAA, *Implementing EPA's Clean Power Plan*, pages 80-83 for a detailed description of elements that must be included in an emission and allowance tracking system.

³³ For the purpose of this paper, we assume that, at least initially, all or most of the RGGI states will continue to auction at least a majority of trading program allowances and use revenues to meet economic, energy and environmental policy objectives. While this is not required under the CPP, analysis of the first six years of the RGGI program demonstrates that the RGGI states have achieved significant economic benefits and state policy goals through the auction of allowances and use of auction proceeds. See Footnote 5.

³⁴ The model rule stated as an objective – not a requirement – that a minimum portion (25%) of state allowance allocations be reserved for auction.

³⁵ For discussion of potential hoarding in allowance markets, see, Toman, “Understanding the Design and Performance of Emissions Trading Systems for Greenhouse Gas Emissions,” RFF, 2003; and EPA, “A Guide to Designing and Operating a Cap and Trade Program for Pollution Control,” 2003.

³⁶ <http://s3.amazonaws.com/media.wbur.org/wordpress/1/files/2016/05/05-17sjcglobalwarming.pdf>.