Market-Based Environmental Programs in New York State:

A PRIMER

Tim Banach

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Contents

1 Introduction

Market-based mechanisms have become more widely adopted in New York State, as well as throughout the U.S. and the world.

The broad goal of environmental regulation is to protect human health and the environment. To that end, regulation often seeks to prevent or control the release of pollutants into the air or water or onto the land. New York State regulators have approached the control of pollution in two ways: through command-and-control requirements and market-based mechanisms. This primer provides an introduction to market-based mechanisms currently employed in New York State environmental regulation.

What Is a Market-Based Environmental Program?

Over the last several decades, market-based mechanisms have become more widely adopted in New York State, as well as throughout the U.S. and the world. Market-based approaches are effective in achieving environmental goals, sometimes sooner than required, while allowing for more flexibility than traditional command-and-control approaches. In many cases, the inherent flexibility of market-based approaches has proved more cost-effective than traditional command-and-control strategies. Experiences with market-based programs to date provide important lessons on best practices.

Under a "command-and-control" model, regulators "command" facilities to "control" their emissions by requiring operators to install specific emissions control technologies or adopt particular management practices. Unlike command-and-control approaches, market-based mechanisms generally do not dictate installation of a specific technology or plant-specific approaches that operators must adopt to meet environmental requirements. Instead, market-based approaches create environmental markets with environmental commodities such as emissions allowances. The environmental commodity is priced in the marketplace, sending a market signal to participants in the environmental market to behave in a certain way. If designed appropriately, market-based approaches allow operators to adopt compliance strategies that are in the operator's own interest. The firms that make up the market collectively achieve the environmental objective.

For example, if the environmental goal is to reduce carbon dioxide (CO_2) emissions, the ability for an operator to emit one ton of CO_2 becomes the commodity – an authorization to emit that can be traded or sold to other market participants. Regulators determine the total amount of allowable emissions for all operators regulated within the market (referred to as the "emissions cap"). A quantity of allowances is created equal to the emissions cap. Regulated operators are required to monitor their emissions and to possess one allowance for each ton of CO_2 emitted. Allowances are surrendered to the regulatory authority at the end of each compliance period, typically from one to three years. In this example, the group of regulated operators is limited to a level of emissions, the emissions cap, which is in line with an environmental goal. Individual operators, however, are able to design and pursue the strategy that best satisfies their own interests and meets emissions regulations. An operator might reduce emissions through greater efficiency, thus reducing the allowances it would need to achieve compliance. Alternatively, it may purchase additional allowances from other market participants holding surplus allowances. The operator's ability to buy and sell allowances in the allowance market is the flexibility that lets each operator pursue the lowest-cost compliance strategy. This example is one type of market-based approach referred to as a "cap-and-trade" model.

In other contexts, such as renewable energy portfolio standards, units of energy are traded as credits.

Functional Market-Based Approaches

A number of market-based mechanisms have been operating successfully in the United States and throughout the world. Early market-based programs focused on improving regional air quality. In Southern California, the Regional Clean Air Incentives Market (RECLAIM) has used a trading mechanism to cap and reduce nitrogen oxides (NO_X) and sulfur oxides (SO_X) emissions since 1994. Beginning in 1995, the U.S. EPA introduced the Acid Rain Program, a market-based program aimed at reducing levels of sulfur dioxide (SO_2) in the atmosphere. In the Northeast, the regional Ozone Transport Commission facilitated the creation of a regional cap-and-trade program to reduce emissions of nitrogen oxides from power plants. Larger federal programs, including the NOx SIP-Call and Clean Air Interstate Rule (CAIR), and more recently the Cross-State Air Pollution Rule (CSAPR), later succeeded this program. In 2005, Europe institutionalized its first large-scale market-based emission trading system, called the European Union Emissions Trading System (EU ETS). The EU ETS requires large emitters of CO_2 to track emissions and hold allowances for each ton emitted.

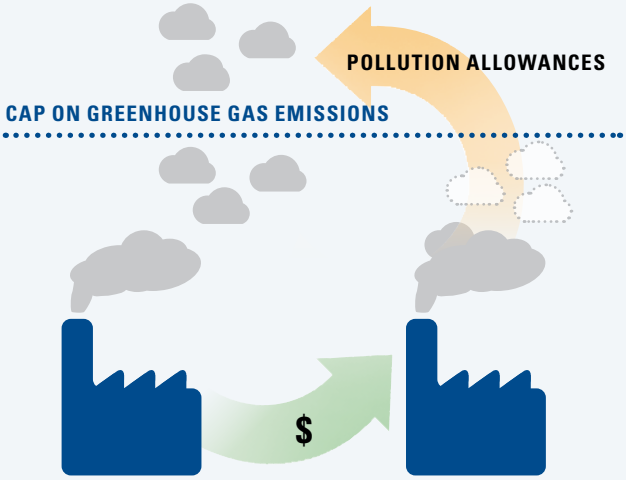
In the absence of federal climate legislation in the U.S., there have been a number of state and regional market-based initiatives aimed at reducing emissions. The Regional Greenhouse Gas Initiative (RGGI), operational since 2009, is the first mandatory market-based emission reduction program. RGGI's cap-and-trade approach operates in 10 Northeast states with the goal of reducing CO_2 emissions from the power sector 10% by 2018. The Midwestern Greenhouse Gas Reduction Accord (MGGRA), signed in 2007, is an agreement between six Midwestern states and one Canadian province to design a regional cap-and-trade greenhouse gas reduction program. Although it represents a fully functional program design, MGGRA is not expected to be implemented in participating jurisdictions. The Western Climate Initiative (WCI) is another cap-and-trade program in development that seeks to reduce greenhouse gas emissions 15% from 2005 levels by 2020. When operational, the WCI program is expected to cover at least one U.S. state and several Canadian provinces.

2 Advantages of Market-Based Programs in Achieving Environmental Goals

Market-based programs achieve environmental goals and offer advantages to both regulators and participating operators over traditional regulatory approaches. A number of advantages are described briefly below.

- **Flexible compliance:** Under a command-and-control model, operators are required to adhere to performance or technology-based standards, with little choice given for how to meet compliance requirements. Market-based mechanisms offer multiple pathways for operators to comply with regulations, ultimately allowing them to design and pursue least-cost control strategies. Compliance options for an emission reduction program may include installing pollution control equipment, switching to cleaner fuels, introducing operational efficiencies, purchasing offsets, or purchasing additional emission allowances. A greater number of compliance alternatives leads to a greater possibility of meeting environmental objectives through new approaches and lower-cost pathways as compared to command-and-control approaches.
- **Achieve environmental goals at lowest possible cost to regulated entities:** Performance or technology-based standards may achieve environmental goals, but do so in a way that does not consider costs at individual facilities. In reality, operators face different costs for reducing emissions or achieving other environmental goals depending on specific circumstances at each facility. Compliance costs vary due to differences in facility efficiency, production design, and other factors. Given the opportunity, each operator will ideally aim to adopt its own least cost option for achieving compliance. Firms that can achieve emission reductions at the least cost have an incentive to do so, because firms that can reduce emissions at levels greater than required can then sell excess allowances. Firms that face great costs for reducing emissions may benefit by purchasing additional allowances and avoiding costly technology installations. In this way, the desired level of emission reduction is achieved by those firms that can do it least expensively and, therefore, at the lowest possible cost to society.
- **Achieve environmental goals at lowest administrative cost:** Administrative costs associated with market-based environmental programs are also typically lower than costs associated with command-and-control approaches. Because market-based programs do not mandate performance or technology-based solutions, there are no costs associated with maintaining expertise in the best available control technology, prescribing technology or performance solutions for each firm, or validating the installation and correct operation of technology. Instead, the administrative tasks associated with

What is Cap and Trade?



In a cap-and-trade program a maximum level of emissions is set. That "cap" is determined by a state, like New York, or in the case of a federal system, commonly EPA or Congress. The cap establishes how many tons of the specified pollutant may be emitted, and in turn, how many emissions allowances exist in the market. Each plant that is regulated under the program must procure enough allowances to meet their emissions. Plants that reduce their emissions may have excess allowances, which can be sold to plants in need of extra allowances to cover their emissions. This system creates economic incentives for plants that pollute less, while dirtier plants face higher costs of operation.

operating a cap-and-trade program consist of enforcing a monitoring and reporting requirement on sources, as well as comparing a source's reported emissions with the allowance account balance for the source. From the perspective of the regulator, implementing and managing market-based approaches require fewer overall resources.

- **Does not pick winners:** Market-based mechanisms avoid prescriptive solutions, relying mainly on a price signal to encourage compliance most cost-effectively. As a result, all firms compete to meet environmental objectives. Firms that can do so most efficiently succeed. In addition, because all firms are playing by the same rules, a simply designed, transparent program leaves little room to manipulate market rules in favor of specific firms or technologies.
- **Drives innovation through price signals:** Market-based mechanisms set desired environmental objectives, but leave open the path to achieving those objectives. Firms will naturally seek out least cost solutions to achieving environmental objectives. Stringent emission regulations and demand for low-cost solutions drive innovation, introduce new technology, and further improve options for low-emission energy solutions. Over time, innovation leads to lower costs of compliance for operators and also for society.
- **Commodity-based compliance easily integrated into business:** Firms are used to operating in markets and build strategies around succeeding in competitive markets. The tools and knowledge that firms would need to succeed in market-based environmental programs are the very same strategies that successful firms use to conduct day-to-day business. Creating a commodity-based program, therefore, is arguably the most desirable approach to incorporate environmental regulation into business practices.
- **Potential for integration into other regional programs:** Separate regional markets that operate with the same commodity, such as CO_2 emissions, may potentially be integrated into singular markets. The existence of operational cap-and-trade programs in the West and Northeast may facilitate the emergence of a national, and eventually an international, comprehensive, market-based environmental program.

3 Key Design Features to Consider When Creating an Effective Market-Based Program

Market-based environmental programs can be designed to achieve various environmental goals. There are, however, key design questions that must be addressed in order to achieve an efficient and effective program.

Define environmental goal in terms that enable a market-based approach: To start, policymakers and regulators must define the environmental objective in terms that allow for the creation of a viable market. A viable market requires a sufficient and diverse number of participants, a well-defined commodity, and a healthy balance of supply of and demand for the commodity. A long-term environmental goal should be set with periodic benchmarks or short-term milestones that can be used to assess program achievements. In addition, regulators must construct market rules that allow for relatively easy or fluid trading of the commodity. Ideally, market entry and participation should not burden regulated firms. A firm wishing to purchase or trade allowances, register a quantity of renewable electricity, or register an offset will be more likely to do so if the costs associated with making those transactions are relatively low.

Define the scope of the market and the point of regulation: It is important to consider the geographic scope as well as the types of firms and sectors to be regulated. Broader geographic coverage generally increases real environmental gains because more participants increase the likelihood that lower cost, innovative reduction strategies will lower the overall cost of the program. In addition, including many firms in the market will provide greater gains from innovation and trade. Both innovation and trade increase with more market participants because larger markets have access to more resources and information, and provide more opportunities for trade between participants. Including many different sectors into the market will also allow for greater market efficiency, but will also add administrative burdens.

The point of regulation can be defined as "upstream" or "downstream" relative to the lifecycle of the commodity. Downstream points occur nearer to the point of emissions, while upstream points occur

earlier in the chain of responsibility. For example, CO_2 emissions from fossil fuels could be regulated at the power plant or other point of emissions, or at the extractor or supplier of the fuel combusted at the power plant. The scope of the market will determine the most appropriate point of regulation. For regional markets, it might be best to regulate at the point of emissions because the regulator may not have jurisdiction to regulate at the point of material extraction. Programs at the state level might regulate at the point of entry into the state, thus ensuring that all imported fuels are accounted for.

Setting the point of regulation in conjunction with the scope of the market is important to prevent against "leakage," which can reduce a program's effectiveness at achieving objectives. Leakage occurs when sources in one geographic area are covered by an emissions cap, causing the emitting activities to shift to another geographic area not subject to the regulation. The emissions are then said to "leak" out of the program. This can also occur within a regulated region when emissions shift from regulated entities to unregulated entities.

The power sector provides an example of leakage. While power producers covered by the cap incur costs for controlling emissions, power producers that are not regulated would not. Unregulated producers may be able to produce more electricity and at lower costs to make up for less electricity production within the regulated area. To eliminate leakage, market-based programs would ideally include all firms in the sector that carry out the emitting activities.

ENSURE ACCURATE MONITORING AND VERIFICATION:

Without accurate monitoring and verification of emissions or creditable electricity generation, a market-based program will not realize its actual environmental objectives. In an emissions cap-and-trade context, accurate initial measurement is required to determine baseline emissions. Accurate emission monitoring during the program is essential to ensure the program is on path to meeting objectives and is enforceable. Confidence in the program monitoring and verification protocols allows firms to be confident in the value of the environmental commodities they are holding. In addition, regulators and the public can be assured that theoretical program achievements represent actual environmental gains.

DEFINE THE COMMODITY AND MARKET FEATURES:

- **Defining the commodity to be traded:** A functioning market-based environmental program requires the definition of environmental commodities. An emissions reduction program might define the commodity as the authorization to emit a quantity of pollutant. A program designed to add renewable energy production might define the commodity as the renewable attributes of a quantity of electricity sent to the grid.
- **Ensuring compliance:** To achieve program goals, compliance for each firm must be ensured. In air pollution cap-and-trade programs, firms are required to monitor and track emissions and hold allowances equal to their total emissions at the end of each compliance period. In renewable energy programs, regulated utilities are required to hold renewable energy credits to cover some percentage of their total electricity production during a compliance period. In most programs, firms are under an

enforceable legal obligation to report their regulated activities to a central regulatory body. Failure to accurately report and surrender allowances leads to enforcement and penalties.

- **Ensuring a robust market:** Trading occurs because firms face different costs for implementing solutions for reducing emissions, increasing efficiency, or achieving some other environmental goal. If all firms faced the same costs for reducing emissions, for example, all firms would implement the same solution and there would be no benefits from trading. Firms that are able to reduce emissions at a low cost relative to other firms will do so. These firms will be required to purchase fewer emission allowances, or sell excess allowances in the market. Firms that face higher emission reduction costs may find it more cost effective to purchase additional allowances from firms willing to sell their excess allowances. Purchasing additional allowances allows these firms to comply with requirements while avoiding more costly installation of emission reduction technology.

  Markets with large numbers of participating firms and great diversity of compliance costs allow for more robust trading at the most accurate price for the commodity. Each firm in the market knows the price at which it is willing to sell a commodity, purchase a commodity, or pursue other compliance strategies. A market with a large number of firms with diverse compliance costs is more likely to match willing buyers and sellers.

- **Limitations on the tradable commodity:** It may be necessary to impose limitations on the commodity, depending on program goals and design.

  Banking a commodity introduces flexibility for regulated firms to achieve compliance. Banking is

Offsets

An offset is one ton of emissions reduced or avoided at a facility not covered by the cap-and-trade program. An offset ton is a real, additional, verifiable and permanent emissions reduction. Because of this, market participants can effectively claim that the offset is equal to one ton of emissions reduced or captured within a system. Offsets offer additional opportunities for firms to achieve compliance without reducing their own emissions. It is essential that offsets meet all of the above criteria because the introduction of offsets could allow facilities within the cap to emit in excess of the emissions cap. Because of this, the use of offsets is often subject to a limit.

advantageous for firms because it allows them to navigate changes in compliance costs over time. In addition, banking allows firms to purchase or save the commodity when the price is low, and trade or sell when prices are high.

It may also be desirable to set limits on when a commodity may be used. For example, in a cap-and-trade program that covers air pollution, there is a risk that allowances that are banked could be used all at once. Depending on the pollutant, that could lead to unacceptable levels of air pollution in a localized area and short period of time. In some programs, banked allowances are subject to "flow control" provisions that discount banked allowances or limit the number of banked allowances that may be used by an individual source at a given time.

4 Market-based Programs Operating in New York State

A number of market-based programs are operational in New York State. Some operate regionally, while the Renewable Portfolio Standard program is a New York State-specific program that may draw Renewable Energy Credits from the region.

Emission Reduction Credits under the Clean Air Act

The Federal Clean Air Act, initially passed in 1970, charged the Environmental Protection Agency (EPA) with protecting and improving the nation's air quality. EPA has set national ambient air quality standards (NAAQS) for each of the six criteria air pollutants covered by the Clean Air Act – sulfur dioxide (SO_2), particulate matter (PM), nitrogen oxides (NO_X), carbon monoxide (CO), ozone (O_3), and lead (Pb). Areas in the country sharing similar ambient pollutant concentrations are defined by air quality control regions. These regions are responsible for maintaining concentrations of each of the six criteria pollutants at or below federally determined standards. Control regions failing to meet NAAQS are identified as being nonattainment areas. In New York State, several areas are in nonattainment for ozone and particulate matter.

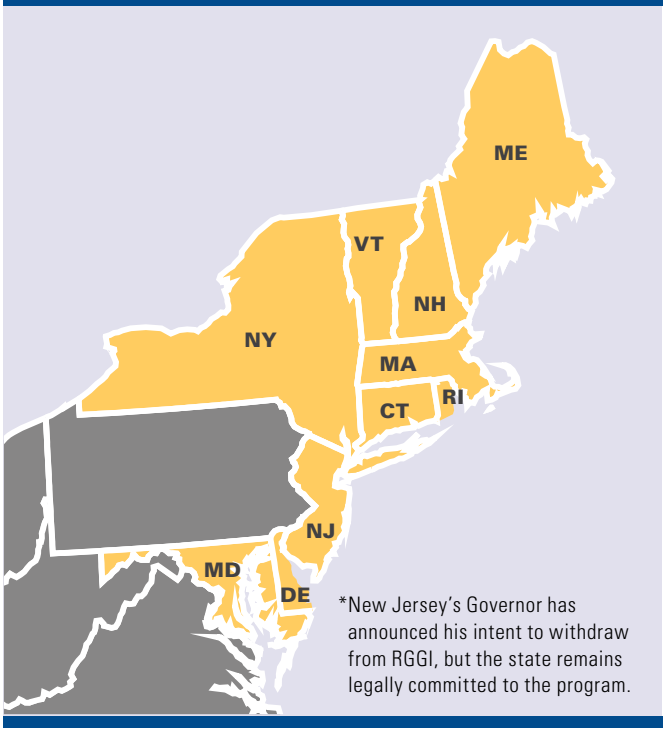
The New York State Department of Environmental Conservation (NYSDEC) established the Emission Reduction Credit (ERC) program as a way to reduce emissions in nonattainment areas. An ERC is created when an emission source within a nonattainment area permanently reduces one ton of a criteria air pollutant. Reductions may come from facility shutdowns, process modifications, or higher efficiency systems. The ERC is then registered with the NYSDEC. Any facility in a nonattainment zone that will generate new emissions at a new plant or by modification of an existing plant, must procure ERCs at a ratio greater than the quantity of new emissions to offset those emissions. As new sources are constructed and old sources are modified, the total quantity of emissions in the nonattainment area decreases because new emissions are more than offset through the retirement of ERCs.

HOW HAS IT WORKED?

- The value of Emission Reduction Credits (ERCs) is influenced in part by new construction in the energy and industrial sectors and the costs of certification and registration.
- Over the last decade, new investments in electricity generating, industrial, and manufacturing sectors have declined in New York State. As a result, the demand for ERCs has become depressed.
- Certifying and registering an ERC in New York State can take significant time and resources, especially for small-scale emission sources. This has resulted in high administrative costs associated with ERC creation.
- As an environmental matter, the ERCs program would seem to be a success, insofar as it has succeeded in preventing new major emissions sources without more than offsetting emissions from reductions are other major sources of emissions.

Market-based programs have accomplished environmental goals at a lower cost level.

States Participating in RGGI



Cap and Trade: The Regional Greenhouse Gas Initiative

The Regional Greenhouse Gas Initiative (RGGI), initially conceived in 2003, is a mandatory CO_2 emissions reduction program involving 10 states in the Northeast including New York State. These states voluntarily designed and implemented the first market-based regulatory program in the U.S. with the goal of reducing power sector emissions 10% below baseline levels by 2018.

RGGI's cap on emissions is held constant until 2014 and then reduced 2.5% annually to achieve 10% CO_2 reductions by 2018. Allowances from any RGGI state can be used to satisfy compliance within each individual state. This single, regional compliance market allows more participants and emission reducing options than any one state could offer.

Each of the RGGI states operates its own CO_2 Budget Trading Program, participates in RGGI's quarterly allowance auctions, and decides how to allocate allowances and how to use any revenue that result from the auction of the allowances. The commodity in the RGGI program is the authorization for a power plant to emit one ton of CO_2. Regulated power plants (those generating 25MW or greater) are required to hold allowances for all CO_2 emitted within each 3-year compliance period. RGGI also allows power plants to acquire allowances through activities outside of the power sector that reduce emissions or sequester carbon, referred to as offsets.

The goal of RGGI is to reduce CO_2 emissions in the Northeast states and to serve as a stimulus for a broader federal climate program. The largest difference between RGGI and previous cap-and-trade programs was the inclusion of allowance auctions. Previous cap-and-trade programs distributed allowances to regulated operators, a process known as "free allocation." RGGI auctions nearly all of the emission allowances, an approach that has proved extremely successful. When compared to free allocation, auctioning is an efficient method of distributing allowances auctioning; sets clear incentives for reducing emissions; it eliminates the need for government to allocate allowances among competing interests and it generates revenue to be invested in energy efficiency and renewable energy innovation.

HOW HAS IT WORKED?

- RGGI has been successful in reducing regional CO_2 emissions, generating revenue for participating states, reducing consumer electricity bills, and demonstrating the viability of the auctioning of allowances in a cap-and-trade program.
- According to a recent study conducted by the Analysis Group, RGGI's first three years of operation have produced the following results:
  - Added $1.6 billion of net value to the regional economy
  - Funded energy efficiency measures (funded by revenue from allowance auctions) that will save consumers $1.3 billion over the next decade
  - Created 16,000 jobs in RGGI states
- A significant degree of RGGI's success may be attributed to the auctioning of allowances. Due to the success of the program, RGGI has demonstrated that allowance auctions are not only a viable alternative to free allocation, but can be vastly superior in terms of public welfare.

Renewable Energy Credits

Renewable energy sources may shift demand away from traditional fossil-based fuels, increase domestic energy security, and avoid harmful emissions. Market-based programs that encourage renewable energy facilitate development and deployment of renewable energy technology, both domestically and globally. Over the past decade, states have adopted programs that require the consumption of a certain level of renewable energy, usually defined as a percentage of total energy consumption. These programs, referred to as Renewable Portfolio Standards (RPS), often incorporate market mechanisms that allow regulated firms to buy, sell, or trade Renewable Energy Credits (RECs) to satisfy compliance obligations. The commodity in these market programs represents one or more attributes associated with the production of a quantity of renewable electricity. In many states, RPS programs require utilities to hold a quantity of RECs equal to a percentage of the total electricity produced by the utility. In this way, utilities supply electricity customers with a minimal percentage of renewably generated electricity.

In addition to avoiding of harmful emissions, renewable portfolio standards have been shown to increase demand for renewable energy sources and, by doing so, have helped to offset the production and development costs associated with renewable electricity technology. In this way, RPSs have helped to reduce the cost gap between renewable technologies and traditional fossil fuel-based energy sources.

HOW HAS IT WORKED?

- New York State's RPS standard requires 30% of all electricity to be generated by renewable sources by 2015.
- A majority of New York's RECs are purchased from producers of renewable energy by a central administrator, the New York State Energy Research and Development Authority (NYSERDA). Other states require the utilities to purchase RECs directly in order to satisfy the RPS.
- New York State RECs carry not only the value of renewable electricity produced but also the associated avoided emissions. Emissions avoided through New York State's RPS program cannot be used for compliance in any other emission reduction program.

- To achieve actual renewable energy targets, it is important that the sale of RECs is connected with actual generation of associated renewable electricity.
- RECs are sold separately from the associated electricity, which is sold into the grid along with traditional electricity. This separation opens up potential for RECs to be oversold or attributes to be double-counted.
- Ensuring that emissions reductions and renewable watts are linked with RECs can be achieved through appropriate accounting and verification procedures. New York State's RPS program solves these problems through its central procurement model.
- The RPS program grants certainty to renewable electricity producers by offering long-term REC contracts (10 years), which provides a stable, predictable income to support renewable project development.

Cap-and-Trade Programs to Reduce Sulfur Dioxide and Nitrogen Oxides Emissions

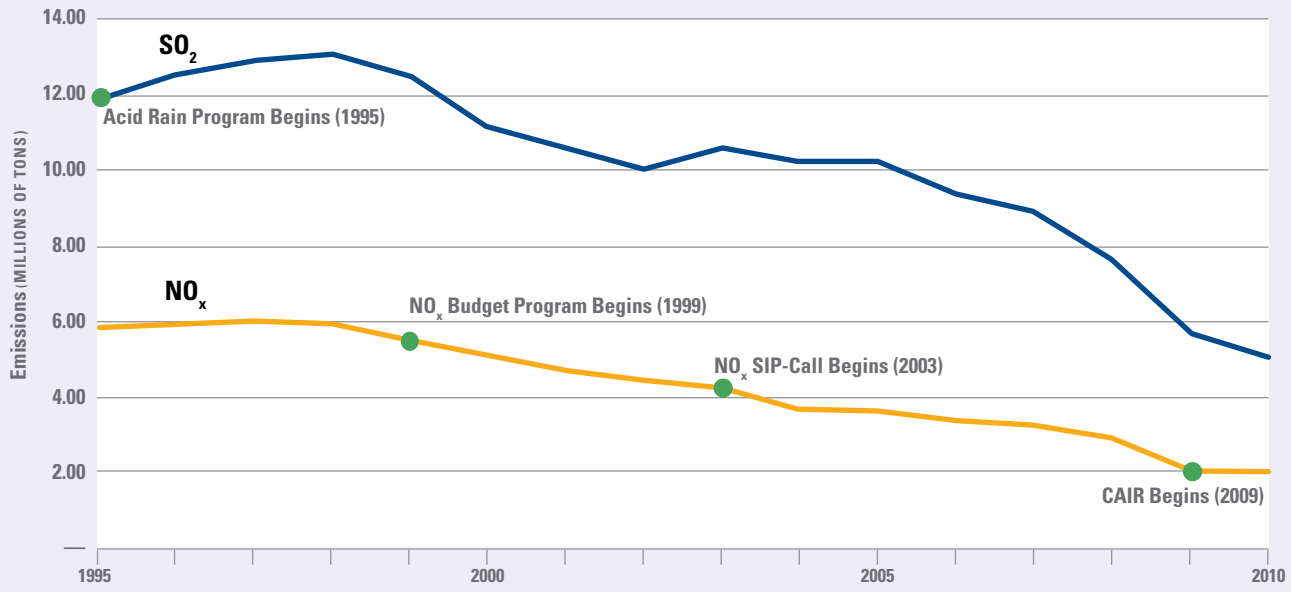
Title IV of the 1990 Amendments to the Clean Air Act established the national Acid Rain Program, a cap-and-trade program to reduce SO_2 emissions from power plants nationwide. The Acid Rain Program covers fossil fuel-fired power plants and is still in operation. The Program is administered entirely by the U.S. EPA and is generally considered a cap-and-trade success story.

The 1990 Amendments also created the Northeast Ozone Transport Commission (OTC) made up of New York and nine other Northeastern and Mid-Atlantic states, plus the District of Columbia. The OTC devised a cap-and-trade program—called the NO_X Budget Program—to reduce ozone-season NO_X emissions. The OTC's program was implemented in New York State from 1999 to 2002. The NO_X Budget Program was part of New York's State Implementation Plan (SIP). A SIP contains a state's approach to coming into attainment of NAAQS. The NO_X Budget Program was succeeded by the U.S. EPA's NO_X SIP-Call program. EPA initiated a SIP-Call because states upwind of the Northeast were contributing to the Northeast ozone problem in contravention of the "good neighbor" provision of the Act. The NO_X SIP-Call cap-and-trade program expanded the geographic reach of the OTC program beyond the OTC states to cover an additional 11 Eastern states. The NO_X SIP-Call program operated from 2003 to 2009, when the Clean Air Interstate Rule (CAIR) superseded it.

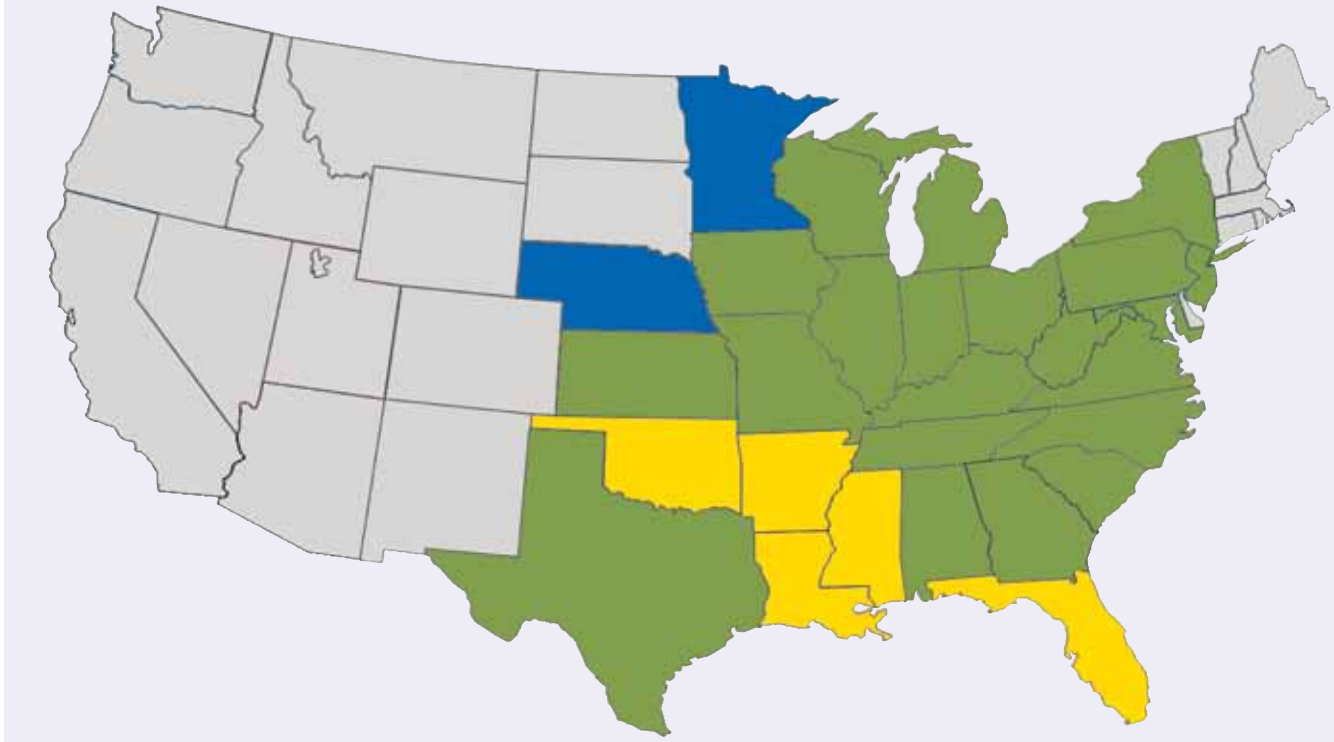
The CAIR program covers either sulfur dioxide or nitrogen oxides, or both, depending on the state. In 2008, a federal court determined that CAIR's interstate trading program violated the "good neighbor" provision of the Clean Air Act, which requires states to reduce emissions that significantly contribute to nonattainment areas in downwind states. In response to that court decision, EPA replaced CAIR in early July 2011 with the Cross-State Air Pollution Rule (CSAPR). CSAPR was scheduled to take effect January 1, 2012, but its implementation has been delayed due to a stay issued by the D.C. District Court of Appeals.

CSAPR will cap and reduce NO_X and SO_2 emissions across areas in the Eastern United States, as shown in the accompanying figure. CSAPR regulates emissions of NO_X and SO_2 using three different standards – Annual NO_X, Ozone Season NO_X, and Annual SO_2. An emissions allowance is created for each ton of these emissions for a specific year for each participating state. New York State-affected sources are required to reduce emissions across each of the three pollutant categories.

Cap-and-Trade Success: Declining SO_2 and NO_X Emissions Since 1995



States covered by the Cross-State Air Pollution Rule (CSAPR)



States controlled for both fine particles (annual SO_2 and NO_x) and ozone (ozone season NO_x) (20 states)

States controlled for fine particles only (annual SO_2 and NO_x) (3 states)

States controlled for ozone only (ozone season NO_x) (5 states)

States not covered by CSAPR

*This map includes six states covered in a supplemental notice of proposed rulemaking that, if approved, would require NO_x reductions under CSAPR's Ozone Season NO_x program.

The total emissions budget for each state is determined by EPA. Regulated emissions sources within that state are required to hold an allowance for each ton emitted annually. Initially, allowances will be freely allocated to facilities in participating states. In the first year of the program's operation EPA will allocate CSAPR allowances for SO_2, AnnualNO_x and Ozone Season NO_x. Following this first year, states will have the option to implement their own allowance allocation system.

CSAPR will set up four limited interstate trading programs beginning in 2012. CSAPR creates one trading program each for Annual NO_x and Ozone Season NO_x, and two trading programs for SO_2. States like New York which are subject to more stringent SO_2 regulations (known as Group 1), trade SO_2 allowances separately from Group 2 states. Group 2 states face less stringent SO_2 regulations to achieve their emission reduction goals.

HOW HAS IT WORKED?

- CSAPR has not taken effect at the time of this writing, and the CAIR program was never fully implemented. Therefore, it is impossible to determine whether CSAPR will achieve NO_x and SO_2 emission reduction goals. However, insights can be gained from the performance of preceding programs.
- According to a 2008 EPA analysis, both the Acid Rain Program and the NO_x Budget Trading Program achieved significant emissions reductions: 75% lower NO_x and 43% lower SO_2 than 1990 levels. The CSAPR trading program has been constructed based upon these successful trading programs.

Comparison of the Trading Programs Operating in New York State

Trading Program	Commodity Type	Market Location	Pollutants Covered	Ownership/Transfer
ERC	Permanent reduction of one ton of specific pollutant	CT, NY, PA	Particulate matter Ozone (VOCs, NO_X, CO)	Credits transferable with NYSDEC approval
RGGI	Allowance to emit one ton of CO_2	CT, DE, MA, MD, ME, NH, NJ, NY, RI, VT	CO_2	Allowances are transferable without government approval
REC	Credit representing one MWh of renewable energy	Not exclusive to NY, but barriers exist across state lines	Avoided emissions: SO_2, NO_X, CO, GHGs, CO_2, CH_4	Credits transferable through NYSERDA
Emissions Allowances in CAIR/ CSAPR	Allowance to emit one ton of NO_X or SO_2	28 states	NO_X (annual and seasonal) SO_2	Allowances transferable without government approval

5 Conclusions

Market-based environmental programs offer an efficient and cost-effective approach to achieving environmental objectives. Compared to traditional command-and-control approaches, market-based programs can be designed with lower administrative costs to regulators and with much more flexibility for regulated operators. A number of successful market-based programs are operational in New York State and the region. As market-based programs continue to evolve, regulators and policymakers should review existing programs and take note of key program design features. Successful cap-and-trade programs, such as RGGI, offer program designs that should be incorporated into future regional, national, or international cap-and-trade programs.

Market-based environmental programs offer an efficient and cost-effective approach to achieving environmental objectives.

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About the Author

Tim Banach is an Energy Policy Research Associate at the Pace Energy and Climate Center. In addition to his focus on market-based mechanisms, Tim is an expert in demand-side measures to improve efficiency and reliability of energy supply, including energy efficiency, distributed generation and combined heat and power. Tim holds a masters in environmental policy from Bard College, as well as a bachelor of science degree, cum laude, in biology from Loyola University. Tim can be reached at tbanach2@law.pace.edu.

Pace Energy and Climate Center
Pace Law School
78 North Broadway, E-House
White Plains, New York 10603

www.law.pace.edu/energy

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