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CLEAN AIR MARKET PROGRAMS

THREE FORMS OF EMISSIONS TRADING

—Cindy Walke, U.S. EPA

Cap and trade, rate-based trading, and project-based trading are three forms of emissions trading. Each trading program can create incentives to reduce emissions at lower economic costs than traditional command-and-control approaches. Each program, however, delivers a different degree of certainty for attaining an emission target and requires a different level of administrative involvement to oversee the program.

This article reviews these three forms of trading and describes some of their similarities and differences.

Under a cap and trade program, legislators or regulators set emission reduction goals and then establish a cap, or ceiling, on total emissions. Within the limitations of the cap, allowable emissions are defined in terms of tradable allowances. Each allowance represents an authorization to emit a specific quantity of a pollutant (e.g., one ton). At the end of the compliance period, emission sources must provide sufficient allowances to cover their emissions during the period or face significant penalties. Cap and trade, as with the other two types of emissions trading, provides each emission source the flexibility to develop a compliance strategy that accounts for the source's situation. An emission source may elect to control emissions more than required and sell surplus allowances to other facilities that were unable to control to required levels. Alternatively, it may elect to take advantage of other sources' lower control costs by purchasing surplus allowances from another source. The emission cap provides the solid foundation on which the trading program is built, ensuring that, if properly enforced, the emission reduction goals are met and maintained over time, even as the economy grows.

Developing a cap and trade program requires substantial up-front effort, but the environmental certainty of the emission cap may warrant the efforts. Before developing a cap and trade program, authorities should undertake a comprehensive analysis to establish the appropriateness of using a cap and trade approach and the level of the emission cap for the regulated

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sources, develop monitoring and enforcement protocols, and determine appropriate penalties for non-compliance. A cap and trade program requires an initial government decision on the distribution of allowances, certification of emission monitoring systems, and establishment of emissions and allowance tracking systems, but once the program is established, each regulated source measures and reports its total emissions and conducts allowance trades. The government simply ensures that the data collected are accurate and that sources hold a sufficient number of allowances to cover emissions.

The majority of administrative expenses for a cap and trade program are incurred during the initial development and implementation of the program. Once a cap and trade program is established, however, the mandatory cap, rigorous monitoring protocols, simple and transparent rules, and automatic enforcement create the solid infrastructure of a stand-alone emission reduction program.

In the second type of trading program—rate-based trading—the regulating authority sets an emission rate performance standard (e.g., tons of emissions per megawatt hour) that can be constant or gradually decline to provide greater incentives for improving efficiency over time. An emission source with an average emission rate below the performance standard earns credits that it can sell to other emission sources. Those sources with emission rates above the standard must either obtain credits to cover the excess or improve efficiency to remain in compliance.

Compared to the cap and trade program, the rate-based program offers less environmental certainty because emissions can rise with production—the more a source produces, the greater the source's authorized level of emissions. This type of program offers incentives for sources to improve emission rates but not necessarily to reduce aggregate emissions. If capping emissions from a specific sector is not feasible, however, then a rate-based approach can be an effective way to limit emissions growth.

As with cap and trade, rate-based trading programs typically require significant effort during the development and implementation of the program. Authorities should undertake a comprehensive analysis to establish the appropriate emission rate for the regulated sources, develop monitoring and enforcement protocols, and determine appropriate penalties for non-compliance. The administrative oversight of rate-based trading is usually more complex because of the government's need to review and approve credit creation and use. This form of trading may be more costly to administer, but compliance costs for emission sources may be lower than cap and trade because there is no limit on total emissions.

The third type of trading program is generally not used as a stand-alone program. Project-based, or offset trading, is often used in conjunction with a traditional command-and-control or cap and trade program. In most cases, the use of project-based trading is emissions neutral because the reductions from the project are substituted for, but are not in addition to, other required reductions. The project-based program allows sources flexibility to seek lower cost emission

reductions from sources outside the underlying regulatory program (e.g., command-and-control program.) In order for project-based trading to work, other methods of regulation must provide the

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incentive for a source to reduce its emissions and must allow project-based emission reductions to be used to offset these requirements. In project-based trading, emission reductions are measured against hypothetical baselines of what the emissions could have been in the absence of the project. To ensure that the reductions are real, these hypothetical baselines must be conservative to minimize net inflation of aggregate emissions.

A project-based trading program is resource intensive because of the extensive analysis, oversight, and administration required for each project. A regulating authority must establish protocols for baselines, monitoring, and verification to ensure that emission offsets are consistent, quantifiable, surplus, and long-term. A regulating authority or party authorized by a regulating authority must also validate the emission reductions for each project on a case-by-case basis. Project participants must submit supporting documentation with claims of emission reductions. Each project requires extensive involvement of the regulating authority throughout the lifetime of the project, and, in order to ensure environmental integrity, the emission levels must be monitored throughout the project.

Because of the large amount of time and resources that each project requires, project-based trading is often characterized by significant transaction costs and, therefore, limited economic efficiency. A project-based trading program might complement a cap and trade program, though, for emission sources not included in the cap and trade program.

Each of the three programs has benefits and trade-offs. Cap and trade programs provide a greater level of emissions certainty, but, for some sectors and pollutants, limiting total emissions may not be economically or politically feasible. Rate-based programs provide more flexibility for emission sources to adjust their compliance strategies as economic conditions change, but aggregate emissions are not limited and the programs may be more resources intensive to administer. Project-based programs can create additional abatement opportunities by seeking reductions from other sources or sectors, but the transaction costs are high and project-based trading is not effective as a stand-alone emission reduction program. Project-based and rate-based programs, however, can be effective learning tools for governments interested in establishing trading programs. They provide platforms for learning some of the steps necessary to establish a cap and trade program before committing to a cap and trade approach.

The Ozone Transport Commission NO_x Budget Program: A Model for the Creation of Multi-Jurisdictional Emissions Trading Programs

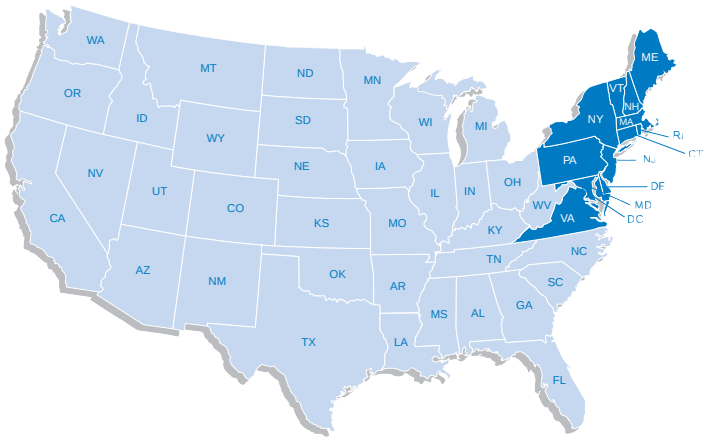
—Amy Kinner, U.S. EPA

Several governments are exploring the use of domestic emissions trading programs to control air emissions. Many of these programs (e.g., China and Slovakia) may decentralize some responsibilities for the design and operation of the programs, but require that each jurisdiction create a program that is compatible and integrated with the overall emissions trading program.

Developing multi-jurisdictional trading programs requires the collaboration of sovereign jurisdictions with diverse interests. While the development of the U.S. Acid Rain Program provides some insight into the creation of effective trading programs, it is a centralized program developed by a national legislative body and operated by a national government agency. A better U.S. example for multi-jurisdictional emissions trading is the Ozone Transport Commission (OTC) Nitrogen Oxide (NO_x) Budget Program, a cap and trade program developed by various states in the northeastern United States to reduce summertime NO_x emissions to improve the transboundary ozone problem in the region.

Collaboration among northeastern states began in 1994 when they signed a Memorandum of Understanding (MOU), committing to reducing NO_x emissions in 1999 and to further reductions in 2003. States, in collaboration with the U.S. Environmental Protection Agency (EPA) and representatives from industry and environmental groups, worked together to develop a model rule for the creation of an interstate emissions trading program, identifying key elements of the regulations that states should make consistent. States could choose to meet their emissions reduction commitments by adopting regulations consistent with the model NO_x trading rule, or they could choose to opt out of the trading program and reduce emissions using other methods. In 1999, NO_x trading began among more than 900 affected electric utility and large industrial boiler emission sources in the region.

While it is still early to assess the environmental effect of the OTC program, the program has led to significant reductions of NO_x from large stationary emission sources in the northeastern United States. Many lessons on the effective development of a multi-jurisdictional program can be taken from the OTC example.



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Common Elements

One key to the OTC approach was to specify which elements should be common among all the states and which elements could be left to the discretion of each state. Some of the common elements include:

Emissions Measurement Protocols

Common measurement protocols enhance the comparability and accuracy of emissions data. They also provide confidence to the market by accurately quantifying the performance of any emissions reduction strategy.

Record Keeping Requirements

Because most data is maintained digitally, common record keeping requirements for both emissions and allowances support data integrity that in turn promote market confidence. In addition, the common requirements limit the opportunities for errors or fraud due to insufficient procedures in any single state, lower administrative costs, and enhance efficiency.

Applicability Standards

To prevent leakage—the shifting of production across state borders to sources unaffected by the program—the model rule contained standards for determining which emission sources and sectors would be required to participate in the emission reduction programs (e.g., large electric generating units and industrial boilers and turbines.)

Compliance Structures

All participating sources in the OTC NO_x Budget Program are bound by a common compliance requirement to submit one allowance for each ton of NO_x emitted during the compliance period. This not only promotes equity, it also ensures a common unit of trade. Common penalties for non-compliance encourage fairness and consistent incentives for compliance.

Process

The successful development of the OTC program can be attributed, in part, to the following factors:

Trust

Regulators from the OTC states developed relationships with one another over the course of several years through face-to-face interactions. This created an atmosphere of familiarity and trust that facilitated the policy development process.

Self-Interest

The level of participation among the states varied depending on their interests. States that faced high total abatement costs and would benefit from improved air quality were active participants (e.g., New Jersey and Pennsylvania). States that faced relatively low total abatement costs but would benefit from improved air quality supported the program but some did not choose to participate in trading (e.g., Vermont and Maine).

Jurisdictional Flexibility

Although there were many common elements identified in the model rule, OTC states had the flexibility to establish other rules compatible with the economic, political, and social circumstances in their states. For example, states individually determined how to distribute, or allocate, allowances. The ability to vary allocation methodologies did not affect the environmental performance of the system. Rather, it allowed states to tailor their allocations to their own circumstances.

The lessons learned from developing the OTC NO_x Budget Program are directly relevant to any multi-jurisdictional emissions trading program. Identifying and establishing common design elements creates a compatible foundation for the overall program and establishes the necessary consistency across individual programs to enhance cost savings and promote a robust market. At the same time, allowing flexibility in certain design elements (e.g., allocation methodologies) can make an emissions trading program more appealing for jurisdictions with different economic and political circumstances.

E-Government and the Clean Air Markets Division

—Martin Husk and Laurel DeSantis, U.S. EPA

In addition to acknowledging the importance of working with the public, its partners, and stakeholders, one of the goals of the U.S. Environmental Protection Agency (EPA) is providing quality environmental information through electronic government, or e-gov, as it is more commonly known. E-gov is the ability of the public to conduct business with the government over the Internet.

Three years ago, the Clean Air Markets Division (CAMD) began its journey into the world of e-gov by conducting a comprehensive review of the operational systems it uses to collect and store data for the Acid Rain and OTC NO_x Budget Programs. Out of this exhaustive review came a two-part vision for all future CAMD data systems. The first part of that vision was to replace all paper-based processes with Web-based processes. Instead of submitting paper forms, emission sources affected by either program would be able to conduct business and manage their data through a password-protected Internet site. The second part of the vision for future systems was to store all data collected by CAMD in a single, easy-to-use format.

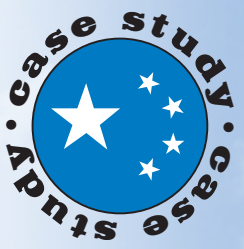
In December 2001, CAMD saw its vision come to fruition with the launch of its first e-gov application—the Online Allowance Transfer System (OATS) (see *Clean Air Markets Update*, Issue 2). OATS lets users transfer allowances for the SO_2 Allowance Trading and OTC NO_x Budget Programs electronically instead of submitting a paper form.

This year, CAMD plans to launch two more e-gov tools. The first tool, the CAMD Business System, will allow users to log onto a secure site and perform all of the functions that were once completed on paper. These functions include changing information about representatives authorized to act for the account, adding/editing facility or emission source data, submitting data about new or retired emission sources, and determining if an emission source is required to participate in the program.

The second tool provides users access to the emission data collected by CAMD. Users can select from a number of pre-defined reports that present annual or ozone season emission data. Alternatively, they can create their own queries with hourly, monthly, quarterly, ozone season, or annual emissions data. Other reports provide operational characteristics (e.g., unit type, fuel type, control equipment) of the units located at a given facility. Finally, users can download pre-packaged files with hourly emissions data.

To learn more about these programs, visit the Clean Air Markets Web site at <www.epa.gov/airmarkets>.

Sino-U.S. Cooperation on Cap and Trade



—Yang Jin Tian, CRAES, and Stephanie Benkovic, U.S. EPA

EPA's Clean Air Markets Division and China's State Environmental Protection Administration (SEPA) and Chinese Research Academy for Environmental Sciences (CRAES) have examined the feasibility of using emissions trading in China to achieve reductions in sulfur dioxide (SO_2) emissions. The outcome of this multi-year effort is a feasibility study jointly developed by Chinese and U.S. experts. The study discusses current SO_2-related policy in China and Chinese experiments with emissions trading, describes the U.S. SO_2 cap and trade program, and considers lessons from the U.S. experience and their implications for China.

Acid Rain in China

In 2000, SO_2 emissions in China—a leading cause of acid rain—reached nearly 20 million tons. Approximately 70 percent of the cities in southern China, representing approximately 30 percent of China's landmass, are exposed to acid rain. Numerous large electricity and industrial boilers, emit SO_2 in China. Based on current estimates, approximately 40 percent of all SO_2 emissions in China are related to power production. Given that a large percentage of the SO_2 emissions are coming from a relatively small group of sources, the application of cap and trade to these sources is promising.

Cap and Trade in China?

The feasibility study indicates emissions trading is a feasible approach to reduce SO_2 emissions in China, and the power-sector may be most readily adaptable to emissions trading. First, a significant part of the environmental problem is regional in scope. Second, there is a wide range of marginal control costs—leading to significant potential cost savings from trading. And third, the current improvements in infrastructure provide optimistic signs for the use of emissions trading in China. Significant barriers still exist, however. For example, can a market-based program succeed in a planned economy? Additional market reforms that further link enterprise-level decision-making to market forces might be needed to support the use of emissions trading in China. China's economy is rapidly evolving and power sector reforms are ongoing.

Building the Capacity

Several infrastructure elements must be addressed before emissions trading could be effectively used on a large scale in China. These same types of infrastructure improvements are needed for any air quality management program to succeed. Recommended institutional enhancements include: establishing clear legal authority; strengthening emissions monitoring, verification, and reporting practices; strengthening objective enforcement practices; establishing emissions tracking and allowance tracking systems; and continuing training at the local and federal levels. The final feasibility study will be available in Chinese and English this year—the Executive Summary was presented in the Summer 2002 issue of Sinosphere and can be accessed at <www.chinaenvironment.net/sino/>. Next steps in this bilateral cooperation are likely to include assessments of emissions measurement and allowance allocation options, data tracking systems, and training.

News From Around the World

The U.S. Environmental Protection Agency (EPA) held a training course for Eastern European government officials on the design and implementation of cap and trade programs. The course was co-sponsored by EPA and the Center for Clean Air Policy. For more information, contact Jeremy Schreifels at <schreifels.jeremy@epa.gov>.

EPA, China's State Environmental Protection Administration, and the Chinese Research Academy for Environmental Sciences have finalized a multi-year collaborative study on the feasibility of using emissions trading for SO_2 control in the Chinese power sector. For more information, see the Summer 2002 issue of *Sinosphere* at <www.chinaenvironment.net/sino>, and the article on page 7 of this issue of the *Clean Air Markets Update*.

EPA released a new brochure entitled "Clearing the Air: The Facts About Capping and Trading Emissions." The brochure explains how and why cap and trade programs work and addresses misperceptions through an easy-to-read question and answer format. To view the brochure online, visit the Clean Air Markets Web site at <www.epa.gov/airmarkets/articles/clearingtheair.pdf>.

The Emissions Marketing Association (EMA) held its 6th Annual Fall Meeting & International Conference in Toronto, Canada from September 29 to October 1. For more information, contact EMA at 414 276-3819, or visit its Web site at <www.emissions.org>.

On behalf of the Bush Administration, **Congressman Joe Barton (R-TX) introduced the Clear Skies Act of 2002** in the House of Representatives on July 26, and Senator Bob Smith (R-NH) introduced the Act in the Senate on July 29. The Clear Skies Act would establish nationwide cap and trade programs to reduce emissions of SO_2, NO_x, and mercury from the power sector. For more information, visit the Clear Skies Web site at <www.epa.gov/clearskies>.

Also in the Senate, Senator Thomas Carper (D-DE) introduced the Clean Air Planning Act of 2002 on October 17. This bill would amend the Clean Air Act to establish a national uniform multiple air pollutant regulatory program for the electric generating sector—covering mercury, CO_2, SO_2, and NO_x.

Finally, Senator James Jeffords' (I-VT) Clean Power Act was reported out of the Environment and Public Works Committee. The Clean Power Act would establish nationwide cap and trade programs to reduce emissions of SO_2, NO_x, and CO_2 from the power sector and place a cap on mercury from the power sector.

The Netherlands Ministry of Housing, Spatial Planning, and the Environment hosted a workshop on the use of emissions trading for conventional pollutants in The Hague, Netherlands, from November 21 to 22. The workshop included participants from EU member states and accession countries, the European Commission, industry, and NGOs. The meeting was part of a broader initiative that aims to explore new approaches to the regulation of industrial installations in Europe.

Upcoming Events

January 27 to 30, 2003

The Electric Utilities Environmental Conference (EUEC) at the Loews Ventana Canyon Resort in Tucson, Arizona. The theme of the conference is "Air Quality and Global Climate Change." For more information, visit EUEC's Web site at <www.euec.com>.