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Air Quality and Emissions Trading: A Primer

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Summary

Emissions trading is a market-based mechanism used to lower the costs of complying with air quality regulations. It allows sources facing high pollution control costs to meet their emission limits by purchasing excess reductions from other sources that can afford to lower their emissions further than federal or state regulations require. Despite the potential for cost savings, the use of trading has been relatively limited, due to its suitability for only certain types of pollutants and the complexities of implementation and enforcement. Trading is best suited for reducing diffuse pollutants that easily spread across broad geographic areas. However, it is not effective in addressing problems with pollutants that remain locally concentrated because excess reductions made in one location would not improve air quality elsewhere. The extent to which trading can improve overall air quality also depends on many other factors related to the geographic extent of the trading area, whether a cap is placed on total emissions, the reliability of mechanisms for determining compliance, the adequacy of penalties to discourage noncompliance, and whether pollution sources are allowed to bank excess emission reductions for future use. While trading is a popular concept due to its potential for cost savings, it also can be controversial if there are difficulties with enforcement or problems with localized emissions. In addition, some critics are opposed to trading based on principle alone. Due to all of these factors, trading is not likely to replace conventional regulation entirely. However, it will likely continue to be considered to control air quality problems with diffuse pollutants that affect large areas and in cases where lower costs are essential to achieve the largest reductions in overall emissions. This report serves only as a primer on the concept of emissions trading and will not be updated to track relevant legislation, issues, or programs.

Introduction

Conventional air quality regulations place fixed limits on emissions from individual sources and/or require the installation of specific technologies to control pollution. However, compliance may be more costly for some pollution sources than it is for others. Emissions trading is a market-based alternative which has the potential to offer each pollution source the most economically feasible option to meet its individual limit on emissions while ensuring that overall air quality goals are still achieved. To accomplish

this objective, trading uses market mechanisms that allow sources facing high pollution control costs to comply with their emission limits by purchasing excess reductions from other sources that can afford to lower their emissions below what federal or state regulations require. The cost of trading is potentially less than would occur under conventional regulation since the largest reductions in pollution are made by sources that can limit their emissions at the least cost. In addition to the potential for cost savings, trading also can provide an economic incentive to develop more effective and less expensive technologies to control pollution, since there would be a market for excess reductions that can be achieved more easily at lower costs. While trading offers certain advantages over conventional regulation, it only has the ability to improve overall air quality in circumstances where a pollutant disperses easily over a broad geographic area and the environmental objective is to control total emissions rather than to limit local concentrations of pollutants.¹

This report briefly discusses the extent to which emissions trading has been used in the United States, explains how trading programs work, analyzes factors that can influence the effectiveness of trading, and examines some of the principal arguments related to the use of trading to control air pollution.

To What Extent Has Trading Been Used in the United States?

Various forms of emissions trading have been used in the United States since the 1970's when the Environmental Protection Agency (EPA) developed more flexible policies on pollution control measures that states could pursue to comply with the National Ambient Air Quality Standards (NAAQS). To encourage the use of trading by states to attain these standards, Congress amended Section 172 of the Clean Air Act in 1990 to allow the incorporation of economic incentives, such as fees, marketable permits, and the auction of emission rights, in state implementation plans to help control air pollution.² While such plans have relied primarily on conventional regulation, some states have used this authority to incorporate trading into their pollution control efforts. For example, trading has been used in California since 1994 to assist the Los Angeles area in reducing emissions that contribute to the formation of ground-level ozone.³ Twelve northeastern and mid-atlantic states also worked together to establish a trading program in 1999 to help control regional problems with ozone transport.⁴ In addition to state efforts, trading has

¹ For further discussion of emissions trading, refer to CRS Report 94-213 ENR, *Market-Based Environmental Management: Issues in Implementation*, coordinated by John Moore.

² 42 U.S.C. 7502(c)(6).

³ California's South Coast Air Quality Management District introduced the Regional Clean Air Incentives Market (RECLAIM) in the Los Angeles Area in January 1994 to provide greater flexibility for stationary sources to achieve reductions in precursors to ground-level ozone pollution, which are needed to help the area attain the NAAQS.

⁴ Ozone transport can occur when emissions of ozone precursors drift across state borders and cause pollution levels to increase in areas where actual emissions are relatively low. The Ozone Transport Commission, representing twelve northeastern and mid-atlantic states and the District of Columbia, established a regional trading program to control ozone transport. The participating states include Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New

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been used at the federal level since 1995 to provide greater flexibility for electric utilities to reduce emissions of sulfur dioxide that contribute to the formation of acid rain.⁵ While trading has been used in several instances such as these, it is complicated to implement and is not suitable for concentrated pollutants or localized air quality problems. Consequently, the use of trading has been relatively limited, and conventional regulation remains the most common way to control air pollution.

How Do Trading Programs Work?

Trading programs are based on the use of either credits or allowances. Under a credit-based program, each pollution source receives a limit on its emissions within a specified time frame. A credit is generated when actual emissions are reduced below the required amount. Pollution sources that have earned credits can sell them to other pollution sources that need additional reductions to meet their emission limits. Allowances differ from credits in that they represent the amount of a pollutant that a source is permitted to release during a specified time in the future. If a pollution source estimates that its actual emissions will be less than its allowances, it can sell its excess allowances to other pollution sources that need them. However, some risk is involved in selling allowances because actual emissions may end up being greater than expected. In such a case, the pollution source that sold some of its allowances would be required to go back and purchase additional ones from another source to demonstrate compliance. Some trading programs also allow pollution sources to save credits or allowances for meeting limits on emissions in future years. This practice is commonly referred to as banking.

For Which Types of Pollutants is Trading Well Suited?

Trading can be a viable option when the environmental objective is to decrease total emissions over broad geographic areas rather than to limit emissions to the same extent from each source of pollution. In such cases, trading has the potential to improve overall air quality if the pollutants that need to be reduced are diffuse and easily disperse throughout the atmosphere. For example, trading is well suited for diffuse gases such as nitrogen oxides (NO_x), sulfur oxides (SO_x), and carbon dioxide (CO₂) because of their tendency to drift far from their points of release.⁶ However, trading is not well suited for pollutants that remain locally concentrated, because excess reductions in one area would not improve air quality elsewhere. Additionally, localized problems with air quality could arise from trading if pollution sources clustered in one area are allowed to increase

⁴ (...continued)

Jersey, New York, Pennsylvania, Rhode Island, and Vermont. Virginia chose not to participate.

⁵ To combat acid rain, Title IV of the Clean Air Act Amendments of 1990 established a trading program to reduce emissions of sulfur dioxide from electric utilities. Phase I began in 1995 and involved over 400 coal-fired electric utility generating units. Phase II began in January 2000, at which time the number of participating units increased to more than 2,000.

⁶ NO_x is a precursor to ozone, and along with SO_x, can contribute to the formation of acid rain. CO₂ is a greenhouse gas that may contribute to global warming. NO_x and SO_x are currently regulated by EPA, but CO₂ is not. For a discussion of the potential use of trading to reduce greenhouse gas emissions, refer to CRS Issue Brief IB97057, *Global Climate Change: Market-Based Strategies to Reduce Greenhouse Gases*, by Larry Parker.

emissions significantly through purchasing excess reductions from other pollution sources located in different areas.

What Factors Can Influence the Effectiveness of Trading?

Aside from the question of whether a particular pollutant is suitable for trading, the extent to which trading can improve overall air quality depends on many other factors related to program design, implementation, and enforcement. Some of the principal factors that determine the amount of real air quality gains that can be achieved through a trading program are the definition of the geographic boundaries of the trading area, whether a cap is placed on total emissions, the reliability of mechanisms for determining compliance, the adequacy of penalties to discourage noncompliance, and whether pollution sources are allowed to bank excess emission reductions. Each of these factors is examined below.

Defining the Trading Area. The geographic area within which trading is allowed to occur depends on how far a pollutant travels from its points of release. For example, if a pollutant disperses over a region of states, sources in different states could trade emission reductions and improve overall air quality. However, if emissions remain largely within a state or a portion of a state, trading would need to be confined within these boundaries because reductions in other locations would not improve air quality in the affected area.

Capping Emissions. Placing a *cap* (i.e., a limit) on total emissions from all participating pollution sources can help to protect overall air quality regardless of the volume of trading, because the aggregate level of pollution would not exceed a predetermined amount. However, using a cap can be a complicated issue for at least two reasons. First, a limit on total emissions must be determined which would accomplish a particular environmental objective. Second, a formula must be developed for distributing the amount of the cap among the pollution sources involved.

Determining Compliance. A system or mechanism to accurately record each trade and precisely monitor emissions is necessary to determine whether the amount of pollution that a source generates exceeds the credits or allowances that it holds. However, if the transaction process to record trades is too complex, the monitoring equipment is unreliable, or the cost of such equipment is too high, determining compliance would be extremely difficult. Under these circumstances, trading might prove infeasible.

Penalizing Pollution Sources for Noncompliance. To provide an economic incentive for pollution sources to comply with their emission limits, penalties for generating excessive pollutants must be significantly higher than the cost of reducing emissions or purchasing excess reductions from another pollution source. If penalties for exceeding emission limits are too low, sources facing high expenses to control pollution might prefer to pay a penalty that is less than the cost of purchasing credits or allowances to meet their emission limits.

Banking Credits or Allowances. Allowing pollution sources to *bank* (i.e., save) allowances or credits for use or sale in the future can provide an incentive to keep emissions below allowable levels in the short-term. A trading program that permits

banking could help to improve overall air quality more quickly than expected if enough pollution sources choose to bank their credits or allowances rather than use them. However, such gains could begin to diminish at a later point in time, if pollution sources use their banked reductions to increase emissions significantly.

What Are Some of the Arguments Related to Trading?

While trading is often a popular concept among pollution sources and federal and state regulators due to its potential to improve overall air quality at lower costs and with greater flexibility, it can be controversial. Since the use of trading began in the United States, there has been some opposition among environmental organizations and concerned citizens based on at least three principal arguments. First, the absolute need for precise monitoring and accurate reporting to ensure that credits or allowances represent actual reductions in emissions has caused some critics to claim that the potential for fraud, or unintentional error, is too great to make trading a dependable option to control air pollution. Second, some opponents argue that trading could lead to violations of environmental justice if localized emissions are allowed to substantially increase through the purchase of excess reductions, because the pollution sources that purchase such reductions are often older facilities located in or adjacent to low-income and minority communities. Third, some of the criticisms of trading are based on principle alone. Certain critics hold the belief that pollution is not a right to be bought or sold on the open market and that pollution should be controlled to the same degree from each source regardless of cost to guarantee that residents in all locations enjoy comparable improvements in air quality. Due to all of these concerns, proposals to use trading frequently face opposition and scrutiny among communities that lie within the geographic boundaries of a potential trading area.

Conclusion

While trading can be an attractive option due to the potential that it offers to control pollution at lower costs and with greater flexibility, it is not necessarily an ideal solution to all air quality problems. The ability of trading to improve overall air quality depends primarily on the nature of the pollutant involved and whether there is a need to limit aggregate emissions over a large geographic area, rather than to control emissions from each source to the same degree. Even if trading is well suited to address a particular air quality problem, trading programs are complicated and difficult to implement effectively due to numerous factors such as the geographic extent of the trading area, whether aggregate emissions from all sources are capped sufficiently to achieve an environmental objective, the ability to obtain accurate monitoring data to verify that transactions between pollution sources represent actual reductions in emissions, the adequacy of penalties to discourage noncompliance and encourage sources to purchase pollution credits or allowances instead, and whether pollution sources that are allowed to bank excess emission reductions will use them in large quantities in the future and reverse initial improvements in air quality. In addition to these factors, controversies and opposition that sometimes arise in response to trading can impede implementation in other ways, especially if litigation is involved. Due to these considerations, trading is not likely to replace conventional regulation as the primary approach to controlling air pollution. However, it will likely continue to be considered as an option to address air quality problems with diffuse pollutants that affect

large geographic areas and in cases where lower costs and greater flexibility are essential to achieve the largest reductions in overall emissions.