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Overview and Issues on
Emissions Allowance
Trading Programs

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Mr. Chairman and Members of the Committee:

We are pleased to be here today to testify on the work we have done on the allowance trading program to control acid rain, which was set forth under the Clean Air Act, and to provide some observations on the feasibility of applying a similar trading approach to control other types of air pollution. Under emissions trading programs, pollution sources that reduce their emissions below the required levels can sell their extra allowances to other sources of pollution to help them meet their requirements. Trading of emissions allowances can be a less costly means to achieve pollution reductions than traditional regulatory approaches.

Our testimony today specifically focuses on (1) cost savings and pollution reductions from EPA's acid rain—or sulfur dioxide (SO₂)—allowance trading program, which are based largely on our December 1994 report¹ as updated to reflect current program data, (2) experiences with trading programs designed to control other air pollutants, and (3) issues that need to be considered in expanding trading programs. In summary, we found the following:

- In 1994, we reported that trading and increased flexibility provided under the act could reduce compliance costs by \$3.1 billion per year as compared to conventional regulatory approaches.² We also estimated that SO₂ emissions could be reduced by approximately 2 million tons below the level specified in the act. Currently, there is more trading of allowances between utilities than we reported in 1994 and prices being paid for allowances have fallen through 1996, suggesting large cost savings. In addition, EPA's 1996 compliance report indicates that emissions of SO₂ were 2.9 million tons, or 35 percent, below the emissions cap.
- To date, there has been limited experience in applying trading programs to other types of air pollutants. In one example of a trading program, the South Coast Air Quality Management District has implemented a trading program in the Los Angeles area to reduce air pollutants that contribute to the area not meeting national air quality standards. District officials believe the program will be more cost-effective than traditional regulatory approaches. EPA plans to issue additional guidance for states to follow in establishing various types of trading programs that the agency believes

¹Air Pollution: Allowance Trading Offers an Opportunity to Reduce Emissions at Less Cost (GAO/RCED-95-30, Dec. 16, 1994).

²This estimate is for the year 2002 and assumes that utilities trade with one another until all cost savings opportunities are realized.

will provide states with more flexibility to decide the most cost-effective way to reduce emissions.

- Several key issues need to be considered in expanding emissions trading programs to other pollutants. These issues include the need for reliable emissions data, penalties to discourage noncompliance, the allocation of emissions allowances, and the development of trading boundaries, to ensure that actual emissions reductions are achieved.

Background

Emissions allowance trading differs from the traditional approach to environmental protection, commonly referred to as “command-and-control.” Under a command-and-control approach, sources of pollution are required to install control technologies or meet plant-specific reductions of emissions for all sources. According to critics of this regulatory approach, command and control is needlessly costly because it imposes similar reduction requirements on sources that sometimes incur very different control costs, rather than concentrating reductions at those sources with the lowest control costs.

Recognizing the economic and environmental benefits of emissions trading, the Congress adopted a new regulatory approach to deal with the issue of acid rain by reducing SO₂ emissions, a major cause of the problem. Specifically, title IV of the Clean Air Act allows electric utilities, the major source of SO₂ emissions, to trade allowances to emit SO₂ with other utilities. After setting the overall reductions in SO₂ emissions to be achieved, the Congress defined each source’s specific emissions limits and directed the administration to allocate allowances to sources in amounts equal to the emissions limits. These emissions limits for all sources combined to meet a total emissions cap. Sources that emit SO₂ must install continuous emissions monitors and regularly report their actual emissions to EPA. Utilities that reduce their emissions below the required levels can sell their extra allowances to other utilities to help them meet their requirements. Utilities that exceed their emissions allowances forfeit allowances to cover the excess emissions and must pay fines that are set at several times the estimated average cost of complying with SO₂ emissions limits.

The use of market approaches to address environmental problems is not new. EPA introduced limited forms of trading emissions into its regulations in the late 1970s.³ More recently, the Clean Air Act Amendments of 1990

³For more details on these earlier approaches to trading, see *A Market Approach to Air Pollution Control Could Reduce Compliance Costs Without Jeopardizing Clean Air Goals* (GAO/PAD-82-15, Mar. 23, 1982).

also addressed the use of market-based approaches to attain and maintain the National Ambient Air Quality Standards (NAAQS) for other air pollutants, particularly ozone. Section 110(a)(2)(A) of title I of the act describes general requirements for state implementation plans to meet the NAAQS and clarifies that states can use “economic incentives such as fees, marketable permits, and auctions of emission rights” to meet the act’s requirements.

The 1990 amendments to the act also recognize that the long-range transport of ground-level ozone is a regional problem that states and localities cannot be expected to fully address by themselves. Therefore, the amendments provided for the creation of interstate transport regions to deal with the ozone problem on a regional basis. The trading of emissions allowances can be a particularly useful approach to address regional problems with ozone in a cost-effective manner.

Acid Rain Program Has Reduced Compliance Costs and Emissions

In December 1994, we reported that the acid rain program would result in significant cost savings as compared to a traditional command-and-control regulatory approach. Thus far, reports of SO₂ emissions have indicated that the acid rain program has also been successful in achieving greater than planned reductions in emissions.

Cost Savings

As we reported previously, utilities have taken advantage of the regulatory flexibility under title IV to choose less costly ways to reduce emissions. As vendors have competed to fulfill utilities’ compliance needs, utilities’ ability to choose among various compliance measures has lowered prices for low-sulfur coal, scrubbers, and allowances. For individual utilities, we reported that the cost savings were large. For example, the Central Illinois Public Service expected to save \$225 million as a result of allowance trading and the act’s flexibility to choose among control options. Illinois Power reported saving \$91 million by purchasing allowances instead of installing scrubbers. Similarly, Duke Power projected savings of \$300 million, and Wisconsin Electric Power Company estimated saving almost \$90 million by avoiding the installation of scrubbers. Carolina Power and Light expected to reduce its future compliance costs by two-thirds as a result of purchasing allowances.

Projected cost savings through the acid rain program are substantial and depend on the level of trading. In 1992, EPA estimated that the costs of achieving compliance could be up to 50 percent lower than the costs

under a traditional command-and-control approach, depending on how much trading occurred between utilities. We also estimated large potential savings. According to our 1994 estimates, emission reductions would cost as much as \$4.5 billion per year by 2002 if utilities were forced to use the types of controls typically prescribed under more traditional regulations. Under the act's more flexible approach, we estimated that utilities would spend about \$2.6 billion per year if they restricted themselves to internal trading, resulting in annual savings of \$1.9 billion.⁴ Finally, we estimated that costs could be reduced an additional \$1.2 billion per year by 2002 if utilities traded with one another until all cost-savings opportunities were realized, resulting in annual cost savings of \$3.1 billion. However, at the time we made these estimates, there was very little trading of allowances occurring between different utility companies and, thus, little evidence that this additional \$1.2 billion per year in cost savings would be realized.

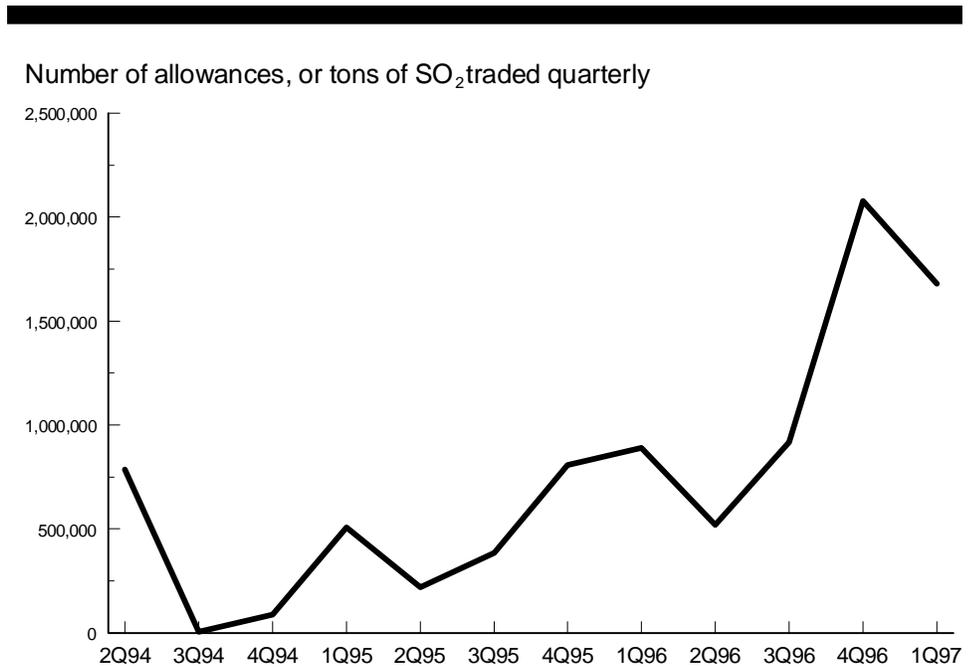
In 1994, we reported that various factors were causing the low level of allowance trading at that time. Among them, phasing in emissions reductions over several years had reduced the urgency to buy and sell allowances. We also reported a major barrier to trading was that state utility commissions and the Federal Energy Regulatory Commission had provided limited guidance on whether utilities could recover allowance trading costs. Without this guidance, many utilities may have avoided trading and instead installed scrubbers or fuel-switching equipment.

Recent data from EPA indicate that the amount of actual trading between utilities has been increasing since the time of our report. The number of allowances traded between utilities, or between utilities and other entities (e.g., brokers), has increased about 400 percent, from 881,852 in 1994 to 4,407,302 in 1996 (see fig. 1 for quarterly trading data).⁵ EPA's data suggest that utilities are making substantial efforts to achieve potential cost savings.

⁴Internal trading means that a utility can lower costs by cutting back emissions in one of its power plants and using the resulting allowances to cover emissions in another of its plants.

⁵Allowances equal one ton of SO₂. 1994 allowances are for three quarters of the year.

Figure 1: Trends in Acid Rain Allowance Trading, 1994-97



Source: EPA Data

EPA holds an annual auction to ensure the availability of allowances for utilities needing them. EPA designed the auction as a “price discriminating” auction in which bidders pay what they bid, thereby resulting in a range of winning prices. Allowances can also be traded by utilities outside of EPA’s auction. We reported in 1994 that, since the auction did not produce a single winning price, utilities found the range of winning prices confusing as an indicator of the actual market price for allowances. According to several utilities, market analysts, and some economic research, an auction resulting in a single, market-clearing price, would provide more accurate price data.

The prices paid for allowances have generally fallen since our 1994 report. Specifically, prices for allowances at EPA’s auction have fallen from an average winning bid of \$159 in 1994 to \$68.14 in 1996. In the most recent 1997 auction, the average winning bid was \$110.36. EPA also auctions allowances for use 6 and 7 years after the auction, and prices for these

allowances have also fallen from highs of \$148 and \$149 respectively in 1994 to lows of \$65.36 and \$64.21 in 1996. The average winning bid for 6-year advances in the most recent 1997 auction was \$105.51 and for 7-year advances it was \$104.16. Prices of allowances sold outside EPA's auction in the private market indicate the same generally decreasing trends, which taken together with increased trading between utilities and other entities, indicate that the costs of complying with the Act may be even lower than we suggested in 1994. We previously reported that the costs of reducing pollution were falling as a result of competition between compliance options spurred by title IV's flexible regulatory approach. An official at the Chicago Board of Trade, which is responsible for holding the annual auction, concurred in this assessment and attributed the declining prices to (1) the act's inherent flexibility in allowing utilities to pick less expensive ways to comply with the law, in particular by using low sulfur western coal, and (2) the impact this has had on dramatically lowering the price of scrubbers.

Emissions Reductions

Title IV of the act is designed to achieve a nationwide 10-million-ton reduction in SO₂ emissions from 1980 levels by the year 2010. Of this reduction, 8.5 million tons is expected to come from electric utilities, the nation's major source of SO₂ emissions. The reduction is being implemented in two phases. In Phase 1, beginning January 1, 1995, the utilities with the highest levels of emissions—primarily large midwestern coal-fired plants—had to reduce their annual emissions by a total of 3.5 million tons. In Phase 2, beginning January 1, 2000, utilities must reduce their annual total emissions by another 5 million tons.

The acid rain program, including the use of emissions trading, has been successful in reducing emissions of SO₂ from utilities. To achieve the program's overall goals to reduce emissions, the program imposes an annual nationwide emissions cap on SO₂. EPA reports that actual emissions from Phase 1 utilities were 5.4 million tons in 1996 or about 35 percent below the emissions cap of 8.3 million tons for that year. EPA's data also indicate that since 1980, the program's baseline year for emissions reductions, emissions reductions have occurred in every one of the 21 states containing utilities affected by Phase 1.

Trading for Other Air Pollutants

As noted previously, title I of the act allowed states to use economic incentives, including the auctioning of emissions allowances, to meet national ambient air quality standards for air pollutants and ozone

precursors, such as nitrogen oxides (NO_x) and volatile organic compounds (VOCs). Despite this legislation and attempts by EPA to implement new guidance on trading emissions allowances, there has been little trading for these other air pollutants.

Cap and Trade Programs

Emissions cap and trade programs under title I are designed in a similar fashion to the title IV acid rain program. States or localities set total caps on emissions and identify those sources that are responsible for meeting the overall emissions cap. Emissions allowances are then allocated to each individual source.

One prominent example of a title I program has been ongoing in southern California since October 1993. Los Angeles is the only area of the country under the act's classification that is considered in the extreme class of ozone nonattainment. As part of its efforts to comply with the act, the South Coast Air Quality Management District developed a trading program to reduce emissions of NO_x and sulfur oxides (SO_x) from stationary sources. This program, called the Regional Clean Air Incentives Market (RECLAIM), was approved by the California Air Resources Board in October 1993. Nearly 400 stationary sources, which accounted for about 70 percent of NO_x and SO_x stationary-source emissions in the district, were initially included in this program.⁶ Sources were included if they held permits for equipment or processes that emit generally greater than four tons of NO_x or SO_x per year.

RECLAIM requires that overall emissions of NO_x and SO_x be reduced gradually every year and replaces many existing command and control rules for NO_x and SO_x. As with the acid rain program, those sources in RECLAIM can choose the most cost-effective means to reduce emissions. Sources that reduce emissions below their allocation can sell their excess allowances to other sources for whom the cost of those allowances is less expensive than installing emissions controls. Sources not participating in RECLAIM are still subject to existing command and control rules for NO_x and SO_x.

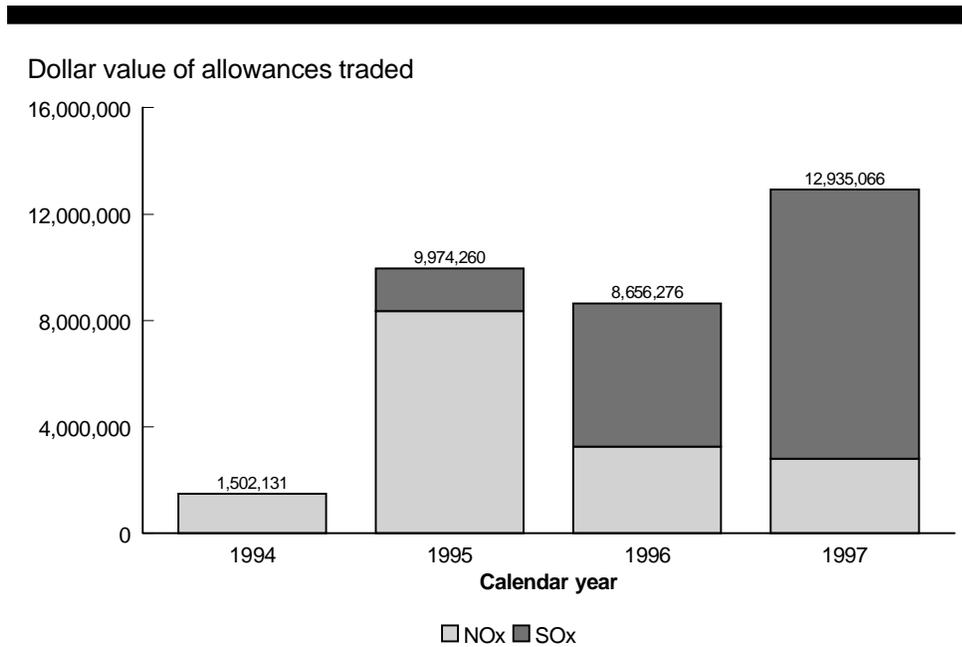
District officials believe that RECLAIM is affording stationary sources significant cost savings over complying with a conventional command-and-control approach. The district originally estimated that the cost of this trading program would be \$80.8 million annually as compared

⁶As of the end of 1995, sources in RECLAIM had declined to 330. According to district officials, the decrease is primarily because district staff found that some sources had less than four tons of emissions per year or belong to an exempt category.

to \$138.7 million with a conventional command-and-control compliance system. Although they have not yet fully analyzed these costs, they believe that the program has been cost-effective. District officials told us that cost comparisons will be included in the initial RECLAIM 3-year audit to be completed next year.

Trading in RECLAIM indicates that there is an active market in emissions allowances. According to the district, \$33 million in allowances has been traded as of April 1997. As shown in figure 2, the dollar value of allowances traded in the first quarter of 1997 already exceeds the annual amounts for the first 3 years of the RECLAIM program. Sources included in this program were initially allocated emissions allowances based on historical emissions data reported in a selected year that those sources believed was representative of normal economic conditions. As a result, the total program allowances exceeded actual emissions at the program's start. District officials believe that the increased trading in the first quarter of 1997 indicates that surplus allowances built into annual targets during the program's early years are starting to disappear.

Figure 2: Trends in RECLAIM Allowances Traded, 1994-97



Note: 1997 data is for the first quarter only.

Source: South Coast Air Quality Management District data

At the start of the RECLAIM program, environmental groups were concerned that, because of the initially generous allocation of allowances, actual emissions would initially increase. Another issue raised was that RECLAIM could adversely affect air quality in certain areas of the South Coast District because the program established a total cap rather than specific controls for each source. As a result of these concerns, the California Air Resources Board requires the district to audit the program each year and submit a report that assesses emission reductions and analyzes air quality in specific areas within the district. The district's most recent audit found that actual NO_x and SO_x emissions for 1995 were both somewhat higher than in 1993 (the program's baseline year). However, the increase was partially attributed to procedures for dealing with missing data which tend to overstate actual emissions. The audit report noted that emissions in the third program year (1996) should be lower due to the expected installation and certification of continuous emissions monitors for most major

sources. The audit also reported that emissions do not appear to have geographically shifted because of the program.

District officials attempted to extend RECLAIM to emissions of VOCs but were unsuccessful. One reason was that the reliability of emissions data for VOCs is less certain than for NO_x and SO_x due to their chemical makeup and because they are difficult to monitor. Additionally, there was a lack of agreement among the district and its stakeholders on the baseline level of emissions for VOCs.

In addition to the RECLAIM program, a concept for another cap and trade program has been developed for 12 northeastern and mid-atlantic states and the District of Columbia. This program, known as the Ozone Transport Commission's (OTC) NO_x Budget Program, caps the summertime NO_x emissions for participating areas at 219,000 tons in 1999 as compared to the 1990 baseline of 490,000 tons. In 2003, the emissions cap will decrease to 143,000 tons. NO_x emissions allowances will be allocated to emissions sources in each of the states and the District of Columbia. The program plans to use an allowance trading system to help achieve the goals to reduce emissions in a cost-effective way. Each participating state may develop its own regulations to implement the NO_x Budget Program including the allocation of its share of the NO_x budget and the use of allowance trading. The OTC NO_x Budget Program is scheduled to go into effect in 1999.

An interstate allowance trading program is also being considered by the 37 easternmost states (OTC and 24 additional states). This group, known as the Ozone Transport Assessment Group, is currently studying possible strategies to reduce NO_x emissions, including an emissions cap and adopting emissions trading.

Open Market Trading

To facilitate the development and implementation of additional emissions trading programs, EPA proposed an "open market trading" rulemaking in August 1995. This proposal was intended to provide states and industry with another option to comply with the requirements of title I in the most cost-effective manner possible. Open markets were proposed to create incentives for sources to achieve more emissions reductions than required by permit and thereby create surplus emissions' credits. These credits are similar to allowances under cap and trade programs except that they are based on the rate of emissions from a source instead of total emissions. Rather than installing control equipment, other sources could find it more

cost-effective to purchase these credits on the open market, thereby meeting their compliance obligations at a lower cost.

EPA's proposed rulemaking on open market trading was the number one priority out of 25 regulatory initiatives for EPA announced by President Clinton and Vice President Gore in March 1995. However, despite its priority, EPA has not issued the rule because several concerns were raised about it. For example, states were moving forward with their own trading plans and believed that EPA's proposal was too prescriptive and would not allow them the needed flexibility to design their own trading programs. The Environmental Defense Fund also expressed concerns that this type of trading rule would not ensure environmental benefits because it did not include any cap on emissions.

EPA officials told us that they now plan to issue guidance on open market trading rather than a new rule to provide states with more flexibility to decide the most cost-effective ways to reduce emissions. EPA officials told us they expect to finalize this guidance by December 1997. Although EPA has not issued formal guidance, some states appear to be moving forward with their own open market trading programs. However, other states are waiting for EPA to provide additional clarification on trading issues. For example, New Jersey wants to see some level of standardization across the country in calculating emissions credits so that interstate trades can be made.

Issues to Consider for Expanding Emissions Trading

Although trading under title I has been limited thus far, the experiences under the acid rain and RECLAIM programs point to five key issues that EPA, states, and other stakeholders will need to consider when adopting additional trading programs.

Reliable Monitoring and Reporting of Emissions

Reliable emissions monitoring and reporting systems are important to help ensure environmental benefits. As noted in our 1994 report, each utility must install EPA-certified continuous emissions monitors and regularly report those emissions to EPA to help ensure that actual emissions are accurately tracked. At the end of each year, EPA grants utilities 30 days to obtain the allowances necessary to cover their actual emissions during the previous year. After this grace period, EPA deducts allowances from a utility's allowance holdings in an amount equal to its recorded emissions. The deduction of allowances, as well as the issuance, transfer, and tracking of allowances, is conducted through an automated system. Operating like a bank, this system tracks the allowances held by utilities

and any other companies, organizations, or individuals possessing allowances. The tracking system provides EPA with a way to determine compliance by ensuring that a source's actual emissions do not exceed its available allowances. Similarly, the RECLAIM program requires major sources to install continuous emissions monitors to track NO_x and SO_x emissions. The reliability of emissions data from other pollutants, such as VOCs, is less certain. Thus, determining ways to obtain reliable data for these other pollutants will be a key issue in developing additional trading programs.

Adequate Financial Penalties

Financial penalties in emissions trading programs must be large enough to discourage noncompliance. For example, if a utility does not have enough allowances to cover its SO₂ emissions, the acid rain program imposes an automatic penalty of \$2,000 per ton, indexed yearly to inflation.⁷ The penalty is currently about twenty-five times higher than today's allowance prices. In addition, a utility that does not comply also has its allowance holdings reduced in the next year by one allowance for each excess ton of SO₂ emitted. EPA reported that all units were in full compliance for 1995. Under RECLAIM, facilities that fail to achieve their annual emissions allowance may also be subject to monetary penalties. The South Coast Air Quality Management District reports that 92 percent of RECLAIM facilities complied with their allocations during the 1995/1996 compliance year and attributed most instances of noncompliance to misunderstandings of proper procedures.

Emissions Baselines and Allocations

Although determining emissions' baselines and allocations can be difficult, stipulating a fixed amount of emissions to be reduced helps ensure environmental benefits. The acid rain program has built-in safeguards to ensure that environmental protection is achieved regardless of how much or how little allowance trading occurs. These same protections could serve as environmental safeguards in applying this approach to controlling other air pollutants. As described previously, the RECLAIM program has similar emissions caps.

Despite the environmental benefits of an emissions cap, it can be difficult and resource intensive to agree on the baseline and how to allocate it to emissions sources. This can also be an issue under a command-and-control approach. In the acid rain program, average 1985-87

⁷According to EPA, the actual penalty in 1996 was \$2,454 per ton.

emissions⁸ were chosen as the baseline against which to measure the required reductions to reduce utilities' incentives to maintain higher emissions for the express purpose of receiving larger initial allowances. Additionally, choosing an average of emissions over several years, rather than singling out 1 year, increases the chance that the emissions baseline represents normal economic activity. In the RECLAIM program, it was only after extensive debate that a baseline level was set for NO_x and SO_x emissions. Much of the debate centered on whether to choose as a baseline year one in which the region was suffering from a recession, thereby establishing an emissions baseline that would have been lower than normal.

Determining Trading Areas

Determining the area boundaries for any trading prior to implementing a program is important because, to the extent area boundaries can be enlarged without jeopardizing air quality, trading is made easier. For instance, an SO₂ allowance in one state can be traded for an allowance in another state, thereby expanding the number of potential trades. Similarly, scientists know that ground-level ozone is a regional phenomenon because pollutants that cause it can be transported long distances by meteorological conditions. Thus, trading allowances for air pollutants that cause ozone can sometimes be done among sources in several states.

Auction Design

The design of any auction associated with a trading program is also an important feature in encouraging trading. As noted previously, EPA's annual SO₂ auction has resulted in allowances being sold at multiple prices, causing uncertainty about what constitutes a fair market price. In adopting emissions trading programs that include an auction, a single price design would be preferable as we noted in our 1994 report.

Conclusion

The acid rain program, including the trading of emissions allowances, has been successful thus far in reducing SO₂ emissions at reduced compliance costs. However, there has been limited success in expanding emissions trading to other pollutants covered under the act. Several important issues, such as developing and implementing reliable emissions monitoring and reporting systems, determining penalties for noncompliance, and allocating emissions reductions among participants, must be addressed in adopting any emissions trading program. As a

⁸The calculation was based on energy input data for utilities multiplied by standard emissions factors.

consequence, it will take time for EPA and the states to resolve these issues.

In judging the feasibility and success of these trading programs to improve environmental quality at less cost, it is important to note that traditional command and control regulatory approaches have shared many of the same problems and challenges, such as establishing agreed upon emissions baselines. In summary, Mr. Chairman, whether regulatory or market-based programs are implemented, mechanisms must be incorporated into such programs to provide for periodic monitoring and evaluation which will help ensure that environmental goals are achieved.

This completes my prepared statement. I will be happy to respond to any questions you or Members of the Committee may have.

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