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TRADABLE EMISSIONS

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before the

JOINT ECONOMIC COMMITTEE
CONGRESS OF THE UNITED STATES

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Wednesday, July 9, 1997

CONGRESS OF THE UNITED STATES
JOINT ECONOMIC COMMITTEE
WASHINGTON, D.C.

The Committee met, pursuant to notice, at 10:07 a.m., in Room 2325 Rayburn House Office Building, the Honorable Jim Saxton, Chairman of the Committee, presiding.

Present: Representatives Saxton, Ewing and McCrery and Senator Bingaman.

Staff Present: Hayden Bryan, Juanita Morgan, Brenda Janowiak Amy Pardo, Mary Hewitt, Roni Singleton, Howard Rosen, Kerry Sutten and John Blair.

OPENING STATEMENT OF REPRESENTATIVE JIM SAXTON, CHAIRMAN

Representative Saxton. Good morning. I am pleased to welcome our witnesses who are here to discuss the concept of tradable emissions Tradable emissions, also known as tradable credits or allowances, provide policymakers an opportunity to employ the power of markets to ease the burden of environmental regulation. As such, they offer a major opportunity for regulatory reform.

Emissions trading systems are currently in use in several pollution abatement programs throughout the United States. An emissions trading system is based on the principle that the cost of emissions reduction varies from facility to facility. When each facility is given a limit on its emissions by the regulators, some facilities may be able to reduce emissions more than required at a fairly low cost. Those which can do so may choose to reduce emissions levels even below those required and sell this difference to another source facing a higher cost of reducing its emissions. If the market price of these extra emissions entitlements is higher than the cost of reducing emissions at a given facility, then there is an incentive to make further reductions and sell these entitlements as well.

One current trading program is the sulfur dioxide allowances trading created by the Clean Air Act Amendments of 1990 to control acid rain. We will hear more about this program from our witnesses, but I want to note that the sulfur dioxide trading program appears to be an excellent example of how a market for emissions can reduce the cost of achieving our environmental protection goals. Its use in the Acid Rain Program has reduced job loss, promoted economic growth, and lowered producer and consumer costs.

Tradable emissions are also being employed at the regional level to control nitrogen oxides, sulfur dioxide, and volatile organic compound (VOC) emissions on a regional basis. We will hear testimony on at least one such program today.

I believe there is a great potential for further use of emissions trading systems in pollution abatement programs. As the Nation debates such issues as more stringent standards for ozone and particulate matter, and on an international scale, global warming, tradable emissions will provide a smart alternative to the traditional command-and-control approach to environmental regulations.

We look forward to discussing these issues today and I at this point turn to Senator Bingaman for any opening statement he may wish to give.

[The prepared statement of Representative Jim Saxton appears in the Submissions for the Record.]

OPENING STATEMENT OF SENATOR JEFF BINGAMAN

Senator Bingaman. Mr. Chairman, I want to congratulate you for having this hearing. I think this is an interesting and important issue, and I do think there is potential for taking what we have learned from sulfur dioxide emissions and the trading programs and applying them elsewhere, particularly with regard to carbon dioxide. The lessons learned in this case may help us find a workable way so that we can take serious action with regard to the emissions of carbon dioxide worldwide. So I am very interested in hearing the testimony. You have a great group of witnesses. Thank you.

Representative Saxton. Thank you. I make note that Mr. Ewing is here. He, I believe, may want to say hello.

OPENING STATEMENT OF REPRESENTATIVE THOMAS W. EWING

Representative Ewing. Thank you, Mr. Chairman. I don't have an opening statement. I just look to the testimony with great expectation and

I am sure it will be a learning experience. Thank you for having the hearing.

Representative Saxton. Thank you.

Our first witness is Mr. Peter Guerrero, Director of Environmental Protection Issues at the General Accounting Office (GAO).

Mr. Guerrero, why don't you come forward and take your place there. I have asked that the GAO update a December 1994 report on the nationwide sulfur dioxide tradable emissions program to control acid rain. We look forward to Mr. Guerrero's thoughts and his testimony, and you may want to introduce your colleagues as well.

STATEMENT OF PETER GUERRERO, DIRECTOR, ENVIRONMENTAL PROTECTION ISSUES, GOVERNMENT ACCOUNTING OFFICE

ACCOMPANIED BY CHARLES BAUSELL, SENIOR ECONOMIST; AND BILL MCGEE, ASSISTANT DIRECTOR

Mr. Guerrero. Thank you, Mr. Chairman.

With me on my right is Mr. Charles Bausell, a Senior Economist at the General Accounting Office and the principal author of the 1994 study we are updating today at your request, and on my left is Bill McGee, the Assistant Director at GAO in charge of air quality work. They both join me today in this presentation.

We are pleased to be here today to testify on our work on the emissions trading program to control acid rain and to provide some observations on the feasibility of applying similar trading approaches to controlling other types of air pollution. Under emissions trading programs, pollution sources that reduce their emissions below the required levels can sell unused allowances to other sources to help them meet their requirements. Trading of emissions, as you pointed out, can be a cost-effective means to reduce pollution.

Our testimony today focuses on, first, updated cost savings and pollution reductions from Environmental Protection Agency's SO2 trading program to control acid rain; second, experiences with trading programs designed to control other air pollutants; and third, issues that need to be considered in expanding these programs.

In summary, we found, Mr. Chairman, first, in 1994, we reported that trading and increased flexibility provided under the Act could reduce compliance costs by $3.1 billion a year. We also estimated that SO2 emissions could be reduced by approximately two million tons below the level specified in the Act.

Currently, trading of emissions between utilities exceeds the levels reported in our 1994 report and prices paid for emission allowances have fallen suggesting larger cost savings than what we reported earlier. Second, experience to date in applying trading programs to other types of air pollutants has been limited. One of the few examples is Southern California's South Coast Air Quality Management District's RECLAIM program that is designed to deal with smog in Southern California. District officials believe the program will be more cost effective than other traditional regulatory approaches. And third, expanding emissions trading to other pollutants like CO2, as you mentioned, raises several issues. These issues which I will discuss later include the need for reliable emissions data, penalties to discourage noncompliance, the allocation of emission allowances, and the development of appropriate trading boundaries.

By way of background, emissions trading differs from the traditional command-and-control approach to environmental protection. Under a command-and-control approach, sources of pollution are required to install control technologies or meet specific plans in emissions reductions for all sources. According to critics, command and control is needlessly costly because it imposes the same requirements on all sources without regard to the marginal cost of controlling pollution; that is, some facilities can do it cheaper and some will pay a heck of a lot more.

The Congress adopted an emissions trading approach to deal with acid rain by reducing SO2 emissions, a major cause of the problem. Specifically, Title IV of the Clean Air Act sets overall reductions in SO2 emissions and then allows electric utilities, a major source of the SO2 emissions, to trade allowances to emit SO2 with other facilities. Utilities that emit SO2 must install continuous emissions monitors and report their actual emissions to EPA, and large penalties are assessed for non-compliance.

Now, I would like to talk about the cost savings and environmental benefits that have resulted from the SO2 trading program.

As we reported previously, utilities have taken advantage of the regulatory flexibility under Title IV of the Clean Air Act Amendments to choose less costly ways to reduce emissions. Utilities' ability to choose among various compliance measures have resulted in lower prices for coal, for scrubbers, and allowances. For individual utilities, cost savings were large. For example, for utilities in Illinois, North Carolina, Wisconsin, reported combined savings of over $700 million as a result of the flexibility contained in the Clean Air Act.

The potential for overall large savings also exists. According to our 1994 estimates, up to $3.1 billion in annual compliance costs could be saved if utilities fully avail themselves of opportunities to trade amongst themselves. Data recently provided by the EPA indicates that trading among utilities has increased since the Acid Rain Program began and the publication of our 1994 report. The number of allowances traded between utilities or between utilities and other entities has increased about 400 percent between 1994 and 1996. At the same time the prices paid for allowances have continued to decline. Thus we are making progress toward realizing the potential cost savings we identified in 1994. At the same time, real and substantial emissions reductions have occurred.

Title IV of the Clean Air Act is designed to achieve a 10 million ton reduction in SO2 emissions from the 1980 levels by the year 2010. Of this reduction, 8.5 million tons are expected to come from electric utilities. The reduction is being implemented in two phases and is subject to a declining cap on total emissions over the period. EPA reports that actual emissions in Phase 1 were 5.4 million tons in 1996, or about 35 percent below the emissions cap of 8.3 million tons for that year.

Now, I would like to turn to the second part of my statement that deals with application of trading to other environmental problems. Title 1 of the Act allowed states to use economic incentives, including emissions trading, to meet national ambient air quality standards for such pollutants as nitrogen oxides, or NOx, sulfur oxide, or SOx, and volatile organic compounds, or VOCs. Despite this legislation and attempts by EPA to implement new guidance on trading allowances, there has been little trading thus far for these other air pollutants.

Programs that do exist fall into two broad categories. The first type is called cap and trade. It is similar to the SO2 Acid Rain Program. States and localities set caps on emissions to find the universal sources responsible for meeting these emissions, and allowances are allocated to individual sources. California's South Coast Air Quality Management District's RECLAIM program is an example of a cap-and-trade program. Begun in 1993, this program covers over 300 stationary sources emitting more than four tons of NOx or SOx per year.

Like the Acid Rain Program, RECLAIM allows sources to choose the most cost-effective means for reducing emissions. Sources reducing emissions below their allocation can sell their excess to other sources for whom the cost of these allowances is less expensive than installing controls. RECLAIM officials believe they will achieve significant cost savings. RECLAIM estimates the cost of this trading program will be

about $80 million a year, compared to about $140 million a year with a conventional command-and-control compliance system.

Some $33 million in allowances were traded as of April 1997, and the dollar value in trades in the first quarter of this year alone exceeds that for the first three years of the program.

In addition to the RECLAIM program, a concept for another cap-and-trade program has been developed by the Ozone Transport Commission, which comprises 12 Northeastern mid-Atlantic States and the District of Columbia. This program known as the NOx Budget Program caps summertime NOx emissions for the participating States at 219,000 tons in 1999 compared to a 1990 baseline of close to half a million tons. The program plans to use an allowance trading system to help achieve these goals.

The second type of program is called open-market trading. To facilitate the development and implementation of the additional emissions trading programs, EPA proposed an open-market trading rule in 1995. The proposal was intended to provide states and industry with another compliance option for meeting the requirements of Title I in the most cost-effective manner possible. It was designed to facilitate cost-effective reductions of overall emissions consistent with state implementation plans to attain air quality standards. I won't go into the details of the open-market trading rule at this time but will be happy to answer questions on it.

Finally, I would like to get to the third piece of my statement that deals with considerations for expanding the use of emissions trading.

First, reliable emissions monitoring and reporting systems are important to ensure environmental benefits. As noted in our 1994 report, each utility must install EPA-certified continuous emissions monitors and report on a regular basis its emissions of SO2 to EPA.

The issuance, transfer, and tracking of allowances is conducted through an automated allowance tracking system administered by EPA. Operating like a bank, this system tracks the allowances held by utilities and any other companies, organizations, or individuals. EPA can thus determine compliance by assuring that actual emissions do not exceed the available allowances, and RECLAIM has established similar types of controls.

A second consideration is providing for sufficient financial penalties that must be large enough to discourage noncompliance. For example, if a utility does not have enough allowances to cover its SO2 emissions for acid rain, that program imposes an automatic penalty of about $25,000 per

ton. The amount is about 25 times higher than today's allowance prices, so not surprisingly, EPA reports all units are in full compliance. Under RECLAIM, facilities that fail to achieve their annual emission allowances may also be subject to monetary penalties.

A third factor is stipulating a fixed amount of emissions to be reduced by a specific date regardless of the amount of trading that occurs. This in turn helps make clear that environmental protection is the primary goal of any trading program. Care must also be taken in choosing the appropriate baseline against which to measure these reductions and care must be taken in allocating this baseline equitably to the participants.

A final consideration is it is important to determine the area boundaries for any trading program prior to implementation. To the extent the boundaries can be enlarged without jeopardizing air quality, trading is facilitated. For instance, an SO2 allowances in one state can be traded for allowances in another state, thereby expanding the number of potential trades.

Likewise, scientists know that ground level ozone is a regional phenomenon and that pollutants which cause it can be transported long distances. Thus, trading of allowances for air pollutants which cause ozone can also be done on a regional basis.

In conclusion, Mr. Chairman, the Acid Rain Program, including the trading of emissions allowances, has been successful thus far in reducing SO2 emissions and in lowering compliance costs. Overall, emissions trading programs hold out the promise of achieving further environmental progress without imposing the kinds of costs associated with command-and-control regulatory programs. However, expanding trading to cover other pollutants covered under the Act has enjoyed only limited success. Several things such as those I have just mentioned will need to be considered in expanding emissions trading to cover these environmental problems.

That concludes my prepared statement. I would be happy to answer any questions.

[The prepared statement of Mr. Guerrero appears in the Submissions for the Record.]

Representative Saxton. Thank you, Mr. Guerrero.

It is obvious you have done a very thorough job in studying, examining and explaining this very successful, seemingly very successful program to us, and we want to express our appreciation for that.

The program is a relatively young program, and apparently has seen some fairly significant success. To demonstrate its success, on page 9 of

your overview on issues on emissions of allowance and trading programs, this chart is obviously a very telling – and these numbers apparently along the column are dollars, dollars value of allowances traded in terms of millions of dollars; is that correct?

Mr. Guerrero. That is right.

Representative Saxton. And in 1994, the first year on this little chart, it looks like there were about a million and a half dollars worth of trading.

Mr. Guerrero. That is right. And these numbers are for the RECLAIM program in the Southern California area.

Representative Saxton. In Southern California only?

Mr. Guerrero. That is right.

Representative Saxton. And this pertains to NOx and SOx?

Mr. Guerrero. That is right.

Representative Saxton. And then in 1995, the trading appears to have gone up to almost $10 million, and in 1996, it went down just a tad for some reason, but the interesting part here is in this year, in 1997, in the first quarter of this year, we see almost $13 million in trading, and is it fair for me to simply multiply that number by four to get some kind of idea what is going to happen in 1997?

Mr. Guerrero. Well, not necessarily, but roughly, it will give you some clue. I wouldn't guarantee that this particular quarter is representative of the entire year, but it is a good indication the program has picked up.

Representative Saxton. So the program could be – at the end of this year we will know more clearly, obviously, when we see final numbers but it looks like since 1994 we have gone from a million and a half to perhaps by the end of this year $50 million in trading. That demonstrates that people, firms, and utilities, who want to use the program have found that it is a successful way for them to do business, and that there are savings and advantages which people seem to be taking advantage of in very significant numbers.

Mr. Guerrero. Yes, I believe that is an entirely accurate assessment.

Representative Saxton. And from an environmental point of view obviously this demonstrates an economic point of view, a dollars-and-cents businessperson's point of view. Is there an equally simple way to demonstrate the environmental success of the program?

Mr. Guerrero. Yes. I believe the ultimate goal is to reduce emissions of NOx and SOx by up to 80 percent in the Los Angeles area, as this program plays out over the next decade or so. There will be very substantial improvements in air quality as a result.

Representative Saxton. Now, you used Southern California as an example?

Mr. Guerrero. That is right.

Representative Saxton. Are there other examples that are as dramatic as this example?

Mr. Guerrero. Not at the present time. There are a number of states, probably at least half a dozen, that we have been able to identify, and there are groups of states as you will hear from other witnesses today, both EPA and Illinois, where those states are thinking of using emissions trading to deal with the problems of ozone and smog pollution. So there is a lot of interest in using this as a tool.

I think the RECLAIM program that we have talked about just recently is the premier example of where a region or a state has used this and used it quite effectively.

Representative Saxton. Have you been able to identify any controversial issues that are involved in the general program?

Mr. Guerrero. There are concerns about whether emissions trading is good or bad for the environment. Those concerns have been around now for well over two decades. Emissions trading is not a new concept. It is a concept that was tried and practiced as early as the 1970s, but the SO2 program under the Clean Air Act really did demonstrate the kind of success it is capable of achieving, primarily because the SO2 trading program under Title IV resolved many of those concerns, primarily establishing a cap that allowed for the achievement of an environmental goal, a very ambitious environmental goal in terms of reducing SO2, regardless of the amount of trades that occurred. In other words, no trading could have occurred period and we still would have achieved that very substantial reduction.

So I think that provided the assurance that emissions trading would be a tool in the arsenal to achieve these reductions and could be used without compromising environmental quality and as a result I think we have gotten both.

We have a couple slides that might illustrate this. If you look at the curve, the dark line curve is the estimate of emissions that would have occurred in the absence of Title IV of the Clean Air Act in 1990, and you see that around the time of the enactment it was on a downward slope, it

would begin to pick up again and we would have substantial amounts of SO2 being emitted into the environment well into the next century.

With the emissions trading program and the Title IV program for controlling SO2, you see a projected line that is dramatically below that and that is the dotted line.

I would also add that downward trend indicated by the dashed line with the SO2 trading program allows for utilities to pick among a number of compliance options, whether it is trades, low sulfur coal, or scrubbers. And the effect of being able to choose among different control sources, which is different from the way we dealt with pollution earlier where we prescribed a solution, effectively has reduced the price of all of those options. And so whether you buy allowances to meet your compliance targets or coal or buy a scrubber and install it on your smokestack, all of those compliance options are cheaper than they were in 1990 and that is a result of the flexibility of the Act.

Representative Saxton. I want to ask one more quick question and then turn to Senator Bingaman.

One of the things that occurs to me is that the potential exists for areas of concentrated, continued pollution to exist, because for one reason or another, geographic location "A" might find it economically more feasible to clean up their emissions through a process where it becomes very expensive in another area, so area "A" cleans up, area "B" buys credits. Is this something we need to be aware of in terms of whatever statutory language we put in place?

Mr. Guerrero. Absolutely. As Congress considers in the future the use of emissions trading to address, for example, smog in the East, there are ways to determine and assess whether an emissions trading program will facilitate the reductions desired or whether it will not get you there. You can look at the expected marginal costs associated with reducing pollution by different participants, you can determine from which direction those trades are likely to go, and you can as a result define the boundaries for trading accordingly to facilitate trades in the direction you want them to go. So, the issue of hot spots can be dealt with under an emissions trading program if that program is designed well and thoughtfully. In fact, that was one of the considerations in designing the SO2 trading program; it is one of the issues that the ozone transport program in the Northeast has considered. They have looked at and modeled what would be the effect of trading in directional effects of using a trading program and whether that would facilitate or not facilitate the kind of reductions you want to see.

The second thing I would add is the problem of hot spots isn't unique to emissions trading. In other words, if you have emitters that are emitting pollutants because of local climate condition, meteorology, or the nature of the pollutants themselves are not widely disbursed and they fall on an area and create problems there, you would have those problems under a command-and-control program and have to address them. And using an emissions trading program is not an all or nothing matter. It should be supplemented through other technologies to deal with those kinds of issues.

Representative Saxton. Thank you very much. Senator?

Senator Bingaman. It would seem to me that an essential ingredient for the success of one of these emission trading systems would be setting the initial limits at the proper level. If they are set too high, then essentially there is not a whole lot of pressure on anyone to do anything. If they are too low, that is if the cap is too restrictive, then it would seem that you set up an impossible situation.

What have we learned from the setting of emission limits in SO2 that would help us in this regard? Were they initially set too high?

Mr. Bausell. I think to answer your question, you have to consider a number of things. On the one hand, you might want to set the emissions cap at a point in time that is as close as possible to when you are going to start the program. You are going to want to set that cap as some fraction of an emissions baseline that is as close in time to the point when you are going to be in the program.

Now, in the SO2 allowances trading program, the baseline was 1985 to 1997. They chose that as a baseline and then they used that information in terms of determining how much of the emissions were allocated to the different utilities. One argument that was made, and I think it is something you should consider in its favor, was that if we had chosen a baseline that was closer to the point in time when the program was to begin we might run the risk of strategic behavior. That is, potential participants would understand late in the game, fairly late in the game, just before the decision is going to be made, that we are going to come up with this trading program and your allowances are going to be a function of, to some extent, what your pollution levels have been in the past. So there could be strategic behavior involved in which you deliberately try to increase your pollution levels just before the program starts so you get a bigger allocation.

So in that particular case of SO2 allocation, they tried to choose a baseline that would mitigate the potential damage from that kind of

strategic behavior, and I think that is something to consider in any future programs. There may not be any one right answer, but you have to be concerned about that kind of behavior.

Senator Bingaman. But you don't think it is clear that the limits were set too high in SO2?

Mr. Bausell. I think that ultimately that goes back to a scientific question. We have to consult with our scientists and we have to, after consulting with our scientists, determine what we think the overall emissions level has to be in order to achieve the environmental objective at hand. So we have to consult with them and I think that should be part of the process.

Senator Bingaman. As I understand it, the way this system was established and implemented, these allowances were essentially provided free to utilities.

Mr. Bausell. Well, you have to consider the history of how we have regulated pollution in this country. Historically, what we have done with the passage of the Clean Air Act, is to tell sources that we are going to require that you reduce some of the emissions that you have been responsible for. We did not start with a system which essentially said, well, we are going to start from day one and, by the way, you are not entitled to any emissions and we are going to negotiate how much higher you go from zero on up. We went the other direction. And so if you look at command and control, which has been our historical regulatory system, the way that is handled is very much consistent with the way we handle this particular situation. Sources basically were grandfathered to some extent based on historical emissions, which were really based on the historical use of inputs, fuel, for example.

Senator Bingaman. And you feel that it was the right decision to go that route?

Mr. Bausell. One can design a trading system in a number of ways and that is one way you can do it. There might have been a political reason for doing it that way.

Mr. Guerrero. I would say, Senator, that it is essentially a policy call. In designing a program, you can design it in a way that encourages greater reductions, you can design it in a way that grandfathers in existing emissions, you can design it in ways that reflects what you believe are, what can be reasonably achieved using existing technology, and I think we made over the last 25 years some very pragmatic choices in those areas. We took essentially what I would view as a legal and engineering approach to environmental pollution. We asked the engineers what are

the ways to get the most cost-effective and best kinds of reductions we can get, what are the best technologies to get these reductions, then we passed laws mandating their use. And excluded from that calculation were the economists who could say, well, if you added flexibility and encouraged market solutions, you could drive down prices and perhaps achieve not only the same results but better results.

And I think what we have paid a price for that over the last 25 years in that pollution-control technologies really have not changed all that much. We haven't seen the kind of innovation and change that we probably would have liked to have seen, and one of the nice things about the SO2 trading program in the Clean Air Act is now there is competition; you begin to see the price of things like scrubbers falling dramatically, because they are no longer mandated; they are not the only way to get to the solution. There are different ways to get to the solution and because of that I think you will see an encouragement to come up with better ways of cleaning up the environment from a technological point of view, and that incentive has been missing from the prior approach.

Senator Bingaman. When I see that chart up there, it occurs to me that the decline in sulfur dioxide emissions can be explained by at least three different factors: new technologies that have been implemented or used, switching to some alternative energy sources - including low sulfur coal, and the tradeable emissions system. Is there any way to sort out the extent to which the reduction in emissions is attributable to this tradable emissions program?

Mr. Guerrero. Again, the data here are as of about two to three years ago when we issued our report, so I would expect this pie chart would look different today. But if you look, most of the improvements are based on switching fuels. Over half is due to blending of fuels or switching to low sulfur coal. Then you see the second largest chunk is coming from probably scrubbers and then internal offsets. Certainly offsets are essentially internal trades by facilities where they have more than one plant and they are trading internally, they are not trading their allowances with other companies. So trading and scrubbers both make up the remaining chunk.

What we felt in 1994 was there was a very large potential to have interfirm trading, trading among firms, that could realize another over one billion dollars in savings, and it appears now, because there is a 400 percent increase in those trades, that is being realized. So the trading slice of this pie today is probably bigger than scrubbers, for sure, but fuel is what is driving the move to lower sulfur content fuels.

Senator Bingaman. I gather from some of your comments that if you try to apply this program to carbon dioxide, and did it on a worldwide basis, the main problem would be enforcement of any sanctions. Is that the problem?

Mr. Guerrero. I think the kinds of things we tried to lay out in our considerations statement section of our statement is any emissions program really has to reflect a number of key elements. The first is that you need to have a clear environmental goal, a clear environmental statement. And so what you would need to have is a clear goal that the U.S. and other countries would agree to in terms of limitations on CO2 emissions. Once you have that, then the next thing you need is a standardized and verifiable way of measuring those reductions. You couldn't have effective trading without that. So clearly, you are going to have to have a way of standardizing something to be traded.

In the case of the SO2 program, we have a ton of SO2 emissions, and that is a standard unit. It is measurable and it is verifiable using continuous monitoring, and it is accounted for and tracked by EPA program. Something similar to that is verification, standardization, will need to be put into place to make a CO2 trading program work.

Mr. Bausell. To add to that, you are going to face those same concerns no matter what system you implement to control CO2 emissions. I think that is important to keep in mind.

Mr. Guerrero. And finally, I will make two more points. You would need to have sufficient penalties and enforcement associated with that system so that for either countries or firms or both that decide to not comply, the costs of noncomplying are higher than the costs of complying. And then finally that you design a system that is sufficiently flexible to encourage firms to choose among an array of approaches to achieve compliance. The effect is to encourage competition, drive down prices and still achieve environmental gains.

Representative Saxton. Thank you. Mr. Ewing.

Representative Ewing. Thank you, Mr. Chairman.

What has been the role of the Federal Government or the state governments in developing a market for trading these emission credits?

Mr. Guerrero. The role has been varied. As we discussed with the SO2 trading program, EPA's role has been to facilitate trading by sponsoring an annual auction, by tracking trades and kind of keeping the books as it were, how facilities are doing in terms of complying with the law and, of course, taking enforcement action when firms are out of compliance. But in this case there are no instances of noncompliance.

A second role for EPA has been to try to encourage use of trading generally by publishing what I referred to earlier as the open-market trading rules. That rule was criticized by both states and environmental groups. EPA went back to the drawing board and now no longer proposes to issue that as a rule but plans on issuing guidance by the end of this year and is trying to address the concerns that were directed towards it when it issued its proposed rule.

It is hopeful. EPA's view is that an open-market trading rule will kind of fill the gap and give states assurance that as they design what are called implementation plans to comply with the Clean Air Act, that if they build in a trading mechanism to achieve compliance, they will have some assurance that EPA will approve those plans. So the guidance is important in that respect.

And then finally there are states. States are doing things. As I mentioned, the OTAG, Ozone Transport Assessment Group, which is comprised mostly of all the States east of the Mississippi, and the Ozone Transport Group, the 12 Northeastern States and the District of Columbia, have both looked at ways of reducing emissions, particularly what are called precursors to smog, NOx, and are looking at emissions trading as a vehicle for that.

The Ozone Transport Group, OTC, is much further along in that regard. Mary Gade who is here to speak on behalf of Illinois can talk about where the OTAG group is. The ozone group of the Northeast is further along and is working with the EPA to design a trading mechanism similar to the SO2 trading mechanism to reduce pollution in the East.

Representative Ewing. This type of program has been popular with the regulated industries?

Mr. Guerrero. I think it is fair to say that it is popular in the sense that it holds out the promise of complying with environmental standards at less cost without compromising the quality of the environment and without compromising those standards.

Representative Ewing. So the economic standard has been there?

Mr. Guerrero. Yes.

Representative Ewing. Has the economic incentive been counterproductive with some industry who maybe find it cheaper to purchase emission reductions than to actually take steps on their own?

Mr. Bausell. I think, you know, the way the trading system works, in the examples that we have highlighted, there are cap-and-trade programs. So there is an overall cap on emissions. You can't go over that cap. That cap is set based on environmental considerations. Within that

given system, you are free to do what you want to do, and some firms will opt to buy allowances and not to put on additional pollution controls. That goes hand in hand with this kind of system.

Representative Ewing. Is there any limitation on the amount of time they can purchase the credits?

Mr. Bausell. My understanding, and there will be witnesses that follow us that can perhaps elaborate on this, but my understanding is these markets have developed to the point where you and I could go out and buy allowances today and every day for the rest of this year if we wanted to. They are basically continuous markets.

Representative Ewing. And where, and I think you covered a little of that, but what part is it mostly? Is it all over the country that this program has been implemented or particularly in the eastern part of the country?

Mr. Bausell. Well, for the SO2 allowances trading program, Phase I primarily covers this part of the country east of the Mississippi. Phase II will cover the entire country.

Mr. Guerrero. If I could go back to the question about a firm, a hypothetical firm choosing not to reduce emissions and going out and buying allowances instead. That isn't necessarily a bad thing if the goal is to reduce overall emissions in a region and if the emissions you are dealing with are regional in nature and you have determined that hot spots are not going to result.

Let me give you an example. For the SO2 trading program, the kinds of trades that have occurred and the kinds of reductions that have occurred because of fuel switching and other factors have led to 10 to 25 percent decrease in the deposition of acidic precipitants out of the air in the United States, particularly in the Northeast according to the USGS, and EPA has determined that acid deposition will be reduced by some 30 to 40 percent by the year 2010. So it is important to keep in mind in an emissions trading concept to keep sight of the forest and not get lost in the trees; that you may have firms that are making specific trades that suggest for them it is cheaper to buy an allowance or to install a scrubber or go and buy cheaper fuel or lower sulfur fuel, but the key questions to ask is are the environmental objectives being attained, and overall, are the trades that are occurring consistent with the trends you want to see achieved. And so far today with the SO2 trading program, that has clearly been the case.

Representative Ewing. Just one final question. Is this by region, as far as whether these emission credits are available? I mean, do you have to meet a certain standard in a defined area or is it the entire Nation?

Mr. Bausell. For Title IV, it is the entire Nation. Again, keep in mind the environmental problem that is being tackled. That has everything to do with it. Acid rain. If you were going to a global warming trading scheme, it would be worldwide because of the nature of the environmental problem. If it is RECLAIM in the South Coast Air Quality Management District, it is NOx, which is a precursor to ground level smog in that area. So you have to first define the environmental problem very carefully, and then if you are going to consider using a trading scheme, design the trading scheme to combat that problem, which means that your boundaries within which you can trade will depend on what kind of environmental problem you are confronting.

Representative Ewing. Thank you very much.

Representative Saxton. Thank you, Mr. Ewing. Mr. McCrery.

Representative McCrery. Mr. Chairman, I don't have any questions but I want to compliment Mr. Guerrero and the GAO on an excellent report. I wouldn't go so far as to say it knocks my socks off, but very well done. Thank you.

Representative Saxton. Let me just wrap up with two questions that have tickled my interest during the conversations we have had here.

The chart that you had up earlier talks about a variety of mechanisms of reducing pollution, installing scrubbers, switching to natural gas, retiring plants, purchasing allowances, switching over to blended coals, and compliance via internal offsets or Pre-Phase I actions. I am not sure I know what the last one means. Could you start by just explaining that bottom 18 percent?

Mr. Bausell. The internal offsets is where we get a lot of that reduction, and basically it works this way: suppose you have a utility plant and you have several smokestacks. It may turn out that it is cheaper to reduce pollutants coming out of one smokestack as compared to another. You have an overall cap on emissions for that utility plant and you decide to rachet down –

Representative Saxton. Got you.

Mr. Bausell. Okay. That is where most of that is coming from.

Representative Saxton. Now, under the scheme known as command-and-control, would a regulator permit the polluter to choose his or her method of reducing pollution from this list, from this menu?

Mr. Guerrero. No, not typically and that is what is unique about this program. The factors, the key components of this program work together very nicely for the first type to create what I believe is a model for future programs to deal with environmental pollutants that present high costs.

Representative Saxton. Right. Okay. So let me try to get this squared away so I understand what I think is emerging to me at least as a key component of this program.

Under command and control, the regulator might come in and say you have got dirty stacks, and therefore in order to continue to operate within 18 months you will install scrubbers on your stacks. That would be a command-and-control option?

Mr. Guerrero. That is right.

Representative Saxton. That the regulator would have, not the emissions producer.

Mr. Guerrero. That is right.

Representative Saxton. So under this scheme, under the tradable emissions scheme, not only are people able to trade credits, but they are able to choose a method of abatement.

Mr. Guerrero. That is correct.

Representative Saxton. And when one chooses a method of abatement, it introduces a new element into the scheme called competition.

Mr. Guerrero. That is right.

Representative Saxton. So the overall cost of reducing pollution is reduced because scrubbers, for example, might cost less because people have other options that don't exist under the command-and-control scheme.

Mr. Guerrero. Exactly. I could argue that the price of scrubbers when they were mandated were artificially high because they were the only game on the block.

Representative Saxton. Okay.

Senator Bingaman. Mr. Chairman, could I follow up on this?

Representative Saxton. Sure.

Senator Bingaman. As I understand the situation, there are really three models. One would be the one that the Chairman was talking about, where you would have a regulator say you have got to install specific scrubbers at a specific plant. That would be one end of the spectrum, as I see it. A second would be to say you have got to meet the following

emissions standards, and you can choose the way you do it. You can either install scrubbers, or you can change fuels, or you can switch, shut down your plant or do whatever you want to do, but you have got to meet these emissions. This is the more typical model used in the past by the government, as I understand it, rather than saying you have got to install this particular type of technology. Is that correct?

Mr. Bausell. The evidence from Title IV would indicate that there wasn't that much flexibility going on heretofore, because when you look, again, at our pie chart, and you look at how sources were planning to comply with Phase I, a lot of them were switching fuels, and a lot of them were doing scrubbers and a lot of them were doing allowances, and a lot of them were doing internal offsets.

Now, if we had had a system which had a lot of flexibility built into it before we passed that law, would we have expected to see the pie chart looking the way it looks? So while in theory we have had the flexibility of using so-called performance standards which you described, I think historically it has been easier in many instances for the regulator to be more specific about what methods they wanted the industry to adopt to meet the particular regulation. But you are correct.

Senator Bingaman. Yes, what I am trying to get clear, though, is there is command and control which involves setting the technology that you use in order to be in compliance; there is command and control that involves performance standards and you choose the technology; and then there is a third variation, which is to say that we are going to not only allow you to choose the technology, we are going to allow you to trade emissions, and that is an additional way you can be in compliance and that is what you are talking about.

Mr. Guerrero. That is right. You can look at it that way.

Mr. Bausell. I think the way you have described it, you can think of the third system as being an expanded performance standard.

Senator Bingaman. Right. Thank you, Mr. Chairman.

Representative Saxton. Thank you.

Now, let me try to understand one other concept here. The cap-and-trade programs you describe on page seven. Emissions cap-and-trade programs under Title I are designed in a similar fashion to the Title IV Acid Rain Program. States and 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.

So as I listen to your testimony, we are talking about, in this paragraph at least, a regional cap on emissions, and then assigning a part of that responsibility to each emitter.

Mr. Guerrero. That is right.

Representative Saxton. Is that right? Now, is there a different variation other than cap and trade as described here?

Mr. Guerrero. Yes. The other model is this concept of an open-market trading approach which EPA proposed this rule in 1995 and is now back to the drawing board and is planning to issue guidance on open-market trading. The difference there is that it doesn't have a cap. EPA also took a slightly different approach, or actually a dramatically different approach, in terms of defining what constituted an allowance – what they call the discrete unit. It also had certain components that left the burden of proving the legitimacy of the credit being purchased on the purchaser. In other words, EPA proposed a buyer-beware approach rather than having a verifiable system out there.

EPA recognized the reasons why it was doing all that, it just wanted to fill the gap, like the cap-and-trade program had a standard unit that was being traded. It was verifiable, it was being tracked, it had an emissions cap, all those things, but EPA felt that to facilitate trading we needed to fill the gap and encourage states to design programs that might be variations of cap-and-trade programs.

Mr. Bausell. The thing to keep in mind is the traditional way of regulating did not in many cases effectively put a cap on overall emissions in a State or region or city. And so if you keep that in mind, if in other words, typically a source would be told you have to do X. And let's suppose doing X was putting on a scrubber. And let's suppose the scrubber achieves 95 percent emissions reduction. The problem is that the total level of emissions is a function of output. More output, more emissions. Ninety-five percent of a bigger number is a bigger number. Ninety-five percent of a lower number is a lower number. So in many instances we didn't really have an effective cap, so you can think of this open-market trading version as very much in sync with the traditional way that we were regulating sources. It was basically trying to graft a trading system onto a largely intact command-and-control system.

Representative Saxton. For fear of trying to oversimplify what is probably a simple concept if I can understand it, would it be fair to say that the cap-and-trade model would be more environmentally sound than the open-market model?

Mr. Guerrero. I think it is fair to say that the answer to that question is yes, because it provides assurance you will get a certain amount of reduction over a certain period of time.

At a minimum, a cap-and-trade system provides the assurance that you are going to get environmental improvement. And the goal of any emissions trading program ultimately is to facilitate the achievement of an environmental objective but to do it in a way that is cost effective, encourages innovation, and reduces compliance costs that we have become increasingly sensitive to.

Representative Saxton. Thank you. I have no further questions.

Senator, or Mr. McCrery, do you have any further questions?

If not, we will thank you, Mr. Guerrero, for your very articulate testimony and thank your colleagues for being here, and with that we will excuse you and we will move on to our next witness.

As Mr. Guerrero and his colleagues are leaving, let me introduce our next witness, Ms. Mary Nichols, Assistant Administrator for Air and Radiation, U.S. Environmental Protection Agency.

We are happy you could take time out of your busy schedule to visit with us today. The Committee welcomes the opportunity to hear from you, Ms. Nichols, and obviously you are here to voice the Administration's position on tradable emissions programs. And when you are prepared to start, please do so.

STATEMENT OF MARY NICHOLS, ASSISTANT ADMINISTRATOR FOR AIR AND RADIATION, U.S. ENVIRONMENTAL PROTECTION AGENCY

ACCOMPANIED BY BRIAN MCLEAN, DIRECTOR, ACID RAIN PROGRAM

Ms. Nichols. Thank you very much, Mr. Chairman. I know you have my written testimony and I am going to attempt to briefly summarize and get to your questions, because having had an opportunity to hear the previous witness, I know you had a lot of very good questions.

I have to say I really enjoyed Mr. Guerrero's testimony because it is not always the case that I am able to agree completely with what I hear from the GAO witness, and in this instance it was a great pleasure to hear what he had to say.

Thank you for inviting me to be here today. I do want to say on behalf of the Air Program that we have had an excellent experience with the Acid Rain Program. I also point out in my past life before I became an EPA official, I was the head of the California Air Resources Program

and also worked in the environmental movement in Southern California and had an opportunity to participate in the design of the RECLAIM program there. So I am familiar with some of the history and some of the controversies and difficulties that have surrounded the effective start-up of trading programs. Clearly it is a concept that economists have been advocating for many years, but it has taken a long time to really begin to see effective programs in place, and with the Acid Rain, Title IV provision of the Clean Air Act, Congress gave this effort a major push forward.

Over the last 20 years, EPA has learned that market-based programs and other types of economic incentives can dramatically cut costs compared to other approaches and we need to increasingly look for those kinds of approaches as we begin to see the benefits of all the control programs we have had over the last 25 years.

The lead and CFC phase-out plans, in addition to the Acid Rain Program, are examples of how you can achieve environment protection at lower cost. EPA's own analyses have suggested that for the gasoline lead phase-out program, the trading and banking provisions lowered the cost of that program by 20 percent. The cost of the reductions in chlorofluorocarbons using an emissions allowance trading program was at least 30 percent lower than it would have been without the allowable trading. And we, of course, endorse the GAO's projection that compliance costs for sulfur dioxide would be less than half the cost that would have existed without trading.

Even though these are impressive results, we do have to remember that trading is a tool. It doesn't replace the need for setting or achieving an environmental objective. And in fact, we have found that setting and maintaining a cap on total emissions is the most effective way to assure achievement of a specified environmental goal. Capping emissions at a particular level can prevent them from increasing over time as new sources appear or as we increasingly use existing sources, and gives credit to the sources for every ton of emissions they reduce.

Setting a cap also requires that we accurately quantify the emissions in order to verify that cap is being achieved. An accurate quantification not only gives us the assurance that we are getting to our environmental goal, it also assures participants in the market that there is some integrity in the commodity they are trading. In this case, emissions credit. When participants have that kind of assurance in the validity of the credits being traded, the transactional costs are also minimized, and so you can optimize the cost savings opportunity.

Trading is also not appropriate in every situation, but where a particular environmental problem is caused by multiple sources that face different control costs and where you can accurately quantify the missions, we believe trading ought to be seriously considered.

The RECLAIM program in Southern California, in place since 1993, was clearly developed in order to recognize the fact that the south coast was simply running out of ways in which they could effectively develop new command-and-control regulations for an increasingly large number of very small sources that were coming under regulation. And I think that it is also important to recognize with that program that they faced serious resistance from some sectors in the business community who felt that regulation might in many instances be more advantageous to them than participating in a cap-and-trade system. So while the program was widely supported by some of the industries, especially industries that faced some of the largest costs in the past, there were some that did not support the program, at least initially.

Now, with respect to the Acid Rain Program in the Clean Air Act, the allocation system there was in the form of tradable allowances which could be traded freely on a national basis. And because of the factors that you heard about earlier this morning, we do believe that the program has enjoyed a great deal of success.

In 1995, the first year of the Program, we saw the largest single one-year drop in emissions of sulfur dioxides since we began regulating sulfur dioxides in 1970. The 110 power plants that were required to be in the first phase of the Program reduced their emissions by more than 50 percent below their levels in 1980, and 40 percent below the levels that were required by law. In 1996, these impressive results were nearly repeated with emissions 35 percent below the required levels.

These reductions resulted in a decrease of 10 to 25 percent of wet sulfur deposition or acid rain over large areas of the Eastern United States in 1995. Ambient concentrations of sulfur dioxide also declined by 17 percent between 1994 and 1995. When fully implemented, the Title IV reductions will also reduce fine sulfur particulates by 30 to 40 percent, resulting in reduced mortality and morbidity and improving visibility over the entire Eastern region as well.

You heard about the trading experience and so I am not going to go into that further, but I would say that one of the additional benefits that I have seen in the Acid Rain trading program is this faster rate of reductions which I think is a result, at least in part, of enthusiasm for the program, but also in part because having the ability to generate a unit which has

economic value also I think provides an incentive to companies to control faster than they might otherwise have done.

We believe that a similar type of cap-and-trade program to limit NOx emissions could also reduce transported levels of NOx and ozone, which in turn can assist states in attaining and maintaining the health-based ozone standard, as well as improve the acidification of our lakes and streams and nitrification of our coastal waters.

As the model for what was done in the Ozone Transport Assessment Group has shown, NOx is emitted by multiple sources and transported widely across state boundaries. EPA is preparing to manage a regional NOx trading program for the 12 Northeastern States represented by the Ozone Transport Commission which will begin in 1999. The OTC program will include electric power generators and industrial boilers, and will allow emissions trading throughout that entire region.

Before embarking on the trading program, the OTC reviewed analyses indicating that multi-state trading would not hurt efforts to attain the ozone standard and would reduce compliance costs by about 30 percent. Since electric utilities contribute about 30 percent of total NOx emissions and are already monitoring and reporting their NOx emissions under the Acid Rain Program as well as participating in the SO2 allowance trading program, their participation in a regional NOx trading program should be relatively straightforward.

In addition, in response to the recommendations of the Ozone Transport Assessment Group, the 37-state group that was mentioned earlier, EPA is going to be calling on the states to revise their state implementation plans and reduce NOx and transported ozone. We cannot require, under the Clean Air Act, the states to engage in a NOx trading system, but because of the voluntary planning program that we supported and encouraged through OTAG, we are in a position to strongly encourage and support state efforts to employ a multi-state cap-and-trade system to minimize the cost of reducing ozone transport.

Finally, EPA believes that emissions trading is appropriate in the climate change context as well. In January 1997, the United States put forward a climate protocol proposal based on legally binding greenhouse gas emissions budgets that offered countries the option of using emissions trading to achieve needed reductions in greenhouse gas emissions in the most cost-effective manner possible. As the President declared to the U.N. Earth Summit on June 26th, our records in this arena are not sufficient. We must create new technologies and develop new strategies

like emissions trading that will both curtail pollution and support continued economic growth.

Over the next few months the Administration will be evaluating alternative budget levels that would reduce greenhouse gases at costs that are manageable for the U.S. economy. But regardless of the level and timing of any reductions, we believe that the flexibility and incentives for innovation provided by emissions trading will be an essential element of a cost-effective international solution.

Creating an international emissions trading system will require three conditions: a legally binding allocation of emissions authorizations or starting budgets; a standardized and verifiable system of measurement and reporting that enables actual emissions to be matched to the authorized amounts; and an effective mechanism to ensure that all parties are complying with their obligations. This is no small feat indeed, but it will be necessary for an effective and credible international greenhouse gas trading program.

So just to sum up, EPA now has 20 years of experience with emissions trading programs. We believe that cap-and-trade programs can assist us, tackle some of our most pressing air pollution problems, including fine particulates, visibility impairment, as well as ozone attainment and other environmental problems such as acidification, nitrification of waterways and, of course, climate change.

Large stationary sources which contribute significantly to these problems have proven to be amenable to a cap-and-trade approach and obviously should be considered good candidates as we move forward.

As we improve the accountability of our emissions measures from other sources, they too should be considered for inclusion in cap-and-trade programs, and where appropriate to the problem and properly designed and implemented, we have found trading to be an extremely helpful tool, not only for allowing us to reach our environmental goals but for promoting innovation and reducing costs as well.

Thanks very much and I look forward to your questions.

[The prepared statement of Ms. Nichols appears in the Submissions for the Record.]

Representative Saxton. Thank you, Ms. Nichols.

Judging from the compliments you afforded the first panel and from the statement you made, in a very articulate fashion, it appears that you are also a believer in the tradable emissions program. Have I got that right?

Ms. Nichols. I have seen it work.

Representative Saxton. Good. You make reference to cap and trade quite frequently in your testimony. The open-market approach, which was also discussed by the previous panel; do you draw a distinction in finding one more helpful than the other or are they both tools that can be used in individual situations?

Ms. Nichols. They are both tools and can be complementary. Clearly, the cap-and-trade program is a more effective way to achieve the environmental results. There is no question about that. The difference with the open-market program is it can in many instances be put in effect more quickly. It can cover sources that would not normally be in a cap-and-trade system, at least initially, and it helps avoid some of the design issues that do have to be addressed in setting up a cap-and-trade program.

I think New Jersey has the only fully fleshed out open-market trading program that I am aware of. And I have spoken with the Environmental Commissioner there about their experience with generating these discrete emissions reductions and using those for trading purposes. They have indicated that they have had thousands of these reductions that have been created. They were ahead of any legally mandated requirements, they have helped to ease some compliance problems in certain situations, and so they do feel that the program is a useful way to get some companies to engage in voluntary emissions reductions that they would not be able to get otherwise and help demonstrate some new technologies. So I do see a place for those programs as well.

Representative Saxton. Now that is good. The information that I have is that the EPA open-market trading rule has not yet been issued. Is that correct?

Ms. Nichols. That is correct.

Representative Saxton. Now, I know that bureaucracies take a while to make things happen, but inasmuch as we both agree that further emissions trading would be desirable, what in the world has been the holdup?

Ms. Nichols. Well, first of all, we initially thought it would be helpful for states to issue a model rule. A rule that had all the regulatory language so if a state just put it into its plan it would guarantee approval by EPA.

As it turned out, states were so different in their existing regulatory structures, what we thought was a well-intentioned effort to assist was actually creating problems for many states that were interested in getting into open-market trading programs, and raised a lot of concerns on both

the part of the business community and the environmental community where we were calling certain issues black or white based on our own judgment rather than allowing flexibility to the states.

Representative Saxton. Has there been a general agreement of any kind between the two camps you just mentioned, the business community and environmental community? Are people coming together and understanding that these are tools and that they tend to work well together, or is there still a black and white division?

Ms. Nichols. I think there is a tremendous amount of agreement that has been achieved. Looking back not many years ago I would say that most of my former colleagues in the environmental community thought that all trading programs were simply evil, that they were a way of rewarding polluters, giving people a right to pollute, and really would not achieve environmental results. And clearly we have passed that point a number of years ago.

I do think that with respect to whether you use a cap or whether there is room for open market and how the enforcement scheme should work and all of that, there is a lot of debate and it can be down to the local level. I think you asked the question earlier about hot spots and localized emissions. You can get into some very difficult issues at the community level if you have a particular area where they feel they have been subjected to undue concentrations of pollutants and that trading could make it worse, and these can get very controversial.

Representative Saxton. Let me get back to another issue involving EPA. On the issue of RECLAIM program in Los Angeles, I think we all agree it appears to be working well and yet the EPA approval for that emissions program wasn't issued until 1996. What were the issues foremost in preventing this earlier certification program to be issued?

Ms. Nichols. Well, actually, Mr. Chairman, the rule was submitted to EPA in 1993, and it was conditionally approved immediately upon its receipt. There were some issues about the design of the RECLAIM program and how they fit within the Clean Air Act construct, particularly how they were going to fit with new source review and permits for new facilities that needed to be worked out, and it took some time for them to be worked out, but throughout the period of time the RECLAIM program was moving forward. So although I guess you could say that there was a period of a couple of years of lag time while some of these legal, technical drafting issues were being addressed, it did not impede the ability of the program to move forward.

Representative Saxton. Has EPA now adopted a formal position that supports the Southern California program?

Ms. Nichols. We have. We do support the Southern California program, yes.

Representative Saxton. Now, we heard about the necessity of flexibility in terms of the development of emissions trading programs. Is there anything that we in Congress can do to be helpful to EPA in promoting the additional use of trading programs? Perhaps sometimes the most useful thing we can do is nothing. Other times there are tools that agencies like the EPA may need that we can be helpful with, and, obviously, one of the primary reasons that we are holding this hearing today is to try to answer that general question.

Ms. Nichols. Yes.

Representative Saxton. So what are your comments relative to our role?

Ms. Nichols. Well, I might mention a couple of things. First of all, I really appreciate the fact that you are asking the question, and I do think that under the current Clean Air Act there are some places where EPA's authority to require a trading program is limited, and I cite the example under Title I of the Clean Air Act, the nonattainment provision, where because the structure of this law is that each individual state is responsible for achieving the reductions within its own state, it has taken us a number of years to bring states together to address the problem of ozone transport.

Fortunately, the states are moving forward and have been under the leadership of a number of states, one of whom you are going to hear from later on, Illinois, willing to engage with each other in trying to develop a program. I think we will be successful in getting a trading program into place. But it may be that at the end of the period where we are going through this reciprocal process, there will be some states that decide they don't want to participate in a trading program and that could result, then, in a scheme that is somewhat of a patchwork where the cost of compliance would be greater for sources than it would if all the states were in the trading program, and in that instance I think it might be appropriate to seek to address that through legislation. I don't think we need to do it at this time.

Another area –

Representative Saxton. Let me just make sure I understand what you are saying. Your position is that it would be undesirable to have a patchwork program, and therefore a legislated Federal program scheme

is something you would see as desirable, or authorization for the EPA to proceed to avoid patchwork? What are you saying?

Ms. Nichols. Well, neither. I am not here to support legislation at the moment, but if the program does not succeed on a voluntary basis, then we would want to come back to Congress asking for the authority to require it or Congress would want to consider whether they want to mandate the program –

Representative Saxton. I am probably over my time limit, and I understand what you are saying, but doesn't EPA have pretty good leverage currently with command and control? Isn't it possible for you to make voluntary seem like the lesser of all the other evils with regard to cost and production?

Ms. Nichols. Well, hopefully we can be persuasive with people –

Representative Saxton. That is what I meant.

Ms. Nichols. – that a cap-and-trade system is the way to go. I think we have been advocates and I think states have picked up on this idea themselves. But it is theoretically possible that you could have a state within the ozone transport area and which would simply decide that they didn't wish to trade with another state, they have some other economic agenda going on or some dispute and they choose not to participate. We have seen – I know there is legislation that has been introduced a couple of times in different states to forbid sources within their state from trading, that sort of thing. I think that would be unfortunate and we would want to find a way to address that.

Representative Saxton. Thank you. Senator?

Senator Bingaman. Are you saying that this trading system has not necessarily resulted in greater reductions of emissions but has resulted in lower costs to the companies that have had to comply?

Ms. Nichols. With respect to the Acid Rain Program, we have seen reductions coming on line earlier than they would have otherwise, and I think that is attributable to the existence of the trading program.

Clearly, we have the evidence from the monitoring data that the emissions reductions are there. Now, we could have mandated those reductions, you are absolutely correct, but I don't think we could have foreseen that they would have come on line ahead of the time, the deadline that they were required to come on line.

Senator Bingaman. Now, why did these emissions reductions come on more quickly than expected? Was it because of the trading capability? It would seem to me that a rational CEO of a company would decide that

he or she was going to go ahead and come into compliance when they were required to come into compliance, and they would either come into compliance through trading or through some other means, including switching fuels, some new technology or some other reason. But why would the opportunity to trade emissions cause them to want to come into compliance early?

Ms. Nichols. I think there are a couple of answers to that, and others could give you a more sophisticated answer than I could, but based on what I have seen from talking to people in the industry, there are two things.

First, the ability to trade or generate allowances within your own business is one planted in common ownership, provides flexibility and incentive for people to move faster in order to have a future cushion against potential need. Another, I think, is that changing to an allowance system clearly puts this program more into the realm of the economic planning arm of the regulated community than off into what sometimes is a backwater of environment compliance, which is run by engineers and lawyers, but isn't necessarily integral to the company's economic planning.

And I think if – as a regulator over a long period of time, if there is one real advantage that I see in terms of the relationship between the regulated agency, the regulatory agency and the regulated community, it is that these programs appear to give the regulated industry the ability to incorporate environmental costs and environmental thinking into their business planning in a way that nothing else we have ever tried has been able to do.

Senator Bingaman. That is an interesting point. The price of these allowances has been dropping. Is this a cause for concern or is it a cause for celebration?

Ms. Nichols. Well, I think at the moment it is simply a cause to say we know in the past that we have overstated or overestimated the cost of complying with environmental regulations, but it is very hard to get accurate data. And because we now have a trading system where the price is transparent later, it becomes quite clear what the cost of compliance was. So it is sort of reassuring to know that the costs are lower than we predicted in the first place. I think that is a good sign.

Senator Bingaman. Okay. Is it also an indication that more and more companies have come into compliance? I mean, that the need for purchasing allowances has diminished much more quickly than anticipated?

Ms. Nichols. Yes, that the cap was able to be met without as much trading.

Senator Bingaman. As I understand it, these allowances are banked. By one report, the share of allowances banked in 1995 and 1996 were 40 percent and 35 percent respectively. This might be a cause for concern in that this banked allowances eliminate pressure on companies to take any additional action for the foreseeable future.

Ms. Nichols. Yes. As we said earlier, as long as companies are complying with the limits, the emissions limits that are set, we don't care, essentially, how they are complying. So we don't go back and say, aha, we should have made you do more.

It could be as we look at the need for environmental improvement, it may be that the target we set may not be enough to get us to the goal of improving the acidification of the lakes or we need more sulfur control. We might want to set a more ambitious target and then those allowances would begin to disappear.

Senator Bingaman. On the issue of CO2, or greenhouse gases more generally, I think you mentioned three main issues. One was establishing legally binding allocations. Which country you are now talking about.

Ms. Nichols. Yes.

Senator Bingaman. That seems like a major hurdle to overcome.

Ms. Nichols. I think it will be.

Senator Bingaman. Do you have any insight into how that might ever happen?

Ms. Nichols. Well, I have only been a participant in some of the preliminary discussion, I have not been part of our international negotiating team, although I have met with some of my counterparts from other countries who have been over here talking to us.

There are I think in some countries a great deal of skepticism about what the U.S. is advocating. Most countries have no idea what we are even talking about when we begin to talk about this cap-and-trade idea, and their immediate reaction is to be suspicious. The approach in most of the rest of the world would be to mandate specific measures and require all countries to adhere to them. Because the U.S. is such a major contributor, we have so many emissions because of the size of our economy, we clearly have a very great interest in trying to educate the rest of the world about the advantages of this approach and that is what we are trying to do.

Senator Bingaman. That is all I have, Mr. Chairman. Thank you very much.

Representative McCrery. [Presiding.] Ms. Nichols, would you explain to me the auction procedure that the EPA uses in the sulfur dioxide trading program?

Ms. Nichols. I have a response to that question. I have to say that I am not an expert on it, but I know that there are issues about the types of auctions that are used. I have with me here today the head of our Acid Rain Program, Mr. Brian McLean, and if you would like him to come forward, I would be happy to have him do that.

Representative McCrery. Sure, that would be fine. Please.

Mr. McLean. My name is Brian McLean. I am Director of the Acid Rain Program.

In 1989 and 1990 when we were developing the program, statutory language for it, there was a great debate over whether to have an auction, what it should look like, and the committees that were writing it decided to a design that was similar to the way Treasury bills were done, a discriminating price auction, where you pay what you bid. So if you bid $100, you pay $100, all the way down to the clearing price.

What that produces is a range of prices that allowances sell for, and in the first auction there were quite a range because people did not have a great deal of knowledge about what the price ought to be. So it spread from $1 up to $400 or $500. Then in the second auction that price spread, reduced quite a bit, from $25 dollars to $9 dollars, and by the third auction there was about $2 difference between the average price that the allowance sold for and the clearing price. So what had happened was the knowledge about the market matured and this particular type of auction where there were differentiations in price did not appear to be that significant a factor. Some people suggested we sell it off for the clearing price, and today that is usually within $2.

So there had been a debate over what is the right way to do it, and it still goes on and it is somewhat of an academic debate, because it is very hard to prove what the perfect auction design is.

Representative McCrery. So, I mean your conclusion is that it is really an argument about very little now because of the tightening of the disparity of the bids.

Mr. McLean. Right. In the beginning it was a bigger issue because of the lack of knowledge, and now, people, 90 percent of the bids are within a few dollars of the actual price.

Representative McCrery. Okay. Thank you. Thank you Ms. Nichols.

Next we will have a panel of witnesses: Ms. Mary Gade, Mr. Daniel Dudek, Mr. Carlton Bartels, and Mr. Daniel Chartier. Let me just introduce each of them briefly.

Ms. Mary Gade is Director of the Illinois Environmental Protection Agency. The Illinois EPA is in the process of starting a program for the regulation of volatile organic compounds in the Chicago area which includes a trading program.

Dr. Daniel Dudek is a Senior Economist with the Environmental Defense Fund (EDF). He has been a consultant on the trading of emissions nationally and internationally and is the lead analyst on the EDF's atmospheric policy work.

Mr. Carlton Bartels is the Managing Director of Cantor Fitzgerald Environmental Brokerage Services. As one who operates in the market as a broker, he is in a unique position to advise us on how markets can be developed and made to run efficiently.

And finally, Mr. Daniel Chartier is the Manager of Emissions Trading for the Wisconsin Electric Power Company and will bring us the perspective of someone who consumes tradable emissions for an electric utility.

We will begin with Ms. Gade.

STATEMENT OF MARY GADE, DIRECTOR, ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

Ms. Gade. Thank you, Mr. Chairman, Members of the Committee. Good morning. My name is Mary Gade. I am Director of the Illinois EPA. I would like to thank you for inviting me to testify today on a subject that the State of Illinois and I personally feel very strongly about, and that is the tremendous potential for emissions trading to contribute to cleaner air, not only faster, but also cheaper.

Our commitment to such an approach is evidenced by a new market-based program we are launching in Illinois to address volatile organic compounds, one of the major precursors to ground level ozone. Smog is Illinois' number one air quality problem and it impacts seven million of our citizens in the Chicago metropolitan area. Since 1990, the Chicago metropolitan area has been ranked as one of the nine worst ozone attainment areas in the country, and despite the best efforts of regulators like myself to impose increasingly stringent controls at ever higher costs to our industry, the area continues to have ozone exceedences.

Unfortunately, I am sad to say the most recent exceedence was just last week.

Consequently, four years ago, the Illinois EPA began to look at market-based approaches as part of the solution. We recognized that if we continued to rely solely on traditional command-and-control regulation, we would impose tremendous costs on our industry and inadvertently we could become a deterrent to innovation.

I think what we have learned over the last 30 years is that when government mandates the solution, usually through technology-based standards, rather than setting an environmental goal and letting industry find the best way to meet it, it can lead to mistrust, litigation, and industry seeking the lowest common denominator while paying the top dollar.

We knew there had be to a better way. To find it we worked closely over the last several years with major companies in our State, the Environmental Defense Fund, including my fellow panelist Dan Dudek, who has made a substantial contribution to our effort, and others from the public and private sector to craft the first VOC trading system in the Nation. I am pleased that President Clinton recognized our efforts as a model of government reinvention in 1995.

The Illinois emissions reduction market system will begin full operation 1999. It is based on three key principles. The first and obviously most critical is the protection and improvement of air quality. This will be accomplished through a cap requiring 12 percent reduction from baseline emissions starting in 1999. Unlike open-market trading, the cap guarantees we will see the reductions we need to protect our air quality. Because of the seasonal nature of ozone, these reductions will apply only through the May through September summer season.

Approximately 244 facilities will be covered by the program. These reductions will apply to a source's baseline emissions. Trading allotments will be assigned and written into the source's Title V Clean Air Act permit.

The second key principle emphasized repeatedly in conversations with businesses was that there should be a minimum of government interference. We have accomplished this by creating a system where no regulatory review or prior government approval of specific transactions is needed because all the trading limits have been created up front and do not require validation during the transaction process. As a result, we believe that trading costs are going to be substantially reduced and there will be more incentive for increased participation by industry.

The third key principle is that sound performance accountability standards must be part of the system to safeguard environmental progress and ensure the integrity of the market. Reports on VOC emissions and trade for each participant in the system will be compared during a three-month reconciliation period. If a company exceeds its cap, they will be penalized by having to obtain more units at a premium price.

Besides the immediate air quality improvements for the Chicago area, we expect this approach to deliver more environmental bang for the buck. Our comprehensive analysis indicates that if we implemented California level VOC command-and-control regulations it would cost 85 percent more compared to a market approach. Or to put it in dollars, we estimate that a California approach in Illinois would cost $20.9 million versus $3.2 million under our system.

Additionally, we expect individual companies in the Chicago area to benefit. Abbot Laboratories, a major international pharmaceutical company, recently testified in hearings in Illinois that under a traditional regime of command and control it would have to spend between $15 and $20 million to meet our 12 percent reduction. Through trading, Abbott estimates it will cost them $2 to $4 million for each of its 301 emissions units in Illinois. These are significant savings that are important to the Illinois economy and the lives of our citizens.

So while Illinois' system is not yet operational, we have very high expectations that our VOC trading program will work much better than a traditional command-and-control program. We think that our cap-and-trade program will ensure that air quality controls are met while simultaneously allowing businesses to do what they do best, make business decisions about the best means to satisfy these goals. We think we have the formula for success in Illinois, and I thank you for the opportunity to share it with you.

[The prepared statement of Ms. Gade appears in the Submissions for the Record.]

Representative McCrery. Thank you, Ms. Gade.

Mr. Dudek.

OPENING STATEMENT OF DANIEL DUDEK, SENIOR ECONOMIST, ENVIRONMENTAL DEFENSE FUND

Mr. Dudek. Thank you, Mr. Chairman.

My name is Daniel Dudek and I am a Senior Economist with the Environmental Defense Fund, a not-for-profit environmental organi-

zation with over 300,000 members. EDF's mission is to solve environmental problems combining science, law, and economics.

EDF is an environmental organization. It is unique in its particular focus on development of market-based environmental policies.

I am here today as an unabashed advocate of properly designed emission trading policy tools. We believe these tools provide superior environmental results, reduce compliance costs, create financial rewards for environmental performance, tap business expertise in the search for new solutions, and create incentives for new technologies, processes, and environmental management.

We believe that the Nation has accumulated significant experience with emissions trading programs, as you heard, implemented initially in the 1970s to accommodate the problem of rigid compliance deadlines and the need for local economic growth and employment. Since that time, emissions trading and banking have been applied to heavy duty engine nitrogen oxides and particulate emissions, lead phase down in gasoline by refiners, reduction of production of stratospheric ozone destroying chlorofluorocarbons, cutting acid rain, retiring high emitting vehicles, creating incentives for alternative vehicle fuels, and reducing pollution discharges to rivers and lakes.

In this 20 years of experience, we have learned a number of valuable lessons. The first and foremost lesson has been that properly designed programs work. They work in reducing costs, creating new markets, and delivering superior environmental performance. For example, under the Acid Rain Program, as we have heard, allowance prices have been as low as $60 a ton. Contrast this with the legislative provision, which is the direct sales subaccount insisted upon by industry as the Congress was debating the program, which offers allowances for sale at $1,500 per ton. As you might imagine, there have been no takers to date.

Whole new businesses such as Cantor Fitzgerald's Environmental Brokerage Services now exist and thrive. We also heard that in 1995, utilities saved 39 percent of the emissions they could have discharged. In 1996, that number was 35 percent. This is over six million tons of sulfur dioxide not put into the atmosphere. This degree of performance is unprecedented in the history of environmental management.

The second lesson, and I think the key to the success of this program, is that emissions trading can be as simple and effective as everyday tools, like a checkbook. In effect, under cap-and-trade systems, the government opens an account for each source and makes an initial deposit. Under the Acid Rain Program, Congress determined what those deposits were.

Deposits in the form of allowances in those accounts are good until they are used. Withdrawals from the account are emissions while deposits can be made by purchases from other sources or savings in terms of emissions at that unit. Compliance, then, is as simple as checking the balance in the checkbook. You look to see whether it is zero or positive.

With today's electronic tools for record keeping and recording with the emphasis on quality assurance, the early forms of emissions trading back in the 1970s seem more like a mercantilist barter system than a modern market by comparison.

From those early experiments, we have also learned the importance of establishing and maintaining clear rules of the game. In the past, regulators have confiscated the contents of emission reduction banks. You can imagine the signal that this has sent to the market. However, under cap-and-trade programs, which focus on limiting the total quantity of emissions, both businesses and the public know exactly how many emissions can be discharged.

As a consequence, both financial and environmental integrity are designed into the program. On the other hand, with open-market trading, companies don't know whether the reductions they have purchased represent real surplus reductions that qualify to compensate for real present emissions. Both environmental and financial uncertainty are at a maximum.

Finally, from our own perspective and involvement in designing and proposing a number of emissions trading programs, we think that it is critical that innovations like emissions trading are designed with utmost attention to preserving environmental integrity. Their effectiveness in reducing cost, enhancing our magnificent economy, and protecting Americans' health and resources critically depends upon public acceptability and confidence.

The status quo is a vicious competitor, and it is all too easy to level the criticism that these programs allow companies to buy and sell licenses to pollute. Emissions trading is about turning the existing regulatory programs on their head, from regulations that prescribe the most that companies must do, to establishing a framework in which doing more than the minimum is rewarded by the market.

While we have learned a lot and put it to effective use, very substantial economic gains can yet be made, gains which would only enhance our competitiveness. This past year I was involved with the design and development of the first interstate trade of nitrogen oxides emission reduction credits involving the States of New Jersey and

Pennsylvania. This innovative transaction was initiated by Merck, a company known for its creativity. It also involved Cantor Fitzgerald's Environmental Brokerage Services. While all the parties were willing, the institutional infrastructure was weak. Final approval of the transaction is going to have to be left to EPA due to differences in the accounting and inventory rules between the two states.

Just as the Interstate Commerce Commission helped forge a common market for our Nation, the EPA needs to foster transactions in these new environmental commodities. Furthermore, states and companies should be given a clear and unequivocal sign that emissions trading is the policy tool of choice. Fast track approval authority for States using cap-and-trade policies would be timely and welcome.

EDF has a strategic vision of a full set of markets for environmental commodities, including greenhouse gases, that would exactly complement the markets for normal goods and services. This innovative policy structure would free us from debating the hypothetical effectiveness and cost of this technology or that. Instead, we would harness the genius of the market, comprising our collective American ingenuity in the search for lower cost, higher profits, and more environmental performance.

It is no wonder there are trading partners who are also involved in international negotiations on the control of greenhouse gases who are anxious about our substantial lead in environmental innovations. We urge Congress to extend this success to other pollutants, sources, and nations. This is a profound environmental revolution which is occurring, and I thank you for the opportunity to testify before you today.

[The prepared statement of Mr. Dudek appears in the Submissions for the Record.]

Representative McCrery. Thank you, Mr. Dudek.

Mr. Bartels.

OPENING STATEMENT OF CARLTON BARTELS, MANAGING DIRECTOR, CANTOR FITZGERALD ENVIRONMENTAL BROKERAGE SERVICES

Mr. Bartels. Thank you very much.

I am Carlton Bartels, Managing Director of Cantor Fitzgerald Environmental Brokerage Services. I have been dealing for my entire career with the integration of environmental concerns and business concerns. I have been a utility planner, Director of Regulated Utility Planning for the State of Vermont, where I addressed it from a public policy issue, have been a Senior Scientist for the Tellus a institute for

environmental policy, I dealt with it from a sort of a theoretical public policy viewpoint, and that has led me to the conclusion that environmental trading, where it can be done, is really the soundest approach we have. As a matter of fact, the reason I am at Cantor Fitzgerald is I went to explain the program to them, Cantor Fitzgerald is a very large inter-dealer-broker, we do about $30 trillion a year in U.S. debt equity and global debt, and they said, you really believe in this program, I said yes, and then they did something all consultants hate, they said, do you want to come and do it. I said yes. I now have eight people in environmental brokerage services working in programs all around the country and helping develop more programs.

The reasons these programs are good, first, they are successful. Environmentally, this is the only program I know where we draw a permanent line and say to the sources involved, this is all you will be able to emit, period. That has very interesting implications. First it says our environmental pollution rights are a scarce resource. You cannot just issue it and keep coming in and polluting more because you have promises of jobs or whatever. If you want emission right, if you need that for your economic activity, buy it from someone who has less of a need for it.

Now that we have a scarce resource, how do we best get it to the right people. Is it a bureaucrat allocating it or do we do what this country does best, let market forces allocate it and get it to the highest value use? That is where the savings are.

In an earlier question it was asked whether or not individual levels and performance levels on each source is good. That gives a polluter no reason to go below those levels. Once you are in compliance under the old system, whether it is a performance standard or technology standard, you have no reason to ever go and reduce further. In these programs you do. And that leads to innovation. Innovation in both new technologies and support for the market.

There is no doubt that this market is fully supported. There is no lack of market support mechanisms. You can get all the information you need, you can design custom-tailored, intricate trades, or you can turn to a spot market and say, what can I buy 5,000 allowances for. That spot market service costs you 50 cents in allowance right now.

I think the success of these programs is going to lead to their expansion; we are going to see the expansion along a couple of different lines. Number one, more types of emissions and related things will be

traded. Whether they are other air emissions or water emissions or water rights, trading will be increasingly used.

You will also see an expansion to smaller and smaller users. Right now we are focused on big spot users. One of the problems with the Acid Rain Program, is it is very expensive to comply with and participate in, and that limits the applicability to smaller sources.

One of the problems is perfection can often be the enemy of the good with them. We strive to be perfect in compliance by each source and to ensure that each trade is "good." As we expand programs, it is important that we try and keep program designs simple.

The focus for programs should be to write a simple program with clean rules and one that is strictly enforced. We should not attend to a lot of hypothetical market - potential market failures and hypothetical environmental failures. It is important to put backstops in to ensure things are there, but let's not try and prejudge failure and make the rules too complicated so that the market cannot exist.

There is discussion about whether or not it is appropriate for the regulators to get involved in market development. If there is a market there and there is a dollar to be made, we, the private sector, will develop the market. Trust me on that.

Now it can argue that the EPA auction does not do that much damage anymore. Nobody has said it has helped the market recently. It is not a necessary role, it is just a distraction to the EPA from enforce-ment, which is what their focus should be on. Environmentally we need backstops but they should be written into the rules and not ad hoc.

In the RECLAIM program, there is a revisitation to see if it is meeting the environmental goal. We know that in 2004 that program will be reviewed. We know there will be a debate up to that point and the market can assimilate that information and react to it.

One other issue is, as we go forward, we must be careful not to penalize activities that are done prior to the establishment of programs. This was raised earlier. There is a fear that if a program is coming down line and an allocation will be made in the future based upon your historic use that you as a polluter will be disadvantaged if you do anything right and clean up in advance. We should be very careful not to penalize early cleanup.

Finally, I see the largest program available and the ultimate implementation of this mechanism is we probably can and should have a greenhouse gas program. I believe that a sound place to start is domestically. I do not think we have to get a one-size-fits-all economies

of the world program in place immediately. On the other hand, I do believe that the United States with 20 percent of global greenhouse gas emissions is a very good place to start. If there are partners that are interested, have robust capability of enforcement and want to join in, they can. I think if you created such a program, you would find that, one, there are a lot of opportunities domestically for greenhouse gas offsets, much less expensive than expected. We have them for sale right now, 30 cents a ton and lower cost. Two, that once a trading program establishes there are dollars there, other countries will want to join us, because it makes sense. We will demonstrate it with a domestic program. With a small, tight focus it will be much easier to move ahead.

It was asked earlier whether industry embraces trading programs. I think industry's first reaction, in general, is please don't regulate us anymore. But if you have to, give us the flexibility of doing it through trading. That is why I see these programs continuing to be supported, the strong environmental gains and the flexibility to the government and the economic gains or the strong flexibility to industry.

Thank you very much.

[The prepared statement of Mr. Bartels appears in the Submissions for the Record.]

Representative Saxton. [Presiding.] Thank you very much, Mr. Bartels.

We will now hear from Mr. Dan Chartier, who has been introduced already, I understand, as Manager of Emissions Trading for the Wisconsin Electric Power Company.

Sir, you may proceed.

OPENING STATEMENT OF DANIEL CHARTIER, MANAGER, EMISSIONS TRADING, FOSSIL OPERATIONS BUSINESS UNIT, WISCONSIN ELECTRIC POWER COMPANY

Mr. Chartier. Good morning. Thank you for the invitation to participate in today's hearing.

My name is Daniel Chartier and I am the Manager of Emissions Trading for Wisconsin Electric Power Company. I think it is really important to note that I am the only utility represented here, but that the utility industry is the industry that is most effected by the regulations that involve trading. It is important to note that it is only through cooperation between the regulated community, regulators, and lawmakers that innovative programs such a Title IV of the Clean Air Act can be

successfully designed and implemented to achieve environment benefits while sustaining our economy.

I am here in two capacities. I have already noted that I am the Emissions Trader for Wisconsin Electric and I also do our compliance planning for SO2. Second, I am here representing the Emissions Marketing Association, which is an independent, nonprofit trade group that I am currently the president of. We have members from the utility industry. We have brokers such as Cantor Fitzgerald that are members. We also have independent trading firms, coal companies, consultants and several international members.

The importance of the Emissions Marketing Association in helping to ensure that the word gets out on the success of emissions trading can't be understated. For your information I have included a package of materials in my written testimony that gives you background on the EMA.

You have already heard ample testimony on the success of Title IV and emissions trading in general. What I want to do for a minute is focus on Wisconsin Electric's specific experience in emissions trading.

WE's experience with emissions trading is very positive. Even prior to the Federal Clean Air Act, Wisconsin Electric was trading SO2 emissions under the State of Wisconsin's own acid rain law. That was passed in 1985. As a point of reference, this law called for SO2 reductions that are more stringent than the current Title IV standards. This landmark legislation also allowed for utilities to do system averaging, which is essentially the ability to trade emissions under common ownership. This law also allowed for trades between Wisconsin utilities. In fact, while some utilities were grabbing national attention for doing the first trades under the Clean Air Act, Wisconsin Electric had already quietly traded SO2 emissions using an innovative options structure under Wisconsin's acid rain law.

In addition to trading under Act 296, we have assisted companies in our territory locate and trade VOC offsets which have allowed them to either locate within our service territory or expand production because we are in a nonattaiment zone for ozone. We have participated actively in the debate over OTAG NOx reductions and participated in the design of the recommendations that came out regarding trading.

We also have two joint implementation projects for CO2. The first is with the Czech republic. That is a project that has switched a dirty brown coal burning power facility to burn clean natural gas, cleaning up the environment for several pollutants, SO2, NOx, as well as reducing CO2.

We also have a joint implementation project with the country of Belize. In partnership with The Nature Conservancy, we have bought land to protect it from deforestation, and are also managing those forests for sustainable harvesting. And more recently we have become involved in the debate on the potential applications of trading for greenhouse gas reductions.

With such varied experience with emissions trading, we would like to share with you our point of view on the aspects needed for a successful market.

First is simplicity. EPA only records trades; they do not become involved in determining whether a trade is a good trade, whether it was purchased at the right price or not, and that is fantastic. As an industry participant, I want to make the choices over what trades to do. It shouldn't be left up to the EPA.

The second is flexibility. Flexibility has been brought up before and it is extremely important. The ability to choose the best option for my utility should be left to me. EPA could go out and try to make these choices, but considering the varied number and types of sources of a utility and the magnitude of sources in the United States, I can't see how the EPA or any other regulatory agency could do as good a job in terms of what is best for my situation.

Third, regulatory certainty. I need to know that a program will be there in the long run. As a trader I don't want to trade into the future, for example, the year 2002, and find out that the program went away. That would discourage me from participating in the market, so regulatory certainty is important.

Fourth, certifiability. It has been brought up before. When I trade in emissions I need to know it is a good commodity. I don't want to present a SO2 allowance to the EPA only to have them tell me it wasn't created properly. So up front there has to a method of certifying, no matter what the market is.

And last, to repeat what you have already heard, early reductions should not be penalized in any way. On Wisconsin Electric's system, for example, because of the timing of capital turnover of equipment you may want to, knowing that a future regulation is going to require you to reduce emissions, install that piece of emission reduction equipment when it is most advantageous. That can be sometimes two or three years before a limit is actually imposed. And we, in fact, did that in one of our power stations, changed out equipment, and we would have hated to have lost the recognition of that early reduction.

Two additional points I would like to make overall. I think there needs to be more education and more outreach through government regarding emissions trading. The press has a field day with it. Headlines such as buying or selling the "right to pollute" or inferring that we have found a "loophole in the law", do a lot to damage the credibility of emissions trading. The simple fact is, as you have heard today, emissions trading is working, emissions are down, the environment is already improving.

And last, trust the science. There are a lot of people out there that will try and tell you that directionality issues are a concern even though the science doesn't support issues such as that. NOx modeling can now predict the impact with a fair amount of certainty. Trust the science, don't listen to just the rhetoric.

In conclusion, I would like to state that the emissions trading is a tool that allows utilities and others to achieve significant environmental benefits while sustaining our economy.

Thank you for the opportunity to testify today on the topic of tradable emissions.

[The prepared statement of Mr. Chartier appears in the Submissions for the Record.]

Representative Saxton. Thank you, Mr. Chartier.

Let me just say welcome to Ms. Gade, Mr. Dudek, and Mr. Bartels. I am sorry I had to run out but it was quite a remarkable event. Those of you who follow legislation around here know that sometimes Northeastern Republicans sometimes have a more difficult time dealing with environmental issues in the West, and today was a time when we brought to the Floor a bill which we had been working on all year so that Northeastern Republicans could agree with Western Republicans on an environmental issue that has to do with forest management, and it was kind of a celebration, so I had to go do that.

In the interest of hometown accommodation, let me turn to my friend from Illinois for his statement and questions, whatever.

Representative Ewing. Thank you, Mr. Chairman, and I am glad the message is getting through to the Northeast.

Representative Saxton. Oh, boy. We haven't voted yet.

Representative Ewing. Mary Gade, thank you for coming and I am sorry I missed your testimony. Mary is the head of the EPA in Illinois and doing an excellent job for our State and I just feel proud to have you here.

Representative Saxton. Do you want to ask questions now or I will?

Representative Ewing. You go ahead. I will pick up.

Representative Saxton. I just have one question to ask each of you. Each of you have testified, apparently, in optimistic and positive terms about the program with perhaps each having some reservations. So let me just ask in your opinion, what is the greatest attribute or success of the program as you have experienced it, and on the other hand, what, if anything, is the greatest failure? Why don't we start with Mr. Chartier and come right across.

Mr. Chartier. I think from the perspective of Wisconsin Electric, the greatest attribute is we have saved significant money for our customers. In my written testimony, I detail a little bit about our compliance planning, which is to switch fuels in time for compliance with Phase II. But in studying the options, fuel switching would not take us all the way.

I have identified in my testimony that the alternative was to install scrubbers in two of our units or turn to the marketplace and buy credits from a different source. Simply put, we are saving over $100 million for our customers by being able to turn to the market to buy those emission additional reductions, so the fact that there is a cost savings is a great attribute.

The second is environmental progress. In Wisconsin, because of our own acid rain law, we have been doing detailed studies of our lakes, forests, and rivers, and the environmental benefit is being shown already. The environmental benefit started prior to the enactment of the Clean Air Act based on Wisconsin's actions alone and continues now that the Federal Clean Air Act is in place.

Referring to the detrimental parts of the Clean Air Act or the trading provisions, there is really nothing that I would change, per se. The topic of the auction has come up. There is a great deal of debate over what auction system would be the best, how to run it, when the timing is, all that good stuff, and the drafters of the Clean Air Act were well intentioned. I am not putting it down in any way. The belief at the time was something was needed to promote the market, get it kick started.

Today it is no longer needed. I think if we were to do new trading programs I wouldn't put in an auction provision. The market is smart enough now. The third parties are out there. We wouldn't need a government mandated auction, so that would be the only change I would recommend.

Representative Saxton. Thank you.

Ms. Gade, let me just say hello from Commissioner Bob Shinn, who is my neighbor back home.

Ms. Gade. Thank you. I would like to say that I think the greatest attribute of emissions trade programs, particularly a cap-and-trade program, is the certainty it is going to provide me as a regulator responsible for the health and well-being of 700,000 Chicago area citizens, that we will be able to achieve our air quality goals.

I am convinced that the 12 percent reduction we are imposing on Illinois' businesses, starting in 1999, will get me to the Clean Air Act ozone standard, health standard that we have been unable to achieve over the last 20 years using traditional command-and-control technologies.

One of the problems with imposing traditional command-and-control technology-based solutions, you may get a company specifically putting in a thermal oxidizer for a VOC problem, but that doesn't tell you that you are going to get the necessary reduction.

The cap-and-trade emissions reduction program that we are implementing in Illinois, and we will see elsewhere around the country, and the Acid Rain Program gives us that certainty that we will meet those goals, and it also allows me as a regulator to do something we have never had the privilege of doing, working hand and hand with industry to provide them with the flexibility to make their own business decisions.

So I have been able in the course of working with industry in creating this program to create a much better cooperative relationship. We have a common objective and goal, and so I think that Illinois' businesses are prepared to go forward to try and come up with some more innovative solutions to some of the problems we have been grappling with from our very narrow bureaucratic perspective, and finally and probably foremost is probably at the same time we are improving air quality, we expect to have substantial economic benefits accruing to the State of Illinois.

We did a large amount of analysis about what we thought the cost savings were going to be from our VOC trading program and we estimate we are going to save 40 to 50 percent in job losses over traditional programs. We expect that savings to individual companies which would range under a traditional program from $700 per ton of reduction to $18,000 per ton, would be more in the range of $3,000 per ton. That is money that can be plowed into further environmental protection or other programs that will then enhance the quality of life for Illinois citizens. I would like to say those are the many attributes I see coming from this.

In terms of failures, I think that emissions trading has been so long in coming and it has got so far to go. I think it is sad that we have taken so long too. I am proud that Illinois is a leader, but I am sorry to say some other states have not yet done it.

I had the privilege of chairing the 37 groups that have been working the last two years to look at the issue of transport of NOx and VOCs across the country, and I am pleased that forum has engendered a better understanding and the recommendation from those States which enthusiastically endorsed a NOx trading system for this country that will enable us to take the next step in putting in an effective trading program for NOx.

Representative Saxton. So you would like to see more progress more quickly.

Ms. Gade. Precisely.

Representative Saxton. And I hate to follow up because I don't want to prolong this, but is there something we can do to get the EPA to move forward faster or is there something legislative that is needed to make the program proceed more quickly?

Ms. Gade. I believe there is adequate legislative authority to proceed under these programs and EPA has already done the relevant rule-making. They put out in March of 1994 economic guidance for these kinds of programs that will allow States to implement them through their State implementation plans and move forward.

What I think we would like to see is more guidance to come up with a uniform framework. There are various components necessary to move forward. You need to have, if you are going to do interstate trading of NOx credits, you need to have a uniform currency, a uniform banking mechanism, and a uniform way of assigning those allotments. So EPA has a role to play in setting up that framework and helping states implement, and the states asked that they indeed play that role.

Representative Saxton. Thank you. Mr. Dudek.

Mr. Dudek. Thank you very much, Mr. Chairman. I think the largest asset that we have had with respect to these programs has been the ability to learn, to learn by doing, and the harnessing of human creativity, being able to learn from the 20 years of experience with emissions trading over a wide variety of sources, many different states, jurisdictions, and legal authorities.

We have been able to synthesize that learning into what we feel is a modern, effective, streamlined system for delivering market forces to solve environmental problems in the form of cap-and-trade programs like

that typified by the Acid Rain Program. We have built a substantial base of public understanding of the effectiveness and incredible environmental benefits that can be delivered from these programs, not only as reductions sooner but as sooner relief, for example, for acid stressed ecosystems in the Northeast.

This understanding has spread internationally. I was involved in the first emissions trade in Poland between a steel mill and power plant which saved 3,000 jobs in a heavily polluted region. It didn't involve any external financing. There was no rich uncle that came in and saved them. It was just the ability to think and have the flexibility and freedom to rearrange their own resources.

I think our greatest problem and liability here is the threat that we will lose the momentum, that we will lose public confidence through poorly designed programs.

We have a very specific concern about the open-market trading approach. It seems to us it maximizes precisely the uncertainty associated with environmental performance and the integrity of financial assets involved here. We have had, and you have heard from Wisconsin Electric, and also from Mr. Bartels, Ms. Gade, substantial problems involved in public education and building support. What companies want to know is that when they purchase these assets there is no question that they are completely equivalent as a compliance tool. We want no uncertainty with respect to the criminal penalty provisions of the Clean Air Act, for example, of whether when they have paid money for something they don't know whether they are going to have its use denied and then be thrown in jail. So we have a long way to go. I think we need to build on the progress and the existing structure we have and go with what works.

Representative Saxton. Thank you. Mr. Bartels.

Mr. Bartels. I would like to say yes, yes, and yes, I agree with everything that has been said, especially the points that have just been made by Mr. Dudek. I think he is correct. We have momentum here. It is important to maintain it, to sort of drop down from the high level to the low level. I think a couple of smaller points that are important are that these programs are very front loaded. They are marvelous on the backside. They are marvelously efficient from a regulatory standpoint.

EPA estimates that the Acid Rain Program addresses about 40 percent of the emission reductions in the Clean Air Act with about 2 percent of the staff and resources. When you set these programs up they need proper attention in design and the design should be really again

simple, elegant, but they should be enforceable and focused on enforcement.

The only other major issue that I see looming is the fact that we must make clear where we are going and lay out a path and that they are not going to again penalize people for doing things in advance. We have opportunities now where we can get reductions be it in greenhouse gases or whatever, but it has to be clear that they (the reductions) will count in the future. Because if you don't send out that message any reduction done in advance of programs, you are incentivizing delay. I have heard people say, I could have done this years earlier (reduced emissions) but I would have lost money doing it. It didn't make any sense, I had no reason to do it and I would be penalized if I did. That is a very dangerous situation.

So as we moved forward, being clear in that respect that current reductions will count and also clear about what may cause us to revisit future programs and cause adjustments. We want to recognize these programs are in motion, we set the cap to the best of our knowledge today, but our knowledge is limited, it may change. We are not going to come in randomly from left field with new regulations and different kinds of programs. Instead, in five years, 10 years, whatever appropriate, we will revisit this cap. If you have the revisitation embedded in the program, the market can see it coming, can listen to the debate and adjust its expectations. But if regulators come in and say, gee, we don't like the way this program is working for some very particular reason and come in legislatively from a particular angle, it is very damaging and creates uncertainty and keeps people from trading and participating.

Representative Saxton. Mr. Ewing.

Representative Ewing. Mr. Chairman, that would be a good place to stop but I do have a couple little questions I wanted to ask. Is there any trading of mechanics credits on any of the formal markets in the country? I mean, is that - are those credits traded?

Mr. Bartels. No, there are no credits traded on formal markets, in particular because the volume is not there to attract a formal market. But let's not be confused that formal markets are better. Cantor Fitzgerald is focused on informal markets and we have developed some of the most efficient markets in the world. Our U.S. Treasury market, a $20 trillion a year trading market, is probably one of the most efficient markets. We do more volume than the New York Stock Exchange. Being informal allows us to innovate and react much quicker to what this market needs.

Our product design and product mix is a lot different today than when we set out in the emissions market. We have competition that is in

there innovating and nudging us, and the cost of making a trade has gone down and the ability to make trades has gone up.

We have done cross market trades where people who are in RECLAIM and the Acid Rain Program have been able to sell one type of credit and buy the other. All of this comes out because we have flexibility and the ability to react and the incentive to react.

Representative Ewing. Well, I wasn't indicating that the formal market was better. It was a question as to whether that is where it was traded. In its informal market, who are the traders?

Mr. Bartels. The traders are - the utility companies are natural traders. Let's make a difference. There is someone who is buying and selling for their need and then there is someone trading for profit and brings liquidity into the market. There are large companies such as Enron, AIG Trading that are publicly managing books in SO2 emission allowances. There are utilities managing books as a profit center. So they are bringing liquidity into the market and as a result the trading volume is at least one or two order of magnitude higher than just last year. A slow week does about as good as a good month last year. So the market has moved along very nicely.

Representative Ewing. We hear a lot here in Washington about the new EPA standards on the Clean Air Act that the President has just come out in favor of. What impact are they going to have on this program and can we meet the challenge of those? Will this help us meet that challenge?

Ms. Gade. Representative, I think one of the exciting things about this framework is its ability to address the standard change or address any unforeseen air quality issues that arise that a bureaucrat was not able to anticipate in 1994 when we were trying to figure out how we are going to come into compliance with the Clean Air Act by 2007. While I am not willing to take on the issue of the ozone standard right now, I can tell you that the Illinois VOC trading framework can adapt to whatever the standard is and we may have to go back and do yet another round of reductions, but our program is geared to do that and our industry is prepared. That is how the program works.

Mr. Dudek. If I might add, Congressman, I think these new proposals put an intense premium on developing this type of strategy on a broad interstate and regional basis. We have this preexisting balkanized state-by-state old, creaky, rickety system for delivering air quality. We don't have an effective means for moving these emissions reductions across state borders, even though as in the case I was discussing before

in Pennsylvania and New Jersey, the two plants were literally within spitting distance across the river, one from the other. We need a whole new mechanism for dealing with interstate transport, transboundary pollution, just as we needed an interstate commerce commission to develop a market for goods and services here.

Representative Ewing. Is there more legislative authority that is needed to expedite that?

Mr. Dudek. I think that EPA certainly has much that it could do with respect to issuing guidance in relation to establishing comparability requirements between States, which would allow people to say a ton is a ton, yes, these are equivalent, and also would allow the EPA to say that States that have programs with the following criteria in terms of meeting inventory management and accounting principles, that have trading with source or sector caps, that utilize stringent monitoring and enforcement, can of course get fast track approval authority and will be allowed to go out and trade one with the other.

Representative Ewing. So the Federal EPA probably has had authority if they would take the initiative and make that movement. And would it be proper to say or correct to say that with the more stringent standards, they are going to have to move in that direction if we are going to have the tools to meet those?

Mr. Dudek. I think there is no question at all about that.

Representative Ewing. Okay. Thank you.

Mr. Chartier. Could I add one point from the utility industry perspective, and that is when you talk about the more stringent standards and the applicability of trading to them, we do believe that trading can be a positive tool for the new standards that have been proposed. But what we see happening is people are using the fact that trading is available, to try to impose more stringent standards than science is able to support. They say the cost savings will be greater and therefore we should impose a more stringent standard than science is able to support. It is just a caution. You have to listen closely to what information you are getting from the various groups.

Representative Ewing. Mary, one thing we are concerned about Illinois, you and I.

Ms. Gade. That is right.

Representative Ewing. One of the problems they talk about with the new standards is the loss of jobs, the economic impact. Can we meet that with programs like this? Can we help minimize that impact and still achieve the clean air standards?

Ms. Gade. I can't tell you specifically because I haven't looked at all the economic analyses that are done in terms of consequences, but I can tell you in terms of the trading program and other work I have seen done in support of the Acid Rain Program that OTAG did as was looking at the NOx trading program, these programs will definitely help preserve jobs and help the reductions, whatever they end up doing, be done at less cost. That is a given. And when it is done at less cost, you save jobs. So we know that. I just don't know the quantity.

Representative Ewing. Thank you.

Representative Saxton. Thank you, Mr. Ewing.

I would like to thank each of you for being with us today and all of the panelists who were here earlier, some of whom are still with us. Thank you for sharing your experience relative to emissions trading, and obviously what has seemed to be, at least today, unanimous feeling of great optimism about the program.

Thank you and the hearing is adjourned.

[Whereupon, at 12:34 p.m., the Committee was adjourned.]

SUBMISSIONS FOR THE RECORD

PREPARED STATEMENT OF REPRESENTATIVE JIM SAXTON, CHAIRMAN

Good morning. I am pleased to welcome our witnesses who are here to discuss the concept of tradable emissions. Tradable emissions – also known as tradable credits or allowances – provide policy makers an opportunity to employ the power of markets to ease the burden of environmental regulation. As such, they offer a major opportunity for regulatory reform.

Emissions trading systems are currently in use in several pollution abatement programs throughout the United States. An emissions trading system is based on the principle that the cost of emissions reductions varies from facility to facility. When each facility is given a limit on its emissions by the regulators, some facilities may be able to reduce emissions more than required at a fairly low cost. Those which can do so may choose to reduce emissions levels below those required and sell this difference to another source facing a higher cost of reducing its emissions. If the market price of these extra emissions entitlements is higher than the cost of reducing emissions at a given facility, then there is an incentive to make further reductions and sell these entitlements.

One current trading program is the sulfur dioxide allowances trading created by the Clean Air Act Amendments of 1990 to control acid rain. We will hear more about this program from our witnesses, but I want to note that the sulfur dioxide trading program appears to be an excellent example of how a market for emissions can reduce the cost of achieving our environmental protection goals at least cost. Its use in the Acid Rain Program has reduced job loss, promoted economic growth, and lowered producer and consumer costs.

Tradable emissions are also being employed on a regional level to control nitrogen oxides, sulfur dioxide, and volatile organic compound (VOC) emissions on a regional basis. We will hear testimony on at least one such program today.

I believe that there is great potential for the further use of emissions trading systems in pollution abatement programs. As the Nation debates such issues as more stringent standards for ozone and particulate matter – and on an international scale, global warming – tradable emissions will provide a smart alternative to the traditional command-and-control approach to environmental regulation.

JOINT ECONOMIC COMMITTEE

CONGRESS OF THE UNITED STATES
Jim Saxton, Chairman

PRESS RELEASE

For Immediate Release
July 7, 1997

Press Release # 105-68
Contact: Mary Hewitt
(202)224-9532

JEC RELEASES NEW STUDY ON TRADABLE POLLUTION EMISSIONS

WASHINGTON, DC — Joint Economic Committee Chairman Jim Saxton (R-NJ) will be releasing a study on July 9th entitled *Tradable Emissions* which reviews the value of an emissions trading system as an element of regulatory reform in the area of environmental protection.

"This study emphasizes the need to use the power of markets as a tool for reducing the cost of pollution abatement," said Saxton. "It explains the kinds of policies which are necessary to regulate the discharge of emissions at least cost, thereby encouraging economic growth, minimizing job loss, and lowering production and consumer costs."

Emissions trading systems reduce the cost of pollution abatement by using the market for emissions to find the lowest cost points for reducing emissions. Each emission source is required to reduce levels of pollutants to a specific point, but reductions beyond that point generate extra credits which can be sold in the emissions market. Because emissions reduction costs can vary from source to source, this trading system encourages additional reductions by those sources with less cost.

Saxton predicted, "I believe that the success of the acid rain tradable emissions program in the Clean Air Act Amendments of 1990 provides a sufficient measure of success to encourage the further use of tradable emissions in the future as we address more costly pollution problems."

In addition to helping control the acid rain problem at lowest possible cost, tradable emissions have been used by the Federal and state governments to reduce the cost of controlling smog-producing chemical pollutants.

Due to the excessive regulatory burden imposed by the traditional command-and-control approach, economic needs dictate the use of tradable emissions systems. Opportunities for employing tradable emissions lie with new and more stringent regulations for ozone and fine particles soon to be proposed by the U.S. Environmental Protection Agency.

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TRADABLE EMISSIONS

Chairman Jim Saxton (R-NJ)

Joint Economic Committee
United States Congress

July 1997

Abstract

Tradable emissions have proven to be an efficient market-based tool for reducing the cost of pollution control. Exchanging emissions in competitive markets with low transactions costs can be used as a way of finding the lowest cost points of abatement in an industry or geographical region. The Congress used this approach in creating tradable sulfur dioxide allowances in the Clean Air Act Amendments of 1990 to reduce the cost of acid rain control, a policy which has demonstrated great success. New pollution control policies would benefit from the use of tradable emissions as a method of reducing a national abatement cost already estimated at over $100 billion.

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TRADABLE EMISSIONS

INTRODUCTION

Policy makers are beginning to discover the value of markets as a tool in the protection of public health and the environment. As larger and more costly environmental problems are addressed, "tradable emissions," which allow holders to emit specific amounts of pollutants, are increasingly recognized as an efficient way of enabling regulated entities as a group to seek the lowest cost of reducing pollution. There are a number of opportunities in the environmental regulation field to employ the concept of tradable emissions, particularly in those areas where higher standards are necessary or where current regulatory practices have not produced the expected reduction in pollution. Successful examples are found in the regulation of both air and water pollution. Tradable emissions provide a useful mechanism for reducing what is estimated to be a current national pollution abatement cost of more than $100 billion.[1]

A tradable emissions system is based on the principle that the cost of emissions reductions varies from facility to facility. When each facility is given a limit on its emissions by the regulators, some facilities may be able to reduce emissions more than required at a fairly low cost. Those which can may choose to reduce emissions levels below the required levels and sell the differential to another source facing a higher cost of reducing its pollution. If the market price of these extra emissions entitlements is higher than the cost of reducing emissions at a given facility, then there is an incentive to make further reductions and sell these entitlements.

In the near future, two air pollution problems might be addressed with the aid of this market-based tool. Under the Clean Air Act, particulate matter and ozone are pollutants for which higher standards are under consideration and for which reduced costs might mean the difference in achieving the new goals. Internationally, negotiations are underway to reduce the worldwide emissions of carbon dioxide and other gases due to their role in increasing global temperatures, commonly known as the "greenhouse effect." Several nations, including the United States, are prepared to recommend tradable emissions as a tool to reduce the worldwide cost of any initiative which may result from these negotiations.

Over the last 50 years, environmental regulators have prescribed specific methodologies for pollution reduction by an approach known as "command and control." This approach requires government regulators to make a judgment as to the best technological solution to a pollution problem or to specify a level of emissions reductions for each plant, despite variations among

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[1] U.S. General Accounting Office, *Regulatory Reform: Information on Costs, Cost-Effectiveness, and Mandated Deadlines for Regulations*, March 1995, p. 4.

plants in adaptive capacity and the cost of reducing emissions. Command and control is a heavy-handed and cumbersome form of regulation. The resulting loss in scarce resources, higher consumer costs, and elimination of jobs reduce the growth rate of the economy. On the other hand, tradable emissions allow more flexibility in the selection of specific reduction measures. They take advantage of a plant manager's understanding of his facility and the best options for reducing emissions at lower cost. Lower costs for firms mean lower costs for consumers.

While trading emissions in the market provides some flexibility in how firms deal with the emissions limitations, the important issue from an environmental protection viewpoint is that overall limitations on pollution have been established. A regulatory framework is first established to define the total limit for emission of a pollutant. Then an allocation scheme divides this total among various entities--through grandfathering, auctioning, or some other formula. As long as the ceiling for emissions is not violated, how the total permissible amount is eventually distributed among firms by the market is not a major issue.[2]

TRADABLE ALLOWANCES IN SULFUR DIOXIDE

The Acid Rain Title of the Clean Air Act Amendments of 1990 was the first major legislative effort to deal with a large and continuing problem with the assistance of tradable emissions "allowances." It redesigned the Federal approach to solving the problem of sulfur dioxide emissions. Sulfur dioxide is deposited into the air mainly by fossil fuel-burning electric power plants and is a major contributor to the problem of acid rain. Prior efforts to deal with the problem were unsuccessful, in part because the Clean Air Act, like many environmental protection regulations, assumed that the government could specify a technical solution for every source of pollution. In the case of fossil fuel power plants, the solution proposed was to require higher standards for new plants, which was believed to be cheaper than requiring expensive modifications to existing facilities. But this policy and other factors encouraged utilities to keep plants in service beyond their normal life spans, so sulfur dioxide reduction goals were not met.

One objective of the 1990 Amendments was to reduce sulfur dioxide emissions from utilities by 8.5 million tons below 1980 levels by the year 2000. To accomplish this, electric utility plants above a certain size were given an initial allocation of emissions allowances for sulfur dioxide based on historical patterns. Each allowance permits a generating unit to emit one ton of sulfur dioxide in the year in which the allowance was issued or in succeeding years. Emissions levels below these initial allocations mean that a generating unit has a surplus of allowances which might be sold to another unit to cover its emissions above the initial allocation. The method used to achieve reductions is not specified. The only requirement is that each generating plant owns allowances sufficient to cover the amount of its emissions. This approach

[2] In circumstances where hot spots may occur due to a geographical concentration of emissions sources, limitations may be placed on some trades.

offers financial incentives to reduce emissions beyond some level specified by regulators. Units that exceed the level of emissions for which they hold allowances are penalized at a rate in excess of the cost of compliance and are required to purchase the necessary allowances after the fact.[3]

The program is divided into two phases. The first phase began on January 1, 1995, and covered 110 of the largest utility generating plants. The second begins on January 1, 2000 and will cover almost all generating plants. Owners of new generating plants are required to buy allowances in the market or purchase them from a reserve auctioned off by the U.S. Environmental Protection Agency (USEPA). By requiring the new units to acquire allowances from the initial allocation, no net increase in emissions is caused by the addition of those units.

CRITERIA FOR A SUCCESSFUL MARKET

Although some aspects of Federal policy as currently conducted might benefit from changes, the sulfur dioxide allowance program has been generally successful in lowering the cost of emissions reduction. The key conditions for a successful market in tradable emissions are discussed below in the context of this program.

CLEARLY DEFINED PROPERTY RIGHTS

From an economic perspective, pollution problems are caused by a lack of clearly defined and enforced property rights. Smokestack emissions, for example, are deposited into the air because the air is often treated as a common good, available for all to use as they please, even as a disposal site. Not surprisingly, this apparently free good is overused. A primary and appropriate role for government in supporting the market economy is the definition and enforcement of property rights. Defining rights for use of the atmosphere, lakes, and rivers is critical to prevent their overuse. Once legal entitlement has been established, markets can be employed to exchange these rights as a means of improving economic efficiency. For the market system to function efficiently, however, the market should be competitive and transaction costs should be low.[4]

Establishing ownership rights is the first step in taking advantage of market efficiencies. Without a clear definition of ownership, exchange will be difficult. Likewise, these property rights will be of low value unless they are enforced by the government. Often, what should be

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[3] The availability of sophisticated technology permits the continuous monitoring of emissions.

[4] Ronald Coase is the economist most closely associated with the concept of employing a clear definition of property rights and permitting their exchange in a competitive market as the most efficient way of dealing with the problem of external costs. See his "The Problem of Social Cost," *Journal of Law and Economics*, 3, October 1960, pp. 1-44.

clearly defined and enforced rights are vaguely defined in practice, and their owners are sometimes at the mercy of independent judges who may not enforce them.

Clear establishment of entitlements is the first step. For example, since tradable sulfur dioxide allowances were created by Federal legislation, the value of these legal entitlements has a firmer foundation than if they had been created by an administrative rule. The 1990 Clean Air Act Amendments carefully built the framework of regulation, describing the trading allowance program in greater detail than is typical in the Clean Air Act, leaving little to the discretion of regulators. This specificity reduced the opportunity for litigation which might hurt the soundness of these entitlements. They are also less encumbered because the USEPA, which maintains the records of trades, does not review the trades for approval. Nevertheless, existing environmental protection standards, such as those contained in state implementation plans developed under the Clean Air Act, continue in force.[5]

In addition, for a tradable emissions program to work, not only must the regulatory authorities have confidence in their ability to monitor actual emissions, but the market participants must also have confidence that their investment in emissions rights is protected from cheating by emissions sources. In the case of sulfur dioxide emissions allowances, the availability of continuous monitoring technology and the limited number stationary emissions sources have provided this assurance.

The actual method employed for dividing up the total allocation of emissions is irrelevant to making a tradable emissions market successful. The issue is market efficiency in the allocation of resources, not equity in the initial allocation of property rights. It makes no difference to the market's efficiency as to whom the tradable rights are assigned initially. One of the fundamentals central to economic theory is that a competitive market will reallocate resources to their highest valued use, regardless of the original distribution. In the case of the sulfur dioxide emissions allowances, the initial allocation was based on each generating unit's past record of fuel use and limitation on emissions.

Low Transaction Costs

Efficiency in resource allocation also requires relatively low transaction costs. Transaction costs include those costs necessary to identify a trading partner, make proposals, execute negotiations, and ensure the completion of obligations under any resulting contract. Transaction costs are dependent on the volume and frequency of transactions because economies of scale will reduce transaction costs for frequent exchanges or large numbers of allowances. The acceptable magnitude of transaction costs that will permit market exchanges is dependent on the relative advantage of making the exchange. Greater variation in savings potential among plants will

[5] A. Nancy Kete, "The Politics of Markets: The Acid Rain Control Policy in the 1990 Clean Air Act Amendments." (Doctoral Dissertation, Johns Hopkins University, 1992.)

accommodate higher transaction costs. Little differential, on the other hand, means less incentive to trade, even if transaction costs are relatively low.

Government can assist in developing markets by reducing transaction costs, for example, by recording and reporting exchange prices. Regulators can ensure that transfers are effective as quickly as possible, with a minimal burden on the parties involved in the transfer.[6] For example, in the report accompanying the Clean Air Act Amendments of 1990, the Congress urged USEPA to avoid unduly restricting the types of legal arrangements by which parties could exchange allowances, including leases, sales, and bartering.

One area where USEPA has unnecessarily increased transaction costs has been in the conduct of allowance auctions. Congress permitted the USEPA to withhold a certain number of allowances against the possibility that utility companies might hoard allowances. Each year the USEPA auctions these allowances in a process whereby the winning bidders pay the price they bid, which results in multiple prices rather than one market-clearing price resulting from an iterative process. Multiple prices raise the cost of understanding what future bid and offer prices might be. One market-clearing price would be a better solution for providing information about supply and demand.[7]

COMPETITION

Efficiency in the allocation of emissions rights can be achieved in the ideal case only when the market is competitive. There must be many buyers and sellers, and they must have full information about prices and quantities available to them. Furthermore, no one buyer or seller should dominate the market and independently influence the market price. The extent to which these conditions exist will determine the degree of efficiency with which the market produces an allocation of resources. With the 1990 Clean Air Act Amendments, the Congress made clear that the USEPA should encourage a competitive market for sulfur dioxide emissions allowances. It instructed the USEPA Administrator to support the widest potential ownership of allowances, to include ownership by brokers, investors, and other possible market participants.

ADVANTAGES OF SULFUR DIOXIDE EMISSIONS ALLOWANCES

The advantages of a tradable allowances policy over a command-and-control approach are best demonstrated by the response of utilities and related industries to the restrictions on sulfur dioxide emissions required after 1995. In general, tradable allowances in sulfur dioxide have

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[6] United States Senate, Committee on Environment and Public Works, *Report Accompanying S. 1620*, (S. Rept. 101-228), 101st Cong., 2d sess., p. 320.

[7] U.S. General Accounting Office, *Air Pollution: Allowance Trading Offers an Opportunity to Reduce Emissions at Less Cost*, December 1994, p. 54.

lowered the overall cost of compliance by having the market find the lowest cost in the industry. Utility generating plants capable of reducing emissions at less cost--because of location, technology, age, or other factors--generate surplus allowances for sale or future uses when standards are higher. In theory, these plants will reduce emissions to the point where the rising cost of reductions would equal, per ton, the market price for tradable allowances.

An important result of the market for tradable allowances in sulfur dioxide has been the competition among various purveyors of low-emissions solutions. Among the options available to utilities are scrubbers, low-sulfur coal, fuel-switching, new and more efficient plants, and the purchase of allowances, which encourages the reduction of emissions elsewhere. Promoting competition among these options increases the number of emissions reduction opportunities. Variations in adaptive capacity become a virtue rather than a problem as they would be under a command-and-control type of regulation. One estimate suggests that significant inter-utility trading beyond the year 2000 could produce savings of $3.5 billion annually compared to command and control.[8]

In a review of the emissions trading program created by the 1990 Clean Air Act Amendments, the U.S. General Accounting Office noted that the competition generated by the emissions program and the increasing deregulation of the electric power industry have worked to lower the cost of emissions reduction. Low-sulfur coal suppliers have expanded their markets to provide western coal as far east as Georgia, thus competing with eastern low-sulfur coal. Scrubber manufacturers have improved the quality of their product, increasing the sulfur dioxide removal capability and increasing durability, and have found ways to sell the by-products of the scrubbing process. All of these vendors are now competing against each other, an outcome not available with a command-and-control regulatory approach which limits the number of solutions that are acceptable and gives an advantage to the suppliers of those solutions.[9]

Other Successful Trading Programs

While the sulfur dioxide emissions trading program is a high-profile success, other trading programs also have worked well on the local, regional, or national level. The town of Telluride, Colorado, for example, was severely affected by smoke pollution from fireplaces and wood-burning stoves. To solve this problem, in 1985 the town restricted the use of solid fuel burning devices and instituted an offset program of permit trading which required that the owners of a new solid fuel device purchase two permits from existing owners. The substitution of one for two devices automatically reduces the total number in existence, but still allows limited use of new wood-burning devices when demand exists.

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[8] *Ibid.*, p. 37.

[9] *Ibid.*, p. 29.

On the national level, the U.S. Environmental Protection Agency has used its own authority to create more limited emissions trading opportunities in response to the failure of purely command-and-control approaches. For example, in the 1970s the EPA adopted a policy of allowing the start-up of new emissions sources in areas not currently attaining current goals, provided that they used the best available technology (i.e., regulator-approved) and purchased emissions reduction credits from other sources, thereby offsetting the expected emissions increase. In other cases, USEPA allowed emissions at higher rates using emissions-control processes other than the regulator-approved technology if the emitting firm bought emissions reduction credits from other sources in the area. By the early 1980s, the Agency merged these policies into one rule which also permitted emissions reduction credits to be banked for use at a later date.

A more recent program to reduce smog in California's South Coast Air Quality Management District (SCAQMD) uses a system of tradable emissions. The region around Los Angeles has the poorest air quality in the United States and has had great difficulty in meeting the various deadlines for improving air quality. The command-and-control regulation of air emissions was proving to be very expensive, as marginal costs of emissions reduction climbed to five times the national average in some categories.[10] The solution has been the use of an emissions trading program, starting with nitrogen and sulfur oxides from stationary sources.[11] The RECLAIM program (for Regional Clean Air Incentives Market), begun in 1994, gives operators of plants the choice of how to meet the emissions limitations imposed by SCAQMD.[12] More than 300 high-volume emissions sources (in excess of four tons annually) are covered by the program. In addition, many smaller sources have volunteered to join the RECLAIM program to take advantage of a flexibility in attaining compliance which is not available under command-and-control regulation.

The success of the RECLAIM program can be measured by a two-thirds reduction in total emissions, by a reduction in emissions beyond allocated levels, by a decrease in the market cost of emissions allowances below national averages, and by a reduction in job loss to 4 percent of levels anticipated under command and control.[13]

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[10] James M. Lents and Patricia Leyden, "RECLAIM: Los Angeles' New Market-Based Smog Cleanup Program," *Journal of Air and Waste Management*, 46 (March 1996), p. 197.

[11] Banking for later use is not permitted to avoid the possibility of future heavy concentrations of ozone.

[12] Volatile organic compounds (VOCs), along with nitrogen oxides, are the two major ingredients of smog. Because of their more diverse sources, VOCs have not yet been brought under the RECLAIM program.

[13] Patricia Leyden, Prepared Statement before the U.S. Senate Committee on Environment and Public Works, Subcommittee on Clean Air, Wetlands, Private Property and Nuclear Safety, Hearing on "Implementing the Proposed New Air Standards and the Use of Emissions Trading Programs," April 24, 1997.

CONCLUSION

Using tradable emissions to achieve regulatory goals can be expanded to cover additional pollutants. Two possibilities are particulate matter and ozone under the Clean Air Act and carbon dioxide and other greenhouse gases under the Framework Convention on Climate Change.

The EPA is scheduled to release more stringent National Ambient Air Quality Standards for ozone and particulate matter in July 1997. The potentially high cost of regulations could be reduced with tradable emissions. Stationary sources might be regulated under a trading system like the one implemented for sulfur dioxide, and mobile sources could be addressed under a system which allows trading between diesel fuel and gasoline manufacturers.

The worldwide carbon dioxide problem has led to the consideration of limiting emissions, but the complexity of the carbon problem exceeds that of sulfur dioxide. To solve the acid rain problem, a sovereign nation was able to impose regulations on its citizens in implementing a cap on emissions; as a worldwide problem, capping carbon dioxide emissions requires the agreement of many sovereign states. Sulfur dioxide emissions were regulated in a fairly homogeneous economic environment; carbon dioxide must be regulated across nations that have different levels of industrial development and varying amounts of emissions. Sulfur dioxide sources are limited and identifiable; carbon dioxide has a variety of sources as well as offsetting sources of mitigation. Despite these potential differences, if the greenhouse gas problem is perceived to be a sufficient threat and if an international agreement is formulated to limit emissions of carbon dioxide, some form of market trading should be included to reduce the overall cost of the regulatory effort.

At the Third Conference of the Framework Convention on Climate Change in December 1997, several nations will propose the international trading of emissions. The United States is proposing an "emissions budget" for industrialized countries in carbon dioxide and other greenhouse gases. Developing countries, on the other hand, would be urged to adopt emissions budgets on a volunteer basis. The potential costs of such an extensive initiative will almost dictate the adoption of techniques like tradable emissions, providing some flexibility in meeting reduction goals.

Despite an initially slow recognition of the value of markets in seeking the lowest cost of pollution reduction, tradable emissions will undoubtedly have a larger role in future regulatory programs to fight pollution. Although some critics express concerns that individual firms are

making decisions about their own level of emissions, recognition that the aggregate industry or regional level of emissions is controlled by the regulators has reduced barriers to the use of tradable emissions, thus minimizing regulatory costs, preserving jobs, and lowering both production and consumer costs.

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United States General Accounting Office

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Congress of the United States

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AIR POLLUTION

Overview and Issues on Emissions Allowance Trading Programs

Statement of Peter F. Guerrero, Director,
Environmental Protection Issues,
Resources, Community, and Economic
Development Division

GAO/T-RCED-97-183

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 (SO_2)—allowance trading program, which are based largely on our December 1994 report[1] 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 SO_2 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 SO_2 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

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

[2]This 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 SO_2 emissions, a major cause of the problem. Specifically, title IV of the Clean Air Act allows electric utilities, the major source of SO_2 emissions, to trade allowances to emit SO_2 with other utilities. After setting the overall reductions in SO_2 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 SO_2 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 SO_2 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

[3]For 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.

cid 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 SO_2 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.

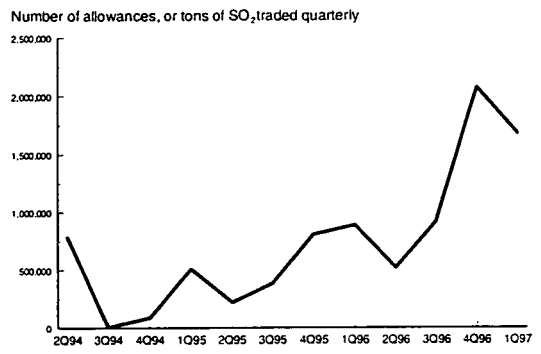
In 1994, we reported that various factors were causing the low level of allowance trading at that time. Among them, phasing in emissions reductions over several years had reduced the urgency to buy and sell allowances. We also reported a major barrier to trading was that state utility commissions and 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.

[4]Internal 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.

[5]Allowances equal one ton of SO_2. 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 SO_2 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 SO_2 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 SO_2 from utilities. To achieve the program's overall goals to reduce emissions, the program imposes an annual nationwide emissions cap on SO_2. 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.

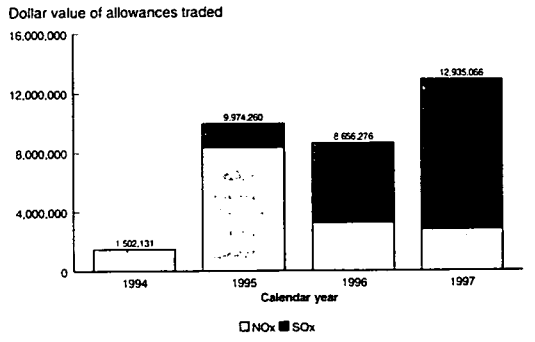
District officials believe that RECLAIM is affording stationary sources significant cost savings over complying with a conventional command-and-control approach. The district originally estimated that the cost of this trading program would be $80.8 million annually as compared

[6]As 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 SO_2 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 SO_2 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

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

emissions[5] 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 SO_2 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 SO_2 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 SO_2 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

[5]The 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.

TESTIMONY OF MARY D. NICHOLS
ASSISTANT ADMINISTRATOR FOR AIR AND RADIATION
U.S. ENVIRONMENTAL PROTECTION AGENCY
BEFORE THE
JOINT ECONOMIC COMMITTEE
July 9, 1997

INTRODUCTION

Thank you for inviting me to testify today on emissions trading. Before I discuss EPA's experience with emissions trading, let me first point out that this country has made substantial progress toward clean air since passage of the Clean Air Act.

Since 1970, the underlying drivers of air quality problems in the U.S. have gone up – U. S. population has grown by 28%, real Gross Domestic Product has grown by 99%, and the number of miles traveled by on-road vehicles (VMT) has increased by 116%. Behind these statistics are more factories, more production, more commerce, more power generation, and more cars. However, as a result of efforts marshaled under the Clean Air Act, during this same time period we have achieved a 29% reduction in air pollution -- that's not emissions -- but actual, monitored air pollution.[1]

In other words, as a Nation we have not just held our own, we have been able to substantially improve air quality across the country, even as the sources of air pollution have increased and the economy has grown. As a result, our air is generally cleaner and healthier today than at any time since EPA began measuring air quality. These pollution reductions are preventing tens of thousands of respiratory illnesses and deaths every year.

But the job is not done. We must continue to make progress in cleaning up our Nation's air. And we must be open to new tools, such as emissions trading, to progress faster, less expensively and more effectively toward that goal. We have experience in using market incentives, including emissions trading – we know that it works, and we plan to expand its use.

The air pollution reduction programs in the U.S. have historically been based on traditional forms of environmental regulation: source-specific emissions standards (e.g., Reasonably Available Control Technology) set on a uniform basis for categories of

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[1] U.S. EPA, National Air Quality and Emissions Trends Report, 1995, EPA 454-96-008, Washington, D.C., December 1996.

similar sources. Even though set as performance standards, these regulations have a tendency to treat all sources within a category the same and to be oriented either toward the average or typical source at an average cost of control, or toward the more difficult sources to control. Such standards simultaneously miss substantial opportunities for inexpensive reductions by sources with lower than average control costs, and impose a disproportionately high cost (per ton of pollutant reduced) on other sources. State and federal governments frequently lack information on undemonstrated but cost-effective control options, and sources have no incentive to be forthcoming. Governments also tend to overlook smaller or unconventional sources.

Recognizing some of these shortcomings with traditional regulation, EPA has developed policies since the late 1970's permitting trading approaches for an increasing variety of emissions. Emissions trading is based on the simple concept of allowing sources, through market-based mechanisms, to seek the least costly solution to meeting pollution control requirements. Sources with relatively low costs of control are able to create extra reductions that are used by sources with relatively high costs of control. When these sources trade emission control obligations, the area experiences the same level of emissions reductions, but at a lower overall cost.

Over the last twenty years, EPA has learned that market-based programs and other uses of economic incentives can dramatically cut costs compared to other approaches. The lead and chloroflorocarbon (CFC) phase-out plans and the Acid Rain program are all examples of the ability of market-based programs to provide environmental protection at lower cost. EPA analyses have suggested that for the gasoline lead phaseout program, the trading and banking provisions resulted in 20 percent lower costs. The cost of reduction in the CFC phaseout program, which used an emissions allowance trading system, was at least 30 percent less than it would have been without trading. According to GAO's analysis of the sulfur dioxide (SO_2) allowance program published in December 1994, the projected compliance costs for full implementation with trading should be less than half the costs without trading, i.e., $2.0 billion per year versus $4.9 billion per year.

In this era of heightened competitive pressures, EPA recognizes that it is essential to ensure that industry is getting the greatest pollution reduction for its money. Emissions trading is one way to do this.

Emissions trading is beneficial because:

- it lowers the cost of pollution control which lowers the cost of goods and services for consumers;

- it rewards technological innovation, creating a market for better pollution control technology and creating an incentive to exceed regulatory targets;

- it can provide cleaner air, sooner, with incentives for early reductions; and

- it obviates the need for compliance delays and variances by providing sources with the flexibility of complying by purchasing credits.

EPA would like to see all of the above benefits realized wherever possible. It must be remembered, however, that trading is only a tool and does not replace the need for setting and achieving an environmental objective, which can be implemented through a cap on total emissions, or the setting of emissions rates on all relevant facilities sufficient to achieve the specified air quality goal. The degree of flexibility afforded by trading must be matched with the appropriate accountability, i.e., the more accountable individual sources are with respect to their emissions, and the more accountable the overall program is to the environmental objective, the more flexible the program can be with regard to how, where, and when emissions are reduced.

FACTORS TO CONSIDER FOR TRADING

From our experience, we have found several factors important to consider before choosing to employ emissions trading.

Nature of the Problem

First, the decision to utilize trading depends on the nature of the problem to be solved. If the pollutant of concern is transported far from its source and dispersed broadly, such as SO_2 and to a lesser degree oxides of nitrogen (NO_x), then where it is reduced may be less important than reducing total loadings in general. Also, if the primary concern is total annual loadings, such as SO_2, then when during the year emissions are reduced is less important. If the concern is ambient ozone concentrations, NO_x and volatile organic compounds (VOC), reductions need to be made in the summer months and a trading system would have to be based on this. Human induced atmospheric carbon loading, which takes place over decades and is caused by emissions of greenhouse gases from multiple sources in many countries around the world, is especially well suited for trading.

On the other hand, pollutants that need to be reduced in a specific location for health or environmental reasons might not be appropriate for trading over a broad region -- for example, acutely toxic pollutants. Also, sources emitting pollutants whose impacts are localized would not be good candidates for purchasing emission allowances in lieu of controlling on site. However, such sources could still benefit from

being part of a trading regime by selling their reductions to others and recovering some of their compliance costs.

Number of Sources with Differing Control Costs

Second, for trading to be utilized and cost savings realized, an adequate number of sources with differing levels of control costs is necessary. Also necessary is a balance between enough sources to make trading viable, but not too many that the program becomes unworkable. For instance, it may not be practical if every car owner were a participant in a mobile source trading program.

Ability to Quantify Emissions

Third, EPA believes that accurate quantification of emissions ensures that the environmental objective is being achieved, and that it gives participants in the market necessary information about the commodity they are trading. Quantification also allows the more effective establishment and enforcement of emissions, budgets or caps.

Institutional Capabilities

Fourth, though trading programs can give sources increased flexibility to choose from multiple compliance options, as with any market, they require appropriate ground rules and proper management. Essential safeguards such as accurate measuring and reporting of emissions, effective and automatic enforcement tools, and certified trading commodities insure the integrity of the trading program and achievement of the environmental objective.

Finally, it should be pointed out that air pollution control programs implemented through State Implementation Plans (SIPs) have unique challenges when developing or implementing interstate trading programs to address multi-state nonattainment situations.

EXAMPLES OF TRADING PROGRAMS

Throughout the country there are many efforts under way to use emissions trading. The RECLAIM program in the Los Angeles area, for example, has been used by the South Coast Air Quality Management District since 1993 to assist the area in coming into attainment with the ozone and SO_2 standards. It is a cap and trade program applied to stationary sources of NO_x and SO_2 and is credited with reducing emissions at substantial cost savings. Today, however, I would like to focus on those emissions trading efforts with which EPA is directly involved.

Sulfur Dioxide (SO_2) Emissions

The leading cause of acidification of our lakes and streams is long-term total loadings of sulfur compounds, and the primary source of these compounds is emissions of SO_2 from hundreds of coal-burning power plants. The Acid Rain Program sets a cap on the total amount of SO_2 emissions from power plants, allocates those emissions in the form of tradeable allowances, and lets the plants trade allowances freely on a national basis. Confidence that allowances accurately represent emissions is assured by state of the art emissions monitoring equipment required on most emission stacks and by automatic penalties for exceedances. The Acid Rain Program has proven to be highly successful in reducing both SO_2 emissions and compliance costs.

In 1995, the first year of the program, we saw the largest one-year drop in SO_2 emissions since 1970. The 110 power plants required to be in this first phase of the program reduced emissions by more than 50% below their levels in 1980 and 40% below the levels required by law. In 1996, these impressive results were nearly repeated with emissions 35% below required levels [see Figure 1]. These emissions reductions resulted in a decrease of 10 to 25% in wet sulfur deposition (acid rain) over large areas of the eastern U.S. in 1995 [see Figure 2]. Ambient concentrations of sulfur dioxide also declined by 17% between 1994 and 1995.[2] By the year 2010, the reduction in fine sulfate particulate matter is expected to provide health benefits of $12 to 40 billion per year[3] and visibility benefits of $3.5 billion per year.[4]

Data from the SO_2 Allowance Tracking System (ATS) is showing that utilities are taking advantage of the market flexibilities and cost saving opportunities afforded by the program. More than 2,400 allowance transfers moving approximately 38 million allowances (where one allowance is an authorization to emit one ton of SO_2) were recorded by EPA between early 1994 and the end of the first quarter of 1997 [see Figure 3]. More than 50% of Phase I affected utilities have engaged in trades with others outside of their company such as other utilities and brokers. Though the number of brokers and traders involved in the market has remained relatively stable since 1995 (there are seven companies that identify themselves as brokers or traders in the ATS), their level of involvement has increased significantly. From 1995 to 1996, the flow of

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[2] U.S. EPA, National Air Quality and Emissions Trends Report, 1995, EPA 454-96-008, Washington, D.C., December 1996.

[3] Lauraine G. Chestnut: "Human Health Benefits from Sulfate Reductions under Title IV of the 1990 Clean Air Act Amendments," November 10, 1995 (unpublished contractor report to EPA).

[4] Lauraine G. Chestnut and Robin L. Dennis: "Economic Benefits of Improvements in Visibility: Acid Rain Provisions of the 1990 Clean Air Act Amendments," Journal of the Air and Waste Management Association, vol. 47, March 1997.

allowances from brokers/traders to utilities increased six-fold and the stream from utilities to brokers increased three-fold. The price of allowances has fallen from early estimates of $400 - $1000 to less than $100 for an allowance [see Figure 4]. These results prove that a legitimate trading market in SO_2 emission allowances exists and is thriving.

Nitrogen Oxides (NOx) Emissions

Using a cap and trade approach to limit NO_x emissions and reduce transported levels of NO_x and ozone which in turn can assist states in attaining and maintaining the ozone standard and mitigate acidification and eutrophication is also appropriate. As the Ozone Transport Assessment Group (OTAG)[5] modeling has shown, NO_x is emitted by multiple sources and transported across state boundaries. EPA is in fact preparing to manage a regional NOx trading program for 12 Northeastern states represented by the Ozone Transport Commission (OTC) , which will begin in 1999. The OTC program will include electric power generators and industrial boilers, and will allow emissions trading throughout the 12-state region. Before embarking on the trading program, the OTC reviewed analyses indicating that multi-state trading would not be harmful to ozone attainment and would reduce compliance costs by 30% compared to the same scenario without trading. Since electric utilities contribute about 30% of total NO_x emissions and are already monitoring and reporting NO_x emissions under the Acid Rain Program and participating in the SO_2 allowance trading program, the administrative framework associated with their participation in a regional NO_x trading program is relatively straightforward.

Greenhouse Gas Emissions

Scientists agree that the balance of evidence supports the view that there is a discernible human influence on global climate due to the significant increase in greenhouse gas emissions (principally carbon dioxide, methane, nitrous oxides, chloroflourocarbons). This global environmental problem is especially well suited to be addressed through emissions trading because the problem is caused by cumulative emissions well mixed in the atmosphere, residing for long periods of time, and originating from multiple sources all over the world. The international community is interested in finding cost-effective policies for slowing and eventually halting global climate change as evidenced by the adoption of the UN Framework Convention on Climate Change. Recently, there has been a growing interest in applying an emissions trading paradigm to the climate problem as indicated by the recent report prepared by the Organization for Economic Cooperation and Development, Working Paper 9, titled

[5] OTAG consists of 37 states convened to study the extent of ozone transport and develop recommendations on cost-effective reduction strategies.

"Policies and Measures for Common Action" on the subject of International Greenhouse Gas Emission Trading. That paper concludes -- and we strongly agree -- that an international emissions trading system founded upon accurate, verifiable emissions measurement and reporting can send the right market signals to create investment in cost-effective technologies to reduce greenhouse gas emissions.

In January, the U.S. put forth a climate protocol proposal based on legally binding greenhouse gas emissions budgets that offered Parties the option of using emissions trading to achieve needed reductions in greenhouse gas emissions in the most cost-effective manner possible.

The key to lowering costs is to allow maximum flexibility in reducing emissions, while ensuring the strict accountability of all Parties involved. Allowing trading between nations with low and high marginal costs of abatement could reduce the costs of achieving emission reductions significantly. The ultimate effectiveness of a trading system in lowering the costs of reducing emissions will depend on its ability to keep transaction costs low, and its success in creating and maintaining the credibility of the commodity being traded.

Creating an international emissions trading system requires three initial conditions: a legally binding allocation of emissions authorizations (or starting emissions budgets); a standardized and verifiable system of measurement and reporting that enables actual emissions to be matched to authorized amounts; and an effective legal mechanism to ensure that all Parties are complying with their obligations.

CONCLUSION

To sum up, EPA has now had 20 years of experience with emissions trading programs. Where appropriate to the problem and when properly designed and implemented, we have found emissions trading to be an extremely helpful tool in lowering compliances costs, promoting innovation, and achieving environmental goals.

Figure 1

SO2 Trading Program: Initial Results

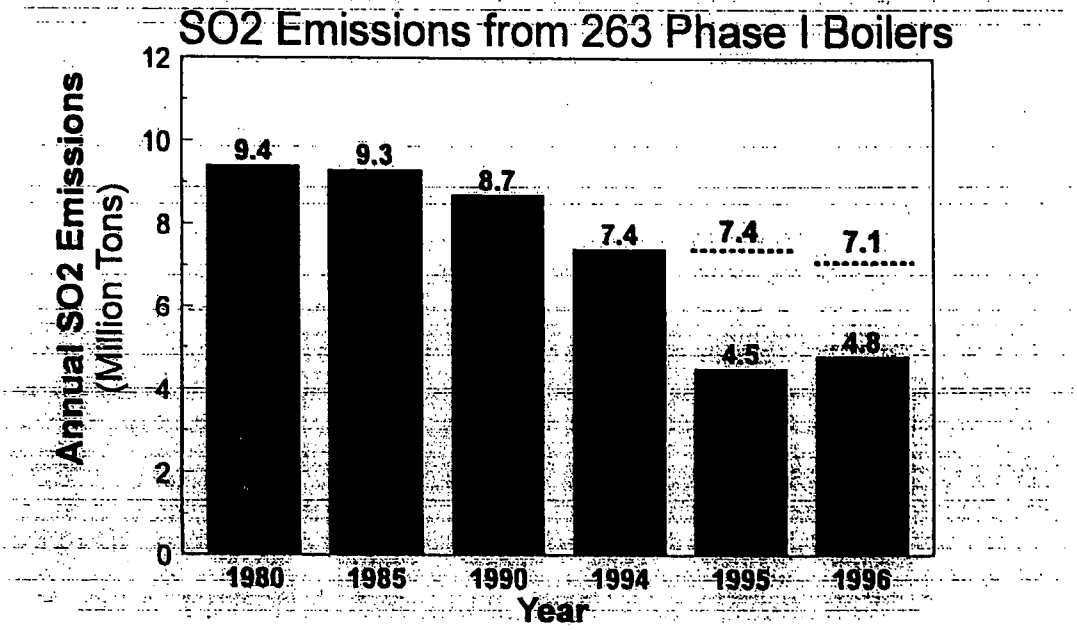


Figure 2

SO2 Trading Program: Reductions in Wet Sulfate Deposition

Percent Departures of 1995 Annual Sulfate Ion Concentrations from Predictions of the 1983-94 Seasonalized Trend Model

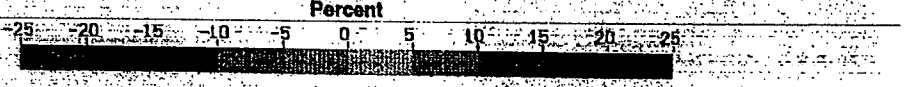


Figure 3

SO2 Trading Program: 38 Million Allowances Transferred

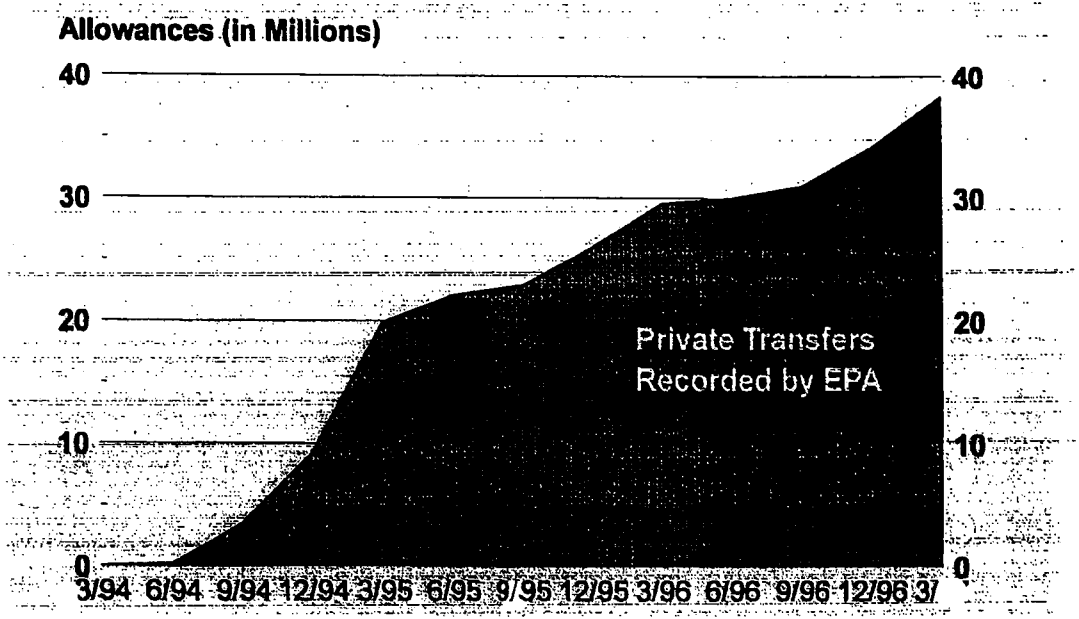
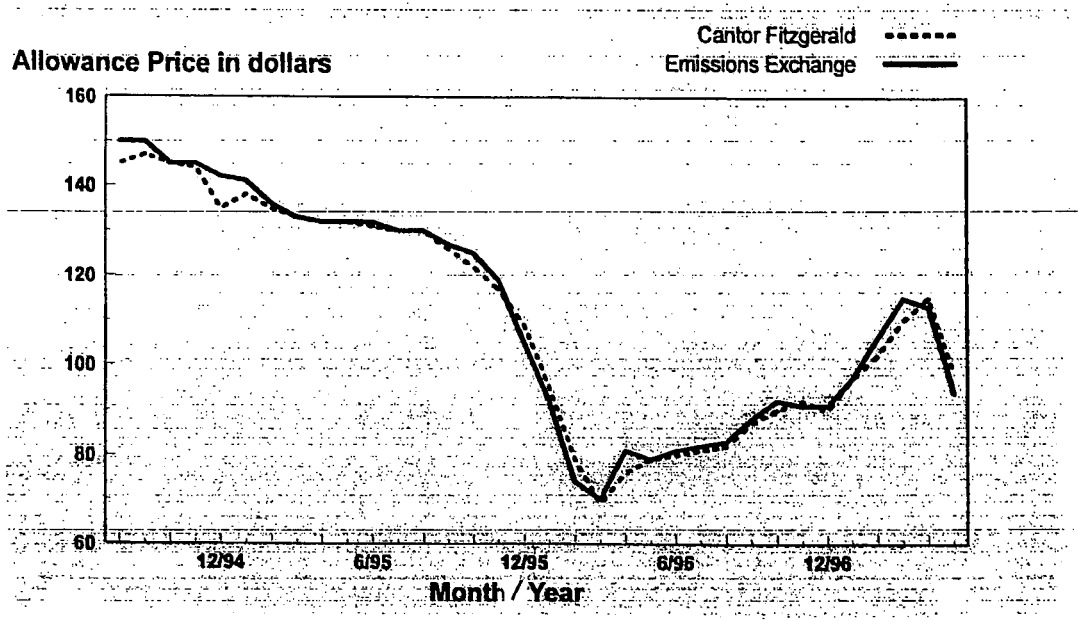


Figure 4

SO2 Trading Program: Allowance Prices



TESTIMONY OF

MARY A. GADE, DIRECTOR

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY (IEPA)

FOR THE HEARING OF

THE JOINT ECONOMIC COMMITTEE

CONGRESS OF THE UNITED STATES

ON THE ISSUE OF

TRADEABLE EMISSIONS

AS A METHOD OF

REDUCING THE COST

OF POLLUTION CONTROL

JULY 9, 1997

Good morning. My name is Mary Gade. I am the director of the Illinois Environmental Protection Agency. Thank you for inviting me to testify before the Joint Economic Committee today on the issue of emissions trading, a keystone in Illinois' efforts to use market forces to achieve enhanced environmental benefits by the most cost-effective methods.

While some of my colleagues on the panel will discuss the advantages of trading systems, I will focus today on a unique program we expect to launch in 1999 in Illinois. Now in the final stage of rulemaking, the Illinois volatile organic compounds (VOC) trading system for the Chicago metropolitan area will be the first of its kind in the nation. We were pleased when President Clinton chose to honor our efforts in designing this program as an outstanding example of government re-invention in March 1995.

We believe this program will give Illinois businesses the tool they need to meet targeted reductions required by the Clean Air Act. Make no mistake, this is no small obligation. Chicago was classified in 1990 as one of the nine worst ozone non-attainment areas in the country under the 120 parts per billion standard. Ground-level ozone or smog significantly impacts the health and well-being of 7 million Illinoisans each year. Despite increasingly stringent and costly controls on most of our industries, the Chicago metro area continues to have ozone exceedences. In fact, just last week we had our first exceedence of the year, at 128 parts per billion. Confronted with this difficult environmental challenge and concerned about negative impacts on Illinois' economy, Illinois EPA weighed our options.

We recognized that relying solely on the traditional "command and control" regulatory approach would impose tremendous costs on our industry and could be a deterrent to innovation. Consequently we turned to market-based approaches.

The Emissions Reduction Market System (ERMS) in Illinois is the result of four years of review and study that has drawn in top experts from the public and private sectors. The Illinois EPA held workshops, hearings and assembled a multi-faceted design team that did thorough research and investigation of market-based approaches before proceeding with our program.

The system that resulted from this collaboration is built upon three fundamental policy considerations. The first, and most critical, is to assure that air quality goals are met. We did this by establishing an explicit cap on total VOC emissions implemented through a fixed number of VOC emission allotments -- that is authorizations to emit 200 pounds of VOCs -- which are tradeable, and to a limited extent, bankable. This approach is modeled in part after the Title IV Acid Rain Program. The cap on mass emissions distinguishes this program from traditional command and control requirements as well as some other emissions trading frameworks. Second, Illinois EPA recognized a minimum amount of governmental interference was desirable in a free market system, so we worked hard to limit the regulatory involvement that would be necessary once the program was up and running. As a result, transaction costs will be reduced, creating an incentive for increased participation by sources and maximizing the cost savings that are realized. Finally, to safeguard environmental progress, we incorporated sound performance accountability standards.

We believe Illinois' market-based strategy will result in significant reductions in one of the two major pollutants contributing to unhealthy levels of ozone while providing increased flexibility and significant cost-savings for business and industry.

Illinois' program has several novel features but is not a pioneer. Without the foresight of the Congress in laying the foundation for market mechanisms to reduce pollution as part of the 1990 amendments to the Clean Air Act, Illinois' program might still be in the starting blocks. The success of sulfur dioxide trading under the Acid Rain program is an important forerunner of our efforts. We carefully reviewed the structure and the data generated by the Acid Rain program in crafting Illinois' system.

DEVELOPMENT EFFORTS

Illinois EPA did not set out to create the country's first VOC trading program. In fact, after the Clean Air Act Amendments of 1990, the Agency initially targeted NOx emissions for reduction. We were convinced they were the key to reducing unhealthy ozone levels. We turned to the approach we knew best and started to develop Reasonably Available Control Technology (RACT) regulations for NOx. Because of the legitimate fears over cost by the business community, we simultaneously began working on something new -- a NOx trading system.

In June 1993, I was joined by Sam Skinner, president of Commonwealth Edison, our state's largest electric utility, in jointly announcing the development of a NOx trading program. A design team was formed with staff from Illinois EPA, Commonwealth Edison, and the Environmental Defense Fund, and developed a draft proposal distributed in September 1993.

However, the plot took a major twist in December 1993. Results from the Lake Michigan Air Directors' Consortium regional air quality modeling project showed for the first time that NOx reductions in the Chicago nonattainment area would not improve and might even exacerbate ozone conditions in the Lake Michigan airshed. In reaction to these findings, and without much humor, we joked about graduating from the School of Hard NOx. This unexpected finding shifted the onus for controls in the Chicago metropolitan area on VOC emission reductions.

The findings were subsequently reaffirmed by the extensive modeling and research done by the Ozone Transport Assessment Group, which I was privileged to chair. OTAG was a unique two-year collaboration between the states, U.S. EPA and hundreds of private stakeholders. OTAG confirmed the importance of localized VOC reductions in addressing urban ozone attainment and the existence of substantial NOx reduction disbenefits on high ozone days in Chicago and New York City and to a lesser extent in other major northern cities.

Unfortunately, when Illinois EPA began to review options for obtaining increased VOC reductions, we were stymied.

A thorough review of the potential for using additonal RACT for reducing VOC emissions could identify only one, cold cleaning degreasing, that was a viable option. That left only the option of ratcheting down further and requiring even more dramatic VOC emissions cuts from industries that were already heavily regulated.

The inevitable conclusion was that VOC trading should be pursued. Our work with the NOx proposal had strengthened our conviction that real benefits would result from an emissions trading program. We asked four of the largest VOC emitters in the Chicago area -- Caterpillar, Abbott Labs, Corn Products and Amoco -- to join our design team. The team also met with other interested parties and encouraged submission of written comments. Finally, the new proposal was submitted to the scrutiny of a formal peer review process by three experts before the final report was issued in March 1995. Incidentally, one of the team members is my fellow panelist today, Dan Dudek of the Environmental Defense Fund. We are grateful for EDF's significant contribution to this project.

Our design was formally endorsed by Governor Jim Edgar and the Illinois General Assembly in legislation approved in the summer of 1995. Senate Bill 460 expressed support for using market-based approaches and authorized Illinois EPA to propose rules for an emissions reduction market system. Illinois EPA submitted proposed regulations to the Illinois Pollution Control Board in hearings that were recently concluded. The Board heard enthusiastic testimony in support of the program from the Chemical Industry Council of Illinois, on behalf of about 80 manufacturers statewide.

The plan was also endorsed by the Illinois Environmental Regulatory Group, which represents 45 firms in the Chicago area that are major sources of VOCs. We anticipate final rulemaking by early fall.

PROGRAM FEATURES

The Illinois EPA design team concluded our program must have six key elements to be successful and incorporated them in our proposal. They are a cap on emissions, including all significant sources, providing flexibility, confidence in the market mechanism, enforcement for meeting reduction targets, and the potential for cost savings.

First and foremost is establishing a cap on emissions. A carefully-crafted cap ensures both the environmental performance of the system and drives the cost-savings. The team also determined it was environmentally appropriate and would provide additional flexibility to the trading participants if the cap was based on reductions in VOCs during the five-month "ozone season" from May through September. A review of the monitoring data indicated that no hourly concentrations of ozone have been measured above 100 parts per billion outside of those months.

The Illinois program sets a cap requiring a 12 percent reduction of VOCs from a baseline level of VOC emissions for each source. The baseline is determined by using an average of the seasonal emissions from prior representative years.

The allotments will be written into the Title V permits of each source and will be valid for the season in which it has been issued and the next season. The total number of allotments for the entire metro area will be limited to achieve the overall 12 percent reduction in VOC emissions -- about 1500 tons per season. In addition, it is important to emphasize that the reductions go beyond those already achieved under RACT requirements. To further ensure the market will not create any toxic "hot spots," sources will also still be subject to federal Maximum Available Control Technology (MACT) standards that apply to toxic VOC emissions. This will prevent increases in toxic VOCs being offset by decreases in non-toxic VOC emissions in the Chicago metro area under the trading system.

The second key element of the program is including all sources whose emissions significantly impact the target reductions. The system will capture about 90 percent of the total point source emissions of VOCs in the Chicago metro area by requiring any business with a Title V permit to participate if their emissions exceed 10 tons per season. An estimated 244 individual sources emitting 12,500 tons of VOC emissions per season and representing 28 different industrial categories, including printers, food processors, can coaters, oil refineries and chemical companies will be required to participate.

Third, the system must have as much flexibility as possible.

Stakeholders told us repeatedly that governmental review and/or approval of specific trading transactions would severely hamper performance of the system.

Consequently, this "cap and trade" program does not require regulatory review or approval of specific transactions because of the nature of the trading units in the market. All have been created upfront and do not require validation during the transaction process.

The system also includes a secondary source of allotments called the Alternative Compliance Market Account in response to industry concerns that adequate allotments would be available for purchase. This account in effect provides a "safety net." One percent of each source's baseline will go into this account and would come out of the 12 percent reduction. In addition, 20 percent of allotments held by sources that have shut down will go into the account, as well as any voluntary contributions. Anyone may purchase the allotments from this account at a price of $10,000 per ton or a level tied to a multiple of the average market price.

We also allow for banking of unused emission trading units as an incentive for sources to make early reductions. This approach also enables sources to plan ahead and cope with year to year fluctuations in operations. However, unlike in the Acid Rain program where allowances have an unlimited lifetime, in the Illinois VOC program, the lifetime of the trading units is limited to two years. We have done this to reduce the potential for "emission spikes" or exceedences of the total budget.

We have also built in exemptions for sources who wish to make deeper reductions without participating in the trading program or for sources who have already installed the maximum level of feasible controls.

In another unique measure of flexibility, the Emissions Reduction Market System also includes the potential for inter-sector trading. Companies could reduce their costs of meeting VOC reduction targets by purchasing and scrapping vehicles resulting in an equivalent tonnage reduction. Based on Illinois EPA's experience from a prototype "Cash for Clunkers" program in partnership with General Motors and the Environmental Defense Fund, a full-scale program that scraps approximately 5,000 vehicles would cost less than $2,500 per ton for VOC reductions.

Fourth, the Illinois EPA design team wanted to make sure our VOC trading system had the confidence of investors and participants. Many sources subject to the VOC Emission Reduction Market System were concerned about the availability of trading units and relevant price information. The Acid Rain program uses an annual auction as one mechanism to ensure a supply of allowances on the market and as an indicator of the market price for allowances. The VOC sources in the Chicago area felt that our Alternative Market Compliance Account could serve as sufficient insurance that there will be trading units available for purchase. Therefore, an official auction was unnecessary. To provide additional information on the price of trading units, the Illinois EPA agreed to post and update average price information on our trading system electronic bulletin board.

Fifth, in order for the system to ensure the underlying goal of reducing pollutants, there must be consequences for not complying or delaying implementation of the VOC reduction targets. Therefore, we have included a series of checks and balances to make sure the fundamental interests of all stakeholders, including the public welfare, are protected.

Participating sources will be required to provide actual VOC emissions data for the allotment period as well as data on its emissions transactions. If it is determined a source does not have sufficient allotments to cover its emissions, they must be made up from the set-aside account or from the following year's allotment. Sources that exceed their allotments will have to pay a penalty through purchasing an additional 20 to 50 percent more trading units or making the equivalent emission reductions.. This feature provides both an economic disincentive for noncompliance and maintains the integrity of the environmental goal. Finally, the Agency will conduct an Annual Performance Review of all aspects of the market system to evaluate its impact in producing emission reduction benefits.

Last, but certainly not least, the program must have the potential for significant savings. Using accepted U.S. EPA methodology for estimated control costs by industrial category, Illinois EPA projected industries in the Chicago faced additional costs of $700 per ton to more than $18,000 per ton to further reduce VOC emissions. Although we will not know the price of the allotments until the market actually starts operating, an educated guess based on accepted forecasting methods is they will sell for less than $3,000 per ton.

Our analysis also indicated that imposing California-level strict controls on the Chicago metro area would require industries to spend up to $20.9 million to get only about 50 percent of the reductions we will achieve under our system at a projected cost of only $3.2 million. The analysis also estimated the trading program will result in an areawide gross regional product savings of $34 million and personal income savings of $22 million over an eight year period.

The savings or benefit to individual sources, will of course, vary significantly. We looked at the potential for trading among several specific VOC sources in the Chicago metro area. The trading program will provide an economic benefit to both industries with relatively high costs for increased VOC reductions and those that can meet the target at relatively low cost but can then generate excess credits to sell. For example, a rubber and plastic facility has ozone season emissions of 30.2 tons of VOCs. To meet the 12 percent reduction requirement on its own, the facility determined it would need to install a thermal oxidizer at an annual cost of $279,300. But with the new trading system, it can instead purchase 3.6 tons (the 12 percent reduction) of allotments at a price ranging up to $10,000 per ton. That would result in at least $243,300 in potential cost savings

Among witnesses appearing before the Illinois Pollution Control Board in support of the VOC trading program was Steve Ziesmann of Abbott Laboratories, who also served on our design team. Mr. Ziesmann noted that because Abbott has multiple VOC discharge sources in the Chicago metro area, having to reduce emissions at each site by 12 percent would cost between $15 and $20 million. Using the market-based trading system, Abbott will be able to achieve the overall 12 percent target by higher reductions at some of the sites, with a total cost of between $2 and $4 million.

"The cost to Abbott, and to society, of achieving the same level of emission reductions under ERMS will be much less than what it may have been under a traditional 'command and control' regime," Mr. Ziesmann testified.

LESSONS AND CONCLUSION

It is our expectation that a VOC trading program in Illinois will work dramatically better than if we continued to rely only on a traditional command and control approach. While do not yet have the system in place, from the lessons from other market systems and from our partnership with business and the environmental community over the past four years, we are confident this is the right direction.

Our past efforts at command and control regulation led to years of litigation, mistrust between the business community and our Agency and the imposition by court order of a federal implementation plan, but not attainment of the federal ozone standard. Continuing down that road would only severely hamper the Illinois economy and not necessarily obtain cleaner air.

The Illinois Emissions Reduction Market System does not pit jobs against clean air but instead gives companies a powerful market incentive for innovation. By opening up a range of cost-effective choices, it is our hope industry will be spurred to go beyond complying with regulations geared to the "least common denominator." Free from one-size-fits-all bureaucratically prescribed technologies and control strategies, business will be able to make business decisions that are also good for the environment and the public health. Illinois is bullish about market-based solutions to achieving pollution reductions. We have high hopes for this system. It can not afford to fail and it will not fail. #

EMISSIONS TRADING: PRACTICAL LESSONS FROM EXPERIENCE*

Testimony of

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Before the

Joint Economic Committee

U.S. House of Representatives
U.S. Senate

July 9, 1997

* Mr. Dudek is a Senior Economist at the Environmental Defense Fund. The author gratefully acknowledges the assistance of Joseph Goffman, Senior Attorney with the Environmental Defense Fund, Washington, D.C.

INTRODUCTION

My name is Daniel J. Dudek and I am a senior economist with the Environmental Defense Fund, a national not-for-profit environmental organization with over 300,000 members. EDF's mission is to solve environmental problems by combining science, law, and economics. EDF, among all environmental organizations, has particularly focused on the development of market-based policies. I am here today to testify as an unabashed advocate of market-based environmental policies. EDF believes such policy tools:

- increase environmental effectiveness
- reduce compliance costs
- create financial rewards for environmental performance
- tap existing on-site expertise in the search for new solutions
- create incentives for new technologies, processes, and environmental management.

We believe that the nation has accumulated significant experience with several forms of market-based environmental policies, particularly that class of market tools known as emissions trading. Emissions trading was initially implemented in the late 70's to address concerns about rigid Clean Air Act compliance deadlines and the need to encourage local economic growth for employment. Since that time, emissions trading and banking has been applied to heavy duty engine nitrogen oxide and particulate emissions, the lead phase down in gasoline by refiners, the reduction of production of stratospheric ozone destroying chlorofluorocarbons, cutting acid rain, retiring high emitting vehicles, creating incentives for alternative vehicle fuels, and for the reduction of pollution discharges to rivers and lakes.

Conceptually, emissions trading is quite simple, no more complex than addition and subtraction. In fact, EDF has frequently analogized the acid rain program to the opening and management of a checkbook. Within a category of sources each of which has an emissions limitation requirement, any one source may reduce its emissions more than required and find its emissions below its emissions limitation. That source in effect can transfer or assign the extra increment of emissions reduction to a second source; the second source can emit above its required limitation up to the amount of the first source's extra reductions and both sources' combined emissions still equal the same quantity that would have been emitted had both been emitting at their initial required levels. The key is defining what constitutes an extra reduction and quantifying it. The key to the success of these programs has been empowering business to determine the most effective strategy to produce pollution reductions.

During the '80's emissions trading initiatives created a mixed record, at best. Since emissions trading was grafted onto existing command-and-control programs which suffered basic flaws, it often had the effect of amplifying those flaws. As a result, many

environmentalists worried that including emissions trading in programs that did not control total pollution well in the first place would only aggravate existing command-and-control programs' considerable barriers to achieving the intended levels of emissions reductions (Hinds, 1996). At the same time, the inherent difficulty of converting command-and-control requirements into tradable emissions reductions made transactions cumbersome and costly. However mixed, these experiences provided invaluable learning for the development of more market-oriented emissions trading programs.

With the enactment of the acid rain emissions trading program in the Clean Air Act Amendments of 1990, this decade has seen a steady expansion of emissions trading programs that have brought, or are poised to bring, exactly the benefits the original proponents of emissions trading promised. For the most part, these programs have succeeded by integrating the design of businesses' compliance requirements with the design of the emissions trading tool. In many cases, this design integration has forged a new paradigm for pollution control that offers superior environmental performance, lower cost and a ramping back of otherwise intrusive relationships between regulators and business.

If one of the often debilitating flaws of command-and-control programs was their failure to make any party accountable for achieving specific levels of reductions in actual emissions, and if, for this reason, such programs made emissions trading environmentally risky and economically cumbersome, then the distinctive genius of the acid rain program's design -- which has been instrumental in encouraging the widened use of emissions trading in the past several years -- was in taking these problems on directly.

In so doing, the acid rain program introduced the paradigm-shifting notion of making sources explicitly obligated for meeting a limitation on their actual emissions. This has the effect of guaranteeing that the intended emissions reductions in fact will be achieved and of capping total emissions at the aggregate reduction level. To the great benefit of emissions trading, this approach also means that any emissions reductions below a source's required emissions limitation level are, by definition, surplus and therefore tradable. As a result, sources can create, bank, sell and/or buy, the tradable emissions reduction currency without the need of regulatory intervention with respect to any transaction. Uncertainty and overall transactions costs which dominated emissions trading in the 1980's are radically reduced, if not eliminated.

All of this is made especially easy and understandable by the mechanics of the acid rain program. Every year, the EPA allocates a fixed total of marketable permits, called emissions allowances, to the group of sources with emissions limitations. These allocations were explicitly established by Congress as an integral part of the Clean Air Act Amendments of 1990. In fact, the distribution of these allowances to affected sources was key to reducing industry's opposition to the program and ameliorating impacts among states. Sources can buy, sell or bank these allowances however they wish provided that at the end of each year each source holds allowances equal in number to its actual emissions. As a result, even the regulator's role is fundamentally streamlined.

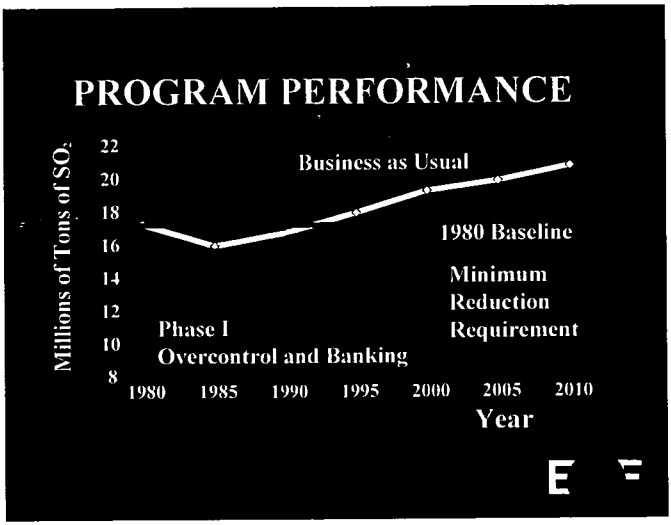
Aside from its many inherent virtues, the acid rain program has provided an instant textbook example of how emissions trading can work and how the problems associated with emissions trading in the past can be escaped or solved. Congress' work in designing the program restored both environmental and economic credibility to the concept of emissions trading and offered a variety of environmental policy-makers and interested parties teaching-by-example. It is in response to this teaching, that environmental regulators from Southern California to the Northeast have developed and deployed emissions trading to combat air pollution throughout this decade.

ENVIRONMENTAL BENEFITS OF EMISSIONS TRADING

EDF had long been convinced of the importance of integrating environmental programs into economic decision-making. Put simply, the vast bulk of the money spent on environmental problems comes from the private sector. Given our market economy's ability to grind down costs through competition and innovation, why shouldn't we harness entrepreneurial energy in solving pollution problems? If we did, we would have more investment choices, new products and markets, fewer resources spent, and, perhaps most important for the environment, more progress faster. However, for many years, EDF was largely alone in this belief. Emissions trading was and is controversial even in the Environmental Protection Agency. It took the spectacular results of the acid rain allowance trading program to demonstrate the power of market forces to produce environmental benefits.

Enhanced Environmental Performance from Early Reductions and Banking

As the figure below indicates, one of the most dramatic results from the Clean Air Act acid rain program has been the degree of overcontrol, i.e. the number of extra reductions that utility sources have made in response to the opportunity to produce and "bank" extra reductions for future use. In 1995, the first year of the program, utility emissions were 39% below allowable levels and in 1996, the program's second year, they were 35% below allowable emission levels (EPA, 1997). This is 3.44 and 2.86 million tons respectively. What other environmental program can show such dramatic performance in so short a time? This performance is especially salient when viewed from the perspective of the environmental problem we are attempting to solve.



In part, acid rain as it affects ecosystems is a cumulative emissions problem which acts over time to leach the buffering capacities from the soils sustaining forests and surrounding lakes. As this buffering capacity is depleted, the process of lake acidification and forest decline are accelerated. By reducing emissions sooner rather than later, the program provides relief to these acid-stressed ecosystems exactly when they need it most. In economist's terms, the marginal benefits, i.e. avoided damages, associated with these extra reductions are highest when we first begin to reduce emission levels. The typical command-and-control regulatory program, on the other hand, phases reductions in slowly and provides no motivation for companies to reduce any more than they are required by the regulation.

In effect, emissions trading turns traditional environmental incentives on their head. Companies are challenged and rewarded by a flexible compliance program and market opportunities to go beyond government minimums. Environmental management becomes part of the strategic business plan.

Recently, EDF was able to participate directly with a company in which this very dynamic was unfolding. On May 14, EDF and British Petroleum struck an agreement to design a greenhouse gas emissions trading program and to test design options with demonstration transactions (Los Angeles Times, 1997). BP's action reflects exactly this strategic understanding, an understanding engendered whenever markets for emissions

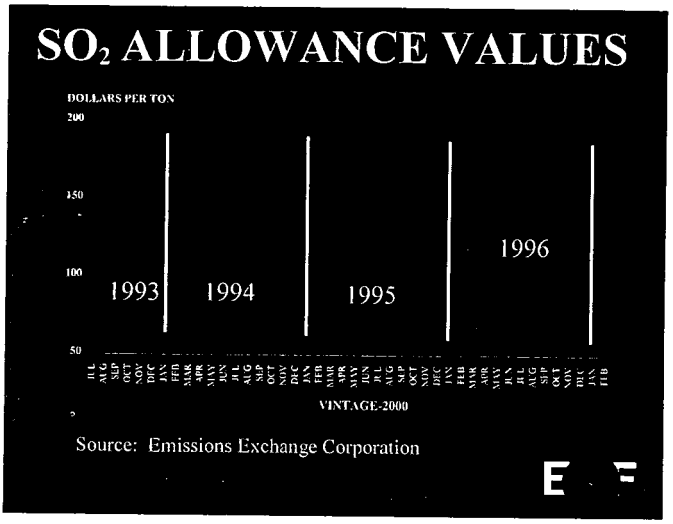
reductions are created. Furthermore, it reflects another critical change induced by the spread of the emissions trading paradigm – the switch from reactive to proactive policy involvement by business.

Reduced Program Costs and Higher levels of Environmental Protection

In addition to accelerating emissions reductions and realigning the incentives of private firms, emissions trading programs, especially those exemplified by the acid rain program, bring other environmental benefits. The simple notion that making sources explicitly accountable for their actual emissions can simultaneously serve as the cornerstone for an emissions trading system has helped air regulators confronting a variety of pollutants and environmental problems see that they can design programs that impose explicit caps on total emissions and thus ensure achievement of intended emissions reductions. This insight has helped win over many previously skeptical environmentalists and regulators.

However, the ability of well designed cap and trade programs to guarantee emissions reductions and the lowest achievable costs led to another more critical insight – that we could afford more environmental protection if policy makers could be guaranteed that costs would be as low as possible. It was this insight that led President Bush to adopt a 10 million ton reduction in sulfur dioxide emissions for the Administration's acid rain program proposal to Congress, a goal long advocated by environmentalists. Assured of the lowest costs to the economy by the flexible market orientation of the program's design, President Bush was able to eliminate the usual tension between environmental and economic performance.

How has the program performed in economic terms? The chart below shows the unexpected history of allowance prices. The economic models employed to assess the potential costs of compliance with the acid rain program predicted substantially higher costs and allowance values (Ellerman, et al., 1997). This performance is especially dramatic when considered in the context of the Direct Sale Subaccount established under Sec. 416 which sets aside 50,000 tons per year for direct sale at $1500 per ton adjusted by the Consumer Price Index.



Focuses Environmental Resources Efficiently and Stimulates Innovation

Some critics have argued that there is "not enough" trading in the acid rain program. They miss two points. First, the purpose of the acid rain program is not to promote trading.[1] Rather, it is to reduce acid deposition at the lowest cost. All evidence points to the fact that the program is succeeding triumphantly. The allowance values reflected in the figure above are far below the marginal cost of compliance projected for the program when it was enacted.

Second, the allowance-trading market may be effective in reducing costs because it fosters implicit or "latent" emissions trading as well as active trading. Put another way, emissions trading places all compliance options in direct competition with each other. Of course, any program that permits flexibility in compliance choices does this. Because of emissions trading, however, that competition is geometrically expanded in the acid rain program. Different compliance options do not compete with each other only at any one facility. Because emissions trading allows a facility operator to choose to apply a

[1] Nonetheless, trading activity increased in 1994 and has continued in 1996. Trading between distinct entities doubled between 1995 and 1996 from 1.9 million tons in 1995 to 4.4 million tons in 1996 (EPA, 1997). At the same time, it is important to recognize that transfers even between units with the same owner can produced very substantial cost savings when compared with more inflexible regulatory programs. These internal transfer economies are a critical consideration for transboundary pollution problems such as acid rain, ozone, and greenhouse gases.

compliance option at its own site or, in effect, at any other affected facility that can make surplus allowances available, the facility operator's range of choices are much broader, the competition among them much more intense, and the capacity of that competition to lower costs much, much greater.

BASIC MARKET REQUIREMENTS

To date, the dramatic spread of emissions trading in the 1990's has been carried by three programs that were more or less patterned on the acid rain "cap and allowance" or "cap and trade" model. The Northeast states' Ozone Transport Commission (OTC) adopted a nearly identical system for controlling oxides of nitrogen (NOx) in the 12-state region as an important measure for reaching the groundlevel ozone standard in cities throughout the region. In Los Angeles, the South Coast Air Quality Management District adopted a similar cap and trade program to reduce NOx and sulfur dioxide emissions in the L.A. basin. Finally, the Illinois Environmental Protection Agency (IEPA) developed a cap and trade program for reducing volatile organic compounds in Chicago.[2]

EDF participated in the "design team" effort convened by the IEPA. Initially, the design team assumed that the characteristics of VOC emissions, their atmospheric behavior in ozone formation and difficulties quantifying them militated against the use of a cap and trade approach. In trying to develop an emissions trading design that ensured environmental integrity and economic viability, however, the design team discovered the superior features of a cap and trade program actually made it easier to address these issues. In contrast, it was alternative designs that did not include caps or that did not proceed from the cornerstone of defining compliance in terms of actual emissions that proved to be the least likely to achieve success.

On the basis of this experience, as well as on its participation in the OTC's design efforts for its NOx program, EDF has concluded that cap and trade programs should be the template of first resort that policy-makers use when designing air pollution programs. To be sure, there are a variety of models and approaches to emissions trading that policy-makers can use in designing specific programs. None has the inherent environmental and economic advantages of the cap and trade model. As a result, in EDF's view, the variety of emissions trading models should be understood to occupy a hierarchy at whose top is the cap and trade approach. For this reason, in assessing alternatives, program designers should begin by determining whether the cap and trade model can be applied to managing the pollutant(s) for which they may be creating a program. Only if they conclude that such an approach is impracticable, should they examine alternative tools.

In fact, notwithstanding its strong preference for cap-based programs, EDF itself has advocated for the use of emissions trading approaches that do not follow the cap and trade template in a number or circumstances, particularly in its work on emissions and emissions trading in the mobile source sector (EDF and GM, 1992). Such approaches are

[2] Illinois uses the term "volatile organic materials" or VOM to describe its program.

demanded for sources that cannot be subject to a total emissions cap or are not being subject to mandatory regulation. Even sources with these characteristics, however, can play a beneficial role in an emissions trading program, just as emissions trading can dramatically improve the performance of programs for controlling emissions from these sources. In fact, the market forces unleashed by cap and trade programs can be focused on the search for untraditional, but cost-effective emissions reductions such as accelerated vehicle retirement.

In working with such programs, EDF has concluded that a second maxim, of equal importance to the ultimate preference for cap and trade models, should guide the work of policy designers: in fashioning emissions trading programs, regulators must develop program features that are highly specific to the pollutants being managed and the environmental problem being addressed. Attempts to promulgate generic emissions trading rules that purport to be applicable to a variety of sources or a range of programs almost inevitably will result in failure. One need only look at the U.S. EPA's ill-fated proposal in 1995 of an Open Market Trading Rule (OMTR) for a demonstration of the importance of this maxim.

EDF was deeply critical of the OMTR and vigorously opposed its final promulgation. To be sure, we offered the agency detailed criticism of a number of its features. In our view, however, its flaws stemmed from the fact that EPA had set itself an impossible task in attempting to propound a rule with generic application. For example, in its attempt to craft the OMTR for use across the full range of existing command-and-control programs, the EPA was unable to fashion a method for establishing that emissions reductions were surplus and tradable in a way that both guaranteed the environmental integrity of the underlying emissions control program while ensuring that open market trading was economically practical. More critically, the EPA failed to provide guidance for the integration of this proposed program with existing emission reduction credit trading programs or with emerging state-based cap and trade programs.

From EDF's perspective, there is no reason to reject open market trading out of hand. Instead, open market trading must be understood to sit far below cap and trade approaches on the emissions trading hierarchy and the application of open market trading should be attempted, as is the case of all trading approaches, only when it can be carefully integrated into the overall design of a specific emissions control program.

However great the superiority of cap and trade programs relative to other trading approaches, even cap and trade is not a magic bullet. The importance of fashioning emissions trading programs by integrating them into overall pollution management programs cannot be overstated.

In crafting pollution control programs, policy designers must pay attention to several fundamentals, however, if their efforts are to succeed:

1. Environmental integrity is paramount. A pollution control program is virtually certain to fail if sources are permitted to trade emissions reductions that are not truly surplus relative to the emissions limitation target of the overall program or, at least, of the category of sources being regulated. The cap and trade approach succeeds because it makes traded reductions surplus virtually by definition. The open market approach, in contrast, must struggle to assure that traded reductions are surplus.

It is imperative for the success of emissions trading programs that the clear and unequivocal message be sent that emissions trades are fully equivalent as compliance options to on-site controls.[3] The performance of most emissions trading markets has been characterized by significant sources of supply, but effective demand has been much slower to develop. Frequently, this pattern has been due to regulatory uncertainty introduced by either environmental or economic regulators. In this regard, public education is a key component to success. Critics can easily misrepresent emissions trading as "selling licenses to pollute". Demonstration transactions, preferably with environmental partners, are an important tool in allaying suspicion about the environmental effectiveness of such programs.[4]

2. Market fundamentals apply to emissions trading markets. An insufficient number of participants will doom an emissions trading market. For example, the U.S. established an production quota trading system to implement the Montreal Protocol and eliminate chloroflourocarbons, which deplete stratospheric ozone. Because there were so few producers, the quota-trading market saw little, if any, activity. Similarly, an early water effluent trading program was established by the state of Wisconsin to reduce pollution in the Fox river. The program was designed, however, in a way that featured extensive regulatory oversight of transactions. As a result, anticipated uncertainty and high transactions costs inhibited participation.

3. High transactions costs may be good for brokers and other intermediaries, but not for buyers and sellers. The design of the acid rain program was highly conducive to minimizing transactions costs: regulatory approval was eliminated and transparency was maximized. Critics have repeated the mantra that there is "not enough trading".[5] These have tended to be market intermediaries, who have missed the point – the program's

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[3] Of course, the pollution controlled whether through on-site controls or emissions trades must meet all applicable health-based limitations such as the National Ambient Air Quality Standards.

[4] For example, in 1992, the Illinois Environmental Protection Agency sponsored a 200 vehicle test of the EDF-GM design for retiring high emitting vehicles. The rigorous nature of this demonstration helped to convince the US EPA that this program design was sound. Ultimately, the design has been incorporated into the set of Economic Incentive Programs offered to states for use in meeting the ambient air quality standards established under Title I. California has recently developed a 70,000 car per year program.

[5] Transactions costs include the costs for search, negotiation, approval, monitoring, enforcement, and insurance. To the extent that the legal regime prevents these costs from being reduced, their existence will reduce the number of transactions and increase overall program costs. For a more complete discussion see Stavins (1993). Dudek and Wiener warn that "regulators wishing to reduce compliance costs using these tools need to design them (and their supporting institutional infrastructure) with a view to managing transaction costs or risk not achieving the primary benefits that they offer in the first place" (1996, p. 6).

purpose is to achieve the required reductions at the lowest cost, regardless of how much or little work or profit there is for brokers. Indeed, those firms, like Cantor Fitzgerald, whose low-cost intermediary services have been specifically designed to streamline transactions costs have done the best at surviving, while those that sought to emphasize their own role have left the market. A key institutional innovation was establishing the legal ability for any person to own or hold such allowances. This has allowed options, swaps, forward and futures contracts to be developed.[6]

In contrast, the OMTR seemed to be designed to maximize uncertainty and related transactions costs. While the proposed rule suggested that emissions trading brokers could provide the tools for hedging or absorbing those costs for buyers and sellers, it would appear that brokers would have to play a featured role – and charge the market accordingly.

4. Banking has important environmental and economic benefits, but must be carefully designed. If sources can keep excess emissions reductions in one year and use them in future years, then an emissions trading system gives them an incentive to make additional surplus reductions early. In virtually every case, early reductions yield additional environmental benefits, as exemplified by acid rain. At the same time, banking can be critical to market formation. In the early years of many markets, potential supply-side investors may have reason to doubt whether demand exists for extra emissions reductions they may create. If they know, however, that reductions made even in the early years of a program can be used in later years, when the market can be expected to mature, the value of that expectation will justify making early reductions. In many cases, investments in early reductions involve investments in aggressive and innovative control technologies, thus helping to stimulate the deployment of environmental innovation.

Of course, for many environmental problems, acute exposure to pollutants is more serious than cumulative exposure. In these cases, later emissions increases are not *environmentally* offset by earlier excess reductions. It falls to program designers then to find approaches to balance the benefits of banking with its potential problems. For example, the designers of the OTC's NOx cap and trade program permitted unlimited banking but included a "flow control" requirement limiting the use of banked emissions reductions in certain circumstances.[7] The designers of the IEPA VOC program, in

[6] EDF participated in the development of an interpollutant emissions swap. In this case, 25,000 tons of SO_2 allowances from Arizona Public Service were exchanged for 1.75 million tons of CO_2 reductions from Niagara Mohawk Power Corporation.

[7] This provision illustrates the importance of designing the emissions trading market in conformity with the underlying environmental problem. In particular, NOx trading programs are intended to control ozone precursors which tend to have greater environmental impact during hot weather. These same weather patterns induce increased demand for electricity which results in increased NOx emissions from the increased combustion. In the absence of some feedback on NOx emission reductions bank withdrawals, the potential would exist for trading to exacerbate the environmental problem.

contrast, included a device to limit, ultimately, the number of emissions reductions that could be banked.

5. Regulators cannot be market-makers, but they can give markets the tools to build the institutions to facilitate market activity. A key to markets, of course, is information. Program designers can ensure this by maintaining a transparent system for accounting for sources' emissions and tracking trades. In addition, auctioning a small portion of emissions credits or allowances can jump-start price discovery.[8] Of course, private intermediaries are instrumental to facilitating market activity. For this reason, emissions trading markets should be designed to let any person, not just sources, hold and transact allowances or credits.

PRESENT POLICY NEEDS AND PRIORITIES

The practical experience with emissions trading is significant and growing. However, some real barriers to the realization of its full potential remain. First, not enough has been to educate the public about the importance of these environmental reforms. They have reduced costs and provided more environmental protection sooner. This is the kind of good news that is all too rare in environmental policy making. This good news needs to be shared with our colleagues and trading partners throughout the world as well. As we review our experience with the Commission on Environmental Cooperation established under the North American free Trade Agreement, we should extend NAFTA's mandate to free trade in environmental commodities.[9] NAFTA is an excellent laboratory for the extension of emissions trading outside the U.S. Our trading partners among the OECD nations need to understand more of the positive experience with emissions trading in the U.S. At the present time, negotiations aimed at the development of a market-based international protocol for the control of greenhouse gas emissions is threatened by misunderstanding of emissions trading (Dudek and Goffman, 1997).

Secondly, the remaining artifacts of the old command-and-control system continue to inhibit effective application of emissions trading. Nowhere is this more evident than in the difficulties of cooperatively managing interstate flows of ozone and its precursors. Last year, EDF was involved in the first interstate emissions trade of NOx emissions reduction credits. The trade was between facilities of two companies straddling the borders of New Jersey and Pennsylvania. Most aspects of the negotiations between the two companies involved were a relatively straightforward business transaction. However, the negotiations between the two states and the two regional EPA

[8] Ellerman, et al (1997) note the importance of the SO_2 allowance auction in price discovery and in the ultimate emergence of a smoothly functioning market. The auction provisions in the legislation could have been strengthened through provision of a sunset mechanism geared to the emergence of private alternatives for example. This approach was followed in the design of the Illinois VOM trading program.

[9] EDF has established a program in the El Paso-Juarez region to build an institutional capacity and experience with cross-border emissions trading. Closer cooperation with Canada in the control of SO_2 emissions as well as ozone precursors offers positive economic opportunities.

offices were protracted. Since such a transaction had never before been consummated, each state had to under the other's program in order to adjust for the transfer. In the end, the resolution of critical details concerning emissions inventories had to be punted to the US EPA since the strategies each state was pursuing differed so radically. These differences existed and persisted despite the fact that each state program was developed under the US EPA's Final Emissions Trading Guidance of 1986. We will continue to have high compliance costs and poor environmental protection if we don't address these key interstate comparability issues.

Lastly, we need to extend the development of emissions trading both in the emissions and sources covered. EDF's strategic vision is of a complete set of environmental commodity markets as companions to the normal markets for goods and services. This comprehensive approach would extend the environmental and economic effectiveness of these programs more widely throughout the economy. Emissions trading programs have been very effective in controlling costs for producers. They have also acted to reveal and identify and bring to market emissions reductions options not previously contemplated by regulators. The remaining challenge is how to tap consumer energy to amplify the economic rewards to producers' environmental decision making. Creating market incentives for companies to reveal the emissions consequences of their products in competition for consumer purchases, for example in the case of energy or vehicles, would be a significant step to creating markets for environmental commodities that engaged all Americans.

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Testimony of
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Cantor Fitzgerald Environmental Brokerage Services

before

Congress of the United States
The Joint Economic Committee

July 9, 1997

Overview

Q. Do you have any opening comments?

A. Yes, first I would like to thank the Committee for inviting me to come and share my comments and insights regarding the usefulness of market based environmental trading systems. Over the course of my career I have been involved in environmental regulation of utilities from several different perspectives--as a utility planning engineer, as the Director of Regulated Utility Planning for the State of Vermont, as a senior scientist at the Tellus Institute for Resource and Environmental Strategies and, currently, as the Managing Director of Cantor Fitzgerald Environmental Brokerage Services.

Q. What is your direct experience with market based emission programs?

A. My first exposure to market based programs was during my tenure as Senior Scientist at the Tellus Institute. A significant part of my work focused on how best to incorporate environmental impacts into utility resource planning. In that capacity I provided expert testimony on this issue in a variety of jurisdictions.

My analysis of Title IV of the Clean Air Act Amendments of 1990 (the Acid Rain Program) led me to conclude that the tradable emissions system are a highly efficient and effective approach to this contentious problem. Economically, tradable emission rights[1] can readily be incorporated into resource planning and operations promoting economic efficiency. Environmentally, the fixed quantity of emission rights guarantees permanent reductions in the emission of the pollutant from the regulated sources. I would like to emphasis guarantee and permanence compared to other types of environmental regulation.

My enthusiasm for these programs led to my present position at Cantor Fitzgerald. I joined Cantor Fitzgerald in 1992 and created Environmental Brokerage Services (CF-EBS) to service the secondary market for Emission Allowances used in Title IV of the Clean Air Act Amendments of 1990. CF-EBS subsequently has expanded to serve the secondary market for RECLAIM Trading Credits, and the various state programs for Emission reduction Credits. CF-EBS currently has a staff of eight broking all active environmental trading programs in the United States, and the fledgling market for Greenhouse Gas Offsets.

Since establishing CF-EBS, I have been immersed in developing services and programs to extract value from these markets for my clients.

Q. Given your experience, do you believe that market based tradable emission programs are a successful method of implementing environmental policy?

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[1] Tradable emissions rights are used in a variety of existing, and proposed programs. The rights themselves are called various names in the different programs, including: Emissions Allowances, Emission Reduction Credits, Discrete Emission Reductions, etc. Unless specified in my comments, I am referring to tradable emissions rights , in general, and will refer to them in this generic fashion.

A. Absolutely. The interface between economics and environmental responsibility has always been one of the most problematic issues faced in resource planning for electric utilities and other businesses that create significant environmental impacts. Tradable emissions programs address the pertinent public policy issue, i.e., containment of environmental insults, head on, while leaving the marketplace to reveal the path to obtaining that goal.

Different Types of Environmental Programs

Q. Please elaborate on your last point by contrasting tradable emissions programs to other modes of implementing environmental policy.

A. There are three basic types of environmental regulation: Command and Control; Tradable Emission Rights and Emission Taxes. Each types balances environmental and economic impacts of environmental restrictions using a different economic paradigm.

Command and Control

Command and Control, the traditional approach to environmental regulation n the US, uses a central planning perspective. Command and Control focuses on technology prescribing specifically the environmental control technological approach a business must use comply with the regulation.

The economic penalties of this system are severe. Command and Control is rigid, does not readily adapt to changing economic conditions, and therefor, does not embrace new technological solutions.

In the short-term on an operational level, industry has an extremely limited ability to adjust its compliance strategies to changing business conditions. This can result in both economic and environmental sacrifice.

In the long term on a strategic level, the cast in concrete nature of Command and Control regulations stifles innovation. Entrepreneurs are discouraged from exploring better ways to meet environmental constraints knowing they must not only build a better mouse trap, but before they can sell it, they must also get regulatory approval. The process of getting such approvals is unwieldy, bureaucratic, and fraught with vested interests for maintaining the status quo.

Emissions Taxes

Emission taxes, by contrast, focus on environmental objectives indirectly. Emission taxes offer no direct connection to the level of true emissions. They attempt to control pollution through economic surrogates.

Controlling emissions through taxation can result in an endless game of chasing one's tail. Such taxes are in turn either environmentally ineffective or economically punitive depending on the state of the economy. During strong economic periods, emission taxes are likely to be sufficiently high to constrain excess emissions resulting from increased industrial activity. During weak economic periods, taxes are an unnecessary burden on businesses operating within acceptable emission limits.

Finally, and perhaps most significantly, emission taxes place environmental and economic objectives in diametric opposition. Emission taxes pose the perpetual threat that environmental policy will become hostage to fiscal policy.

Tradable Emission Rights

Tradable emissions programs correctly and directly recognize that the key public policy issue is the containment of a particular environmental insult. Pollution is a reality of today's society. Environmental policy must balance the negative impacts of pollution against the benefits of industrialization. The creation of a limited quantity of tradable emission rights transforms the right to pollute into a scarce resource.[2] This is exactly the way it should be viewed.

[2] Tradable emissions rights generally apply to a particular segment of regulated businesses, and not all of the potential emitters. However, for narrative simplicity I will omit restating this modifier.

By limiting the amount of emissions available to a particular category of regulated businesses, the environmental goals are guaranteed. And most importantly, they are guaranteed through time. Emissions are constrained through the short-term rise and fall of the business cycle and in the long-term as industry reinvents itself.

Economically, today's market economy is well positioned to continually reallocate this scarce resource to the highest valued users ensuring the efficient allocation of this new commodity. In addition, the economic burden on industry is self-regulating. An emissions trading system adjusts the economic burdens in correlation with the economic cycle. During periods of economic slow down the demand for emission rights decreases resulting in a lower prices and costs to industry. During economic expansion, demand increases driving prices up, promoting rational investment strategies in alternative processes that reduce emissions at a time when industry can best afford it.

Successes of Existing Market Based Programs

Q. From a practical view point, what is your overall impression with the actual experience with the implementation of tradable emission programs?

A. Existing programs have been very successful, which is very impressive given the novelty of these early programs. In particular, the success of the Acid Rain Program[3] is widely held. The GAO[4] conservatively estimated that the utility industry will save at minimum of $1.4 billion per year compared to traditional Command and Control regulation.

While I agree that the Acid Rain Program has been highly successful, I have a somewhat different view on the revealed successes and weaknesses of the program than the mainstream interpretations. Some of the criticisms leveled at the program, are really success stories. Conversely, some of the attributed successes I believe reveal modest failures in the programs design.

Q. Please elaborate.

A. The Acid Rain program came under criticism after the program revealed the true cost of emissions reductions to be well below the estimates prevailing at the time the program was being developed. It was argued that the low costs demonstrated that the environmental community had failed to capture sufficient reductions. Others argue the low prices did not result from the use of tradable rights, but rather from the unforeseen impact of railroad regulation.

Both of these interpretations are in error. First, the primary environmental benefit of tradable permit programs is achieved when the cap is established The cost savings resulting from the use of emission allowances (EAs) versus traditional command and control regulation is a very important secondary benefit, as well as the major economic benefit. The operative question from the environmental perspective is whether or not the agreed upon emissions cap is sufficient, not whether it could have been lower simply because the goal was less expensive to achieve than anticipated. The environmental goal was to achieve a specific quantity of emission reductions, not to spend a specific sum of money.

Second, it is interesting that some parties denigrate the value of the tradable rights programs by teasing out the technological basis of the savings. Tradable rights programs in and of themselves do not reduce emissions. Instead, they provide the vehicle that permits the affected parties to seek out and exploit such opportunities.

Q. Isn't the point of that criticism that the saving would have been obtainable through traditional methods without the use of a tradable rights program?

A. Theoretically, the saving would be obtainable under Command and Control; however, we can never know whether or not the saving would have been captured without a tradable program. My guess is that they probable would not have been.

There are several factors underlying this opinion. One is the reluctance by a regulated entity to modify an approved environmental compliance strategy. This is particularly true, if such a modification requires regulatory, or

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[3] Title IV of the Clean Air Act Amendments of 1990.

[4] Air Pollution Allowance Trading Offers an Opportunity to Reduce Emissions at Less Cost; (GAO/RCED-95-30, December 1994).

public, review. The Acid Rain Program grants utilities the right to take advantage of temporary reduction opportunities without lengthy review, and, of equal importance, to revert to their original strategy if conditions change back.

I have an antidote, which illustrates this point. Before the market price of EAs was well established, it was routine to explore a client's cost of emission reductions to determine if they should be buying or selling EAs. One utility fuel trader was reluctant to reveal the cost of emission reductions on his system. Eventually, he revealed that the company was actually saving money buying lower sulfur fuel. This opportunity had been available for some time, so prior to fuel switching the company had been polluting at a loss.

This seemingly illogical behavior was actually quite rational. Under the pre-EA system, if the utility had started to buy lower sulfur fuel, they would have been subject to a de facto downward ratcheting of their allowed emissions. This company was afraid that should the price of low versus higher sulfur fuel should later reverse itself, it would not be politically feasible to increase emissions back to earlier levels. Economically, the added cost of the higher sulfur fuel was the cost to maintain the option to continue emitting at previously allowed levels.

Q. You mentioned earlier that some claims of success for this program you viewed as partial failures. What did you mean?

A The EA program has resulted it a vast over compliance by the affected utilities in the early years of the program. The EPA reports that Phase I affect units over controlled emissions by 6.3 million tons, or 38% below allowable levels.[5] While this is unarguably good for the environment from a Acid Rain abatement standpoint, it reveals one of the weakness of the specific implementation of the Acid Rain Program.

While some early excess reduction was expected, the actual excess reductions were two or three times that anticipated level. For the most part this resulted from investments by utilities in emission reductions, which in retrospect, were not economic efficient.

Part of the blame is attributable to unavoidable vagaries of planning for the future. With regard to the Acid Rain Program, rail deregulation had the unanticipated impact of expanding the economic penetration of low sulfur coal from the Powder River Basin into new markets.

A second factor was the failure of both utilities and their regulators to embrace the freedom offered by the new system. In too many cases, the immediate reaction was to reduce system emissions before without consideration of trading opportunities.

Third, the last minute bifurcation of the program into Phase I and Phase II. This compounded both of the aforementioned faults and contributed an additional dimension. Phase I embraced the 110 'big dirty' utility stations requiring them to enter the tradable EA program in 1995. Phase II embraces all plants beginning in the year 2000. Economies of scale indicate that the biggest emitters are likely to have the lowest average cost of emission reductions. Consequently, they are among the natural sellers. Conversely, the natural EA buyers would be found among the Phase 2 units. The bifurcation of the program inserted a five year separation between the decision making points between the natural buyers and sellers.

Efficient markets rely upon the constant give and take between buyers and sellers. A five year gulf breaks the communication between these groups depriving the potential Phase I sellers of important feedback regarding the value of their reductions; i.e., what the market would pay for those reductions. As a result, the Phase I utilities made large investment decisions based upon early, untested estimates of the value of emission reductions.

Q. Were any of these factors unavoidable?

A. All three of these factors contributed largely to the over investment in reductions. Of them the first case was largely unavoidable. Plans will always be revealed to be better or worse than anticipated in the cold light of the future revealed. If we had perfect foresight we wouldn't need markets, we would have a perfectly efficient centrally planned economy. With markets and planning comes mistakes, and conversely, the occasional windfall.

Corporate cultures will always take time to embrace radically new tools, the adaptation period growing geometrically with the level of regulation. To embrace these new tools utilities had to build consensus both within their company and with their regulators that trading was an appropriate course of action. Often secondary factors weighed into the debate, such as effects on local employment. In addition, both utilities and regulators lack many of the required skill sets to fully recognize and exploit the new opportunities available to them. In the future, this

[5] 1996 Compliance Report Acid Rain Program, (EPA 430-R-97-025, June 1997).

problem will be lessened as new programs embrace players already operating under existing programs due to program overlap; and as new players review the errors of earlier program hopefully avoiding those mistakes. Additionally, new programs will benefit greatly from the existing framework of brokers, traders, and trade organizations developed to service the EA market.

The bifurcation of the program was the only issue which was unavoidable. Future program design should refrain from inserting unavoidable complications into the system. Markets work best; i.e., when they are simplest and unencumbered.

Keep It Simple

Q. Is there a greater lesson to be derived from your last point?

A. Market forces are excellent at anticipating and correcting for uncertainty. However, dealing with this uncertainty inflicts a price on the overall efficiency of the system. Consequently, in the promotion of efficiency, it is best to keep the programs as simple as possible. One important aspect of simplicity is to apply the program uniformly to all participants. Any subdivision of program participants into sub-groups creates different economic impacts among the groups resulting in a different equilibrium price for each group. While markets thrive on exploiting the differences among participants the creation of artificial differentials should be avoided.

The apparently simple act of the Phase I and II bifurcation greatly complicated the implementing regulations, reporting and monitoring. A very large portion of the implementing regulations addressed issues related to the bifurcation, and a large part of the implementation and monitoring ensures that participants do not unduly shift emissions from Phase I to Phase II units.

The resulting complexity of the regulations eventually led to legal challenges of the regulations.

Q. Isn't it important to build in regulations to protect against environmental 'hot spots'?

A. Yes it is, but fortunately most of the protections are already available through existing laws. Each facility is still governed by an individual air emissions permit. If there is a specific need to further control a particular source, it can be done on a case by case basis. This was done at the Navaho coal-fired power station, which was required to reduce its sulfur dioxide emissions below that allowed under the Acid Rain Program to address haze problems at the Grand Canyon.

I would caution that any such adjustments must be made selectively and only after the program has had an opportunity to work. New programs already contain a reassessment period providing a safety net against programmatic failure. If the program is not on track to accomplishing its emission goals, the emissions cap can adjusted downward. Because the reassessment process and time frame is known, and the assessment will be public, the market for those particular emission rights should have an amble opportunity to assimilate the potential for changes to the cap and make adjustments to the price for those rights accordingly.

Q. Isn't it important to build in regulations protect against a party cornering the market?

A. Hypothetically, it might be possible for a party to corner the market. However, in practice it would be very difficult and unlikely to be an attractive investment. First, no party can corner the market without first purchasing the credits in the open market. This would require out bidding the other potential purchasers. Second, as the prices rise due to the speculators activities, it would become attractive for parties not to utilize any credits they already held and to execute emission control strategies instead with the intention of selling their now unneeded credits. The combined effect of these two factors makes it unlikely that a speculator would find the risk reward relationship attractive.

Avoid the Urge to Develop the Market

Q. Does this concept of program simplicity extends to other aspects of the implementation of tradable right programs?

A. Yes it does. In general, the simpler the program the more efficient the market for the commodity can become in its continual reallocation of emissions to the highest value uses. Ironically, one complicating factor can be the attempt of a regulating body to facilitate market development.

When a marketable product is created a support services (e.g., brokers, trade organizations, information providers, etc.) develop in proportion to the economic value of the portion of the product expected to trade. I am directly involved developing these services for tradable emissions rights.

New markets create a tremendous level of anxiety among the market's participants. The level of anxiety is inversely proportionate to the level of their experience with markets. As a result, arguments undoubtedly arise for regulators to create programs or institutions to "encourage" market development. In many cases, such programs create an unanticipated obstacle to the development of an efficient market.

Q. Please explain how a program designed to enhance market development can create such an obstacle.

A. We turn to markets in the belief that overall efficiency is achieved through the constant give and take of parties with different knowledge, ideas and objectives. This applies the sector servicing the market, as well as, the flow of the market good itself. If the government dictates a program or market activity, it is de facto preventing the give and take used by the market to find the best solution. This creates at least two problems.

First, it virtually eliminates the competition among ideas. Potential service providers will not spend the resources to offer alternative solutions. Second, if the injected solution proves to be ill designed, or even slightly off target, corrections are hard to make. Where competitive pressures constantly cause the market service industry to refine its products to better serve market participants, legislated or regulatory programs must be corrected through political, not economic feedback.

Q. Can you offer any examples of how programs were designed to encourage market development proved to be hindrances?

A. Yes. In particular, I point to the annual auction held by the EPA each year as mandated by the Clean Air Act Amendments. Each year the EPA withholds and auctions 2.8% of the allocated emission allowances. The original premise was to ensure that non-utility generators, which did not receive an original allocation, had access to emission allowances at a 'market price'.

The results have proven to be quite different than original expected. Almost none of the auctioned emission allowances have been purchased by the groups that sought these protection. The structure of the auction (i.e., once a year for two vintages only) was not useful service this sector. Instead these parties found they were much better serviced by through unregulated over the counter markets in which they could tailor deals to their specific requirements.

Unfortunately, the auction has proven to be worse than simply superfluous. Because the allowances are auction with no minimum price, bidding naturally starts below the prevailing market price. This depresses prices, and penalizes sellers.

Appropriate Role for Regulators

Q. Does this mean there is no role for government in enhancing market development?

A. Not at all. Government has a vital role in the development of all emission trading market. Without regulation there simply is no market. However, that role should be sharply focused enforcement of the underlying environmental objectives, not on developing the market itself.

Nonetheless, I am certain that political pressures will result in future interventions. In these cases, I would strongly advocate that any such intervention have a short and well defined time limit. Any market "enhancement" programs, e.g., auctions, direct sales, etc., should have a fixed expiration date. Extension of a program after that date should require affirmative action, i.e., a demonstration that the effort is having a positive affect and is worth extending. Such a blue sky provision will help ensure that only worthwhile programs get extended.

Q. What factors should the government effort be focused?

A. It is the government's twin duties to write the rules and enforce them.

Need for Adequate Funding

Q. Are there other important factors in establishing a viable trading program?.

A. As I discussed earlier, the simpler the program the more readily it will be embraced by it participants, and the less opportunity for game playing will exist. An often overlooked aspect of establishing the program is funding. Emission trading programs are heavily loaded with front end costs. Establishing the rules, setting up the reporting and recordation systems, and making initial allocations is time consuming and expensive. These up-front cost will be well repaid by a well functioning program. The EPA estimates that the EA program is responsible for 40% of the reduction resulting from the Clean Air Act Amendments of 1990 while utilizing approximately 2% of the staff and other resources.[6]

Early on, the Acid Rain program suffered from the slow establishment of the Allowance Tracking System. The ATS is the computer database in which all Allowances exist. It is essentially the title system for EAs. The creation of the database was delayed for a year in part due to lack of funding. With millions of dollars involved in a medium size transaction, it is easy to understand why the ability to transfer title of the purchased allowances is important. While the lack of transfer capability did not prevent trading in its entirety, it greatly hampers the development of the most efficient market forms

Need for Strong Enforcement

Q. Please elaborate on you thoughts regarding enforcement.

A. There is no 'natural benefit' for owning a tradable emissions right. Their only value is compliance with the law. Consequently, there must be a fate worse than trading if trading is to succeed. Accordingly, penalties for non-compliance must severe when compared to the costs of trading (including the time and effort to execute the trades). And, just as importantly, penalties must be enforced.

Future Programs

Q: Do you have any observations you would like to make regarding the future of tradable emission programs?

A: Yes. Tradable programs are expanding to embrace more and more types of environmental commodities. In addition to expanding to include new pollutants, I expect the programs will also expand to embrace an ever growing number of emitters in each program. Tradable programs initially encompass the largest emitters, consequently an expansion of the program will absorb lower level emitters. Nonetheless, the total quantity of emissions controlled by the program would grow. For such an expansion to occur the cost of participating in the programs must decrease. This may require a loosening of monitoring standards.

For example, the Acid Rain program has a provision to allow industrial sources to opt-in and join the program. Unfortunately, the cost of the required monitoring equipment is so great as to prohibit all but the largest emitting facilitates from joining the program. As a result, facilities that might otherwise join and clean-up are excluded. This is unfortunate.

To facilitate the next generation of programs, we should loosen monitoring standards, but not enforcement standards This is a natural progression in the development of the emissions trading paradigm. Trading programs already exchanged the certainty that each and every trade is in the public good for the knowledge that the aggregate trading program is in the public good.

I believe the level of monitoring and enforcement can be similarly loosened on the individual entity so that we can embrace an ever greater portion of active polluters. Loosening monitoring may result in the occasional cheat or accidental emitter escaping detection; but the gains from embracing larger population of polluters and getting them to reduce emissions at a lower cost should more than off-set such leakage.

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[6] Looking Back on SO2: What's Good for the Environment is Good for the Market; Melanie Dean and Joe Kruger; to be published in Public Utilities Journal, August 1997.

Trading Greenhouse Gas Emissions and Offsets

Q. What is your opinion of a greenhouse gas trading program?

A. I believe that if the US is going to contain it emissions of greenhouse gases (by reduction and offset), a trading program is by far the best means available. I believe the free market will quickly demonstrate that the is a large quantity of relatively inexpensive greenhouse gas reductions and offsets available domestically, as well as internationally. In fact, I am already marketing a large portfolio of high quality projects at a fraction of the cost below those commonly used when discussing the issue.

Q. Do you believe that an international greenhouse gas trading program is possible?

A. In the long-term yes, but I do not believe it the best way to inaugurate trading. I believe the US could establish a domestic trading program to fulfill any commitment to contain domestic emissions of greenhouse gases. A domestic program could incorporate a cap and trade system, similar to the Acid Rain Program, for the allowable level of emissions, and could also permit the creation of greenhouse gas credits through offsets (e.g., methane abatement, carbon sinks, etc.). Offset credits would be approved by a certifying entity, perhaps similar to that establish for Joint Implementation Projects.

A domestic trading program would result in the establishment of a hard price for greenhouse gas offsets. It is my believe that if hard currency were available for parties selling credits to the US market, an international market would quickly develop. This would likely lead to other countries willing to live by the same rules desiring to join the program . Eventually the for the importation of credits from other countries could be allowed provided they meet a criteria at least as strict that used to certify US offsets as credits.

As with other emission programs, we would soon discover that the cost of the solution was well below our expectations.

Q. Does this conclude you testimony?

A Yes, it does.

Attachment to the
Testimony of Carlton W. Bartels

Carlton W. Bartels, Managing Director
Cantor Fitzgerald Environmental Brokerage Services
Cantor Fitzgerald Power Brokerage Service

Carlton W. Bartels joined Cantor Fitzgerald in 1992 to develop the Environmental Brokerage Services division. Environmental Brokerage Services brings Cantor Fitzgerald's prowess as the world's foremost auctioneer of securities and financial assets to the SO2 emissions allowance market created under the Clean Air Act Amendments of 1992, and the Regional Clean Air Incentives Market (RECLAIM) of the South Coast Air Quality Management District (California). In 1995, Environmental Brokerage Services opened a west coast office becoming the only firm that provides brokerage and consulting services involving all national emissions trading programs and global greenhouse gas offsets trading. Mr. Bartels articles and talks on emission trading have appeared in numerous trade journals and dozens of conference proceedings. He has provided testimony to the U.S. Senate on the implementation of Title IV of the Clean Air Act Amendments of 1990, and was a panelist on the White House Conference on Global Climate Change, Joint Implementation Workshop.

In June 1997, Mr. Bartels opened Power Brokerage Services at Cantor Fitzgerald to service the recently deregulated market for wholesale electricity.

Mr. Bartels came to Cantor Fitzgerald from the Tellus Institute for Resource and Environmental Strategies in Boston where he held the position of Senior Scientist. At Tellus, Mr. Bartels consulted domestically and internationally on energy policy focusing on economic and environmental implications of the electric utility industry. Mr. Bartels' has provided expert testimony and consultation on a wide variety of utility issues including: resource procurement and development; environmental externalizes; tariff policy and design; non-utility generation; utility mergers; and resource valuation.

From 1981 to 1986, Mr. Bartels worked for the Vermont Department of Public Service. In his position as the Director of Regulated Utility Planning, he was responsible for strategic planning of the electric utility industry statewide, including the development of Vermont's Twenty Year Electric Plan, and the negotiation of power supply contracts. From 1979 to 1981, Mr. Bartels worked for Green Mountain Power Corporation as an Energy Planning Engineer.

Mr. Bartels earned a Masters of Business Administration from the University of Vermont in 1985, and a Bachelor of Engineering from the State University of New York at Stony Brook in 1979.

WISCONSIN ELECTRIC SUPPORTS EMISSIONS TRADING

Wisconsin Electric[1] strongly supports market-based emissions reduction strategies. Market-based systems which include the opportunity to trade emissions provide the flexibility for affected parties to utilize technology and innovation to manage the costs of reducing emissions -- benefiting consumers, shareholders and the environment. Only by incorporating good business practice and sound scientific analysis into environmental control can we continue to improve the environment while maintaining a sound, healthy economy.

THE TRADING PROVISIONS OF THE ACID RAIN PROGRAM

Title IV of the Clean Air Act Amendments of 1990 (CAAA) calls for a 10-million-ton reduction in utility sulfur dioxide (SO2) emissions when fully implemented. Under old regulatory schemes, this reduction would have been achieved through command-and-control regulation. In other words, regulators would have determined a specific, inflexible emission limit for a plant or unit, or specified what technology to install to reduce emissions. Then, regardless of cost, the emission limit would have to be met or the technology installed.

The trading provisions of Title IV of the CAAA introduced the concept and use of a market-based system. Utilities are allocated SO2 emissions "allowances." One emission allowance is equal to one ton of SO2. For each ton of SO2 emitted by a utility, the utility must surrender one allowance. Under the market-based approach, utilities with allocations above its projected emissions could trade, sell or bank the excess allowances. A utility with emissions above its annual allocation of allowances has several choices available. It can install emission reduction technologies, switch to a lower sulfur fuel to meet the allocation target, improve efficiency, employ conservation or purchase allowances in the market to cover its needs.

If a utility chooses to buy allowances for compliance, two factors ensure that the environmental goals are being achieved. First, excess allowances available on the market means that another party has already made the needed emissions reduction, otherwise the

[1] A subsidiary of Wisconsin Energy Corp., Wisconsin Electric provides electricity, natural gas and/or steam service to about 2.3 million people in southeastern Wisconsin (including the Milwaukee area), the Appleton area, the Prairie du Chien area, and in northeastern Wisconsin and Michigan's Upper Peninsula.

allowances would not be available. Therefore, the benefit to the environment has already been achieved. Secondly, all other local, state and federal regulations, such as the National Ambient Air Quality Standards (NAAQS), still apply. No utility or plant can buy so many SO2 allowances as to endanger the local air quality by violating any other applicable standard.

MEASURING THE ACID RAIN PROGRAM'S SUCCESS

The success of the Acid Rain Program is easy to quantify. SO2 emissions in 1995 were 39 percent below allowable emission levels; this was a total of 3.4 million tons of additional reduction.[2] In 1996, SO2 emissions were 35 percent, or 2.89 million tons, below 1996 allocation levels.[3] Utilities achieved excellent results in complying with the continuous emission monitoring requirements, with both exceptional accuracy results and high monitor availability.[4]

Trading activity continued to grow in 1996. A total of 4.4. million allowances changed hands in 1996 in what the EPA defines as economically significant transfers (transfers between economically distinct utility, broker or fuel company.)[5]

Many more trades occurred intra-utility as allowances were traded between unit accounts for compliance. It should be noted that allowances are allocated by EPA to a specific unit. For many owners of multiple units, the most common type of trade is the simple transfer (trade) of allowances between commonly owned units for compliance. Many statistics overlook the quantity of these intra-company trades. Intra-company trading may be the highest volume compliance activity undertaken by a company, and its significance cannot be ignored.

[2] U.S. Environmental Protection Agency, *Acid Rain Program 1995 Compliance Results*, , EPA/430-R-96-012, July 1996.
[3] U.S. Environmental Protection Agency, *Acid Rain Program 1996 Compliance Report*, , EPA/430-R-97-025, June 1997.
[4] Ibid.
[5] Ibid.

WISCONSIN ELECTRIC'S EXPERIENCE

Wisconsin Electric's own experience with the trading provisions of the Acid Rain Program has been very positive. Compliance planning done immediately following passage of the CAAA showed that Wisconsin Electric expected to have a Phase I allocation that exceeded expected emissions by 200,000 to 250,000 allowances over the five years of Phase I (from 1995 through 1999). During Phase II (year 2000 and beyond), the company expects a shortage of approximately 30,000 allowances per year if no action is taken to reduce emissions.

After careful study of emission reduction strategies it was determined that the least-cost compliance methodology for Phase II would be to switch to lower sulfur fuels at several facilities, achieving 10,000- 20,000 tons of total reductions. The balance of the required reduction would be purchased from the market

In order to achieve the total 30,000 ton SO2 reduction on the Wisconsin Electric system alone, absent the market, would have meant the installation of scrubbers on at least two units. Comparing the capital and O&M cost to scrub the two units, to the cost of purchasing the same emissions reduction on the market, there was over a $100 million (in 1995 $'s) savings by pursuing the purchase allowances option.

With such dramatic cost savings available through the market, Wisconsin Electric gradually entered the market as early as 1992 to begin contracting for the sale of the excess Phase I allowances and the purchase of the needed Phase II allowances. Analysis of the market based on projected future allowance costs and internal economic factors (such as the cost of capital and inflation factors), showed that the simultaneous sale and purchase of allowances was the most beneficial to Wisconsin Electric. Other companies with excess Phase I allowances have concluded, using different economic data, that simply banking Phase I allowances for use in later years was the most economically advantageous route to follow. If Wisconsin Electric had chosen to only bank allowances, and not make any other changes, scrubbers would have been required within 5-7 years of the start of Phase I. This made fuel switching and allowance purchase the most viable option when compared to simply banking allowances.

In summary, by choosing the compliance path of fuel switching and allowance purchases for Phase II, Wisconsin Electric has saved its customers over $100 million and deferred the installation of scrubbers for the foreseeable future.

REGULATORY CERTAINTY

For traders in the emissions market to be able to transact business, they need to know that the commodity that they are trading will be here not only today, but tomorrow as well. For example, one concern that has risen is that the highly controversial proposed standard for PM 2.5 could effectively kill the SO2 trading program. The stringency of the proposed PM 2.5 standard could require that all fossil fuel fired utility boilers would need to be scrubbed. If this were to happen, nearly every utility in the US would have an extensive oversupply of SO2 emission allowances. This huge over supply would drive prices to zero, making the SO2 market and the Title IV trading program meaningless. Care must be taken as programs are added to the regulatory scheme to be certain that negative impacts are minimized, especially on programs as successful as Title IV's trading provisions.

APPLICATION TO OTHER MARKETS

The idea of emissions trading as a means of achieving environmental goals at the lowest possible cost is taking hold in markets other than SO2. Title I of the CAAA encourages trading of nitrogen oxides (NOx) and volatile organic compounds (VOCs) as a means of achieving compliance with ambient air quality standards, while Title III opens the door to trading to meet pending requirements for toxic substances. The Ozone Transport Assessment Group (OTAG) included the use of market-based systems as a means of compliance in the final recommendations from this group to EPA. World leaders are evaluating and negotiating a world-wide market for CO2 emission stabilization/reduction under the Framework Convention for Climate Change. Other smaller regional and state level markets are being developed for other pollutants.

PRACTICAL ADVICE FOR DESIGNING OTHER MARKETS

Simplicity. The Title IV SO2 market is an example in market simplicity. EPA regulations are clear and simple when it comes to recording and processing trades. EPA does not interfere with the market by "approving" trades, they simply record the trade. As long as the party has the allowances on account that they desire to trade, the EPA processes the transaction. This simplicity has kept transaction costs low and helped to create efficiencies that might otherwise not exist. The simplicity of the market has also attracted third parties, such as brokers and independent trading firms. These parties have helped to increase market liquidity. Burdensome regulation that would discourage their participation in new markets and drive costs higher have not been a barrier to entry.

Flexibility. The Acid Rain program allows sources the needed flexibility to choose the desired compliance methodology. Sources can install equipment, reduce usage, or buy allowances, for example, in any combination. The same flexibility should be built into any trading programs for NOx or greenhouse gas emissions. For greenhouse gas emissions this would include the recognition of Joint Implementation projects entered into with non-Annex I nations. Developing nations are the source of some of the most cost-effective greenhouse gas reduction and sequestration projects worldwide. To leave these potential projects out of the picture would be detrimental to the process of achieving greenhouse gas emission reductions at the lowest cost.

For NOx, this may mean allowing inter-sector trading. One example of this would be the ability to scrap older, less-efficient automobiles to achieve the same NOx reduction as otherwise would have had to have been achieved by a utility or industrial boiler on its own.

Certifiable Reductions. The SO2 reductions under the Acid Rain Program are being accomplished with no dispute. Utility emissions are being accurately monitored under the Acid Rain Program through the use of certified continuous emission monitors.

As the debate on greenhouse gas reductions continues at the global level, care must be exercised to ensure that all parties play by a common set of rules. Emission reductions claimed by a party must be real, measurable and certifiable. It would be extremely unfair to the U.S. if we were to closely control and monitor, at great expense, our greenhouse gas

reductions under any potential treaty, only to have another country apply a less stringent standard of measurement or conduct. In a global economy, the playing field must be level to minimize any impacts to the U.S.

Recognition of Early Reductions. Parties that commit to making early, voluntary reductions should not be penalized and should be given full recognition for their efforts. What often occurs is that companies that are ahead of the curve and employ environmental foresight by making voluntary reductions prior to the enactment of regulations, are often penalized by having their early reductions ignored or discounted.

The rationale expressed by some to justify this discounting is that the reductions, should have or would have occurred even without the regulation. Admittedly, some parties only make reductions when faced with pending regulations. However, this ignores that many companies do, in fact, make voluntary reductions to better the environment, and further ignores the issue of capital stock turnover. For example, a company may choose to install a technology at a site early if it thought that pending regulations were likely to require a reduction at a later date. Such a choice would be driven by the fact that most pollution control equipment has a 20-30 year life expectancy. No company wants to install equipment one day, just to replace it a few years later with a new piece of equipment. With rules seemingly always in a state of flux, and new proposals surfacing weekly, this is a real concern to utilities.

Regulation should encourage and recognize emission reductions that are voluntary. After all, the sooner a reduction is made, the sooner we will see the benefit to the environment.

WHAT STEPS CAN HELP THE EXISTING MARKET

Education and Outreach. Public understanding of emissions trading is increasing, but it is still widely misunderstood. Emissions trading is easily sensationalized by the press through the use of provocative headlines over "trading the right to pollute," or claiming that sources that buy emissions have found a "loophole" in the regulations. While these claims help to sell news papers, they do little to build the trust that is needed to expand emissions trading into other sectors. Popular media nearly always overlook the simple fact that SO2

emissions are down dramatically in the first two years of the Acid Rain Program, and costs are far lower through the use of trading than anyone ever predicted they would be. More public outreach is needed as new emission reduction programs, such as the NOx reductions under OTAG, move forward if these programs are to include trading provisions that the public will accept.

To help in this effort, a new industry group, the Emissions Marketing Association (EMA), was formed to promote market-based trading solutions to environmental problems. This group, started by Wisconsin Electric and other key market players, is chartered as an independent, non-profit trade association. EMA currently represents over 60 companies, including several international firms. EMA's mission is to promote the advancement and application of policy and regulation relevant to market-based emissions trading systems; encourage and facilitate information exchange; and provide programs in education and training. Information on the EMA is attached to this testimony.

Trust the Science. The science behind the need for emissions reduction is complex and is evolving as tools are perfected and applied. The OTAG process is a stellar example of this. Never before have the states come together, as they did in the OTAG process, to study the ozone transport phenomenon in such depth. The body of knowledge on ozone transport has been greatly increased, and through rigorous review, there is relative agreement on the inputs and outputs of the process. This sound science provides for the next phase of work in which EPA now must recommend the reductions needed to solve the problem. Subregional efforts are now under way to further refine the science and identify the emission reduction strategies that will result in an improved environment.

CONCLUSIONS

Market-based emissions reduction systems that include emissions trading are an effective tool in our national environmental strategy. While environmental protection is, and should continue to be, a top priority on our national agenda, care must be exercised to ensure that required emission reductions are allowed to take place in the most efficient and economical manner possible.

Emissions trading has already proven its success as a tool for reducing the cost of meeting the strict SO2 emission reduction targets of the CAAA, proving that economic and environmental goals can be achieved efficiently and successfully. Market-based approaches to emission reductions will ensure that, as we proceed into the future, Americans will enjoy both the benefits of lower cost power and a cleaner, healthier environment.

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THE EMISSIONS MARKETING ASSOCIATION

Your complete resource for emissions trading information, education and access

EMA Mission Statement

The mission of the Emissions Marketing Association is to promote market based trading solutions for environmental control and to serve its membership and the public. The Emissions Marketing Association will pursue this mission through the following objectives:

(a) Promote the advancement and application of policy and regulation relevant to market based emission trading systems.

(b) Encourage and facilitate information exchange among members and other professional and technical groups, and the public.

(c) Provide programs in education and training to improve knowledge and skill of members and of the public.

Member Companies

(As of June 1, 1997)

AIG Trading Corp.
Alabama Power Co.
Alcoa
Allegheny Power
Aquila Energy
Arizona Public Service Co.
Associated Electric Cooperative
Atlantic Electric
Automated Credit Exchange
AYP Energy, Inc.
Cantor Fitzgerald - EBS
Cargill
Center for Energy & Environmental Policy Research-MIT
Centerior Energy
Chicago Board of Trade
Cinergy Corp.
Commonwealth Edison
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Dickstein, Shapiro, Morin & Oshinsky
Duke Power Co.
Edison Electric Institute
Electric Software Products
Emissions Exchange Corp.
Emissions Trading, LLC
Enron Capital & Trade Resources
EPA Acid Rain Division
Euro Brokers
Green Power Corporation (Asia)
Greenhouse Emissions Mgmt Consortium (Canada)
Hoosier Energy REC, Inc.
Koch Industries
LG&E Power Marketing, Inc.
Long Island Lighting Co.
Natural Resources Group
NIPSCO Energy Services, Inc.
Oglethorpe Power Corp.
Ohio Edison Co.
Ontario Hydro
Pacific Gas & Electric
PacifiCorp
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Southern Company Services
Springfield City Water, Light & Power
Tennessee Valley Authority
The Pittsburgh & Midway Coal Mining Co.
Trees for the Future
TU Electric
U. S. Generating Co.
Utilicorp Energy Group
Virginia Power
Wisconsin Electric
Wisconsin Power & Light

ema

Frequently Asked Questions...

WHY JOIN THE EMA?

Networking

- Gain better access to traders, brokers and utilities all seeking to buy, sell and trade their emissions
- EMA members trade SO_2, CO_2 and NO_x in the form of allowances, credits, offsets, DER's and ERC's.

Education

- The EMA is committed to bringing you the latest speakers and topics on emissions marketing through frequent conferences.
- The second EMA emissions trading conference will be held October 27-29, 1997, in Phoenix, Arizona. The US Environmental Protection Agency is co-sponsoring this conference.

Information Exchange

- Learn about the Acid Rain program, OTAG, OTC, RECLAIM, green house gas emissions trading and other trading venues.
- Keep up-to-date on developing regional, national and international markets.
- New market opportunities are developing on a regular basis. *Don't be left out!*

Risk Reduction

- Learn how to reduce your risk by integrating market tools such as options, swaps and forwards into your portfolio.

WHAT DOES IT COST?

Individual Membership

- $500.00 annual membership fee.
- Designed for individuals not affiliated with a company or small businesses that have only one representative in the Association.

Corporate Membership:

- $500.00 annual membership fee for the first individual, and $200.00 annual membership fee for the second or subsequent individual (Associate Member) from the same company.
- Designed for holding companies or larger corporations desiring to have more than one individual enjoy the advantages of membership in the EMA.
- Corporate memberships are limited to one voting individual regardless of the number of associate members.

Affiliate Membership

- $125.00 annual membership fee.
- Designed for individuals from qualified nonprofit, governmental and academic institutions only.
- Affiliate members enjoy all Association benefits but do not have voting rights.

NEED MORE INFORMATION?

☎ Call (414) 221-3600 ℗ Fax (414) 221-3899
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William L Fang
Deputy General Counsel
Edison Electric Institute

Tradeable Emissions Permits: The US SO_2 Experience from the Electric Utility Industry Perspective - Successes, Failures, Lessons and Prospects for Future Use

William L Fang
Deputy General Counsel
Edison Electric Institute

The current effort to develop a greenhouse gas (GHG) emissions reduction programme for the Conference of Parties (COP) to the Framework Convention on Climate Change (FCCC) will likely involve consideration of an emissions trading system as one option.

While market-based programmes to meet environmental requirements are not new, there are no examples that have been applied on the scale that will be needed to address GHG emissions. The most recent, and closest, example is the SO_2 allowance programme mandated by Title IV of the United States' Clean Air Act Amendments (CAAA) of 1990. Although the programme is still in its infancy, the development and initial results of the Title IV programme can provide a number of lessons for use in exploring a GHG trading programme.

Background on Title IV

The CAAA, signed into law in November, 1990, culminated a 16 month legislative process. From the time that the Bush Administration announced its original legislative proposal in June, 1989 until final enactment, the Title IV programme underwent significant modifications. Many of these changes reflected a growing understanding of the implications of a market-based system for control of SO_2 as applied to the heavily regulated electric utility industry.

As originally proposed, the SO_2 allowance programme would govern all electric utility sources with historical SO_2 emission rates greater than 1.2 lbs./MMBtu. These sources would be allocated allowances in two phases at levels that would result in roughly a 50% reduction in US SO_2 emissions in the year 2001 compared to 1980 levels. In order to prevent future increases in SO_2 emissions after this reduction was achieved, the proposal included a "cap" on annual utility SO_2 emissions. Existing units would receive at no cost an annual allocation of allowances, while new units would have to procure allowances at least equal to each year's SO_2 emissions from the "market" at the market price. It was anticipated that new units would be able to obtain allowances as older plants reduced emissions to below allocated allowance levels and sold excess allowances to offset control costs or were retired and replaced with cleaner, more efficient plants.

The programme was quickly expanded to all electric utility sources above a minimum size in the lower 48 states when it was recognized that the original approach concentrated allowances in the Eastern half of the US, where the vast majority of sources with historical SO_2 emission rates greater than 1.2 lbs./MMBtu are located. This, coupled with higher rates of growth in electric demand in the Western states, resulted in apprehension that exclusion from the Title IV allowance allocation could place those states at a distinct disadvantage in meeting future energy needs. With future demand for electricity expected to be met with coalfired power plants in the West, allowances were quickly equated with economic growth.

The association of allowances with growth spread to other regions of the country with the imposition of the SO_2 emissions cap in Phase II and greater understanding of the basis for the allowance allocations. The original allocations were tied to each unit's "baseline", or average operating level in the years 1985-87 (in million Btus of heat input). For a number of reasons, such as high growth rates for electric demand or initial operation of nuclear units during the baseline years, the baseline for many utilities is well below projected operating levels in the latter years of Phase I and during Phase II. Compliance with the allocated allowance level would thus require achievement of very stringent emission limits or obtaining allowances from the allowance market. Either approach was viewed at the time as being potentially extremely costly and as presenting a risk that allowances would not be available when needed. This led to efforts by many utilities, states and Congressional delegations to obtain a "fair share" of allowances by increasing allowance allocations through the application of special allocation formulas and reserves. The end result is a system with six special allowance reserves in Phase I and Phase II and 29 different methods to calculate allowance allocations in Phase II.

Based on the argument that the integrity of the allowance market depended on the accurate measurement of SO_2 emissions, Title IV also includes a comprehensive emissions monitoring requirement. Even though the allowance programme applies to SO_2 only, and compliance is to be on an annual basis, the statute called for affected units to install and operate systems to "sample, analyze, measure, and provide on a continuous basis a permanent record of" not just SO_2, but also NOx, opacity and volumetric flow. Late in the legislative process, a similar requirement was added under Title VIII to measure CO_2 emissions from utility units.

Regulatory Implementation of Title IV

Once the 1990 Amendments were signed into law, US EPA began the process of implementation. The Agency established an Acid Rain Advisory Committee (ARAC) to provide guidance in developing the regulations implementing Title IV. ARAC, which met for the first time in December, 1990, consisted of representatives from utility companies affected by Title IV; environmental organizations; state environmental, rate regulation and consumer protection agencies; pollution control equipment manufacturers; low sulfur and high sulfur coal interests and other interested parties. Many of these same groups were instrumental in shaping the final legislation, and in some respects, ARAC served as another forum for parties to pursue individual agendas. This led to considerable disagreement and fractious debate on a number of issues, complicating EPA's implementation process.

Despite the conflicts, ARAC provided EPA with valuable guidance on the development of regulations for Title IV, which EPA proposed in December, 1991. EPA issued final Title IV regulations on January 11, 1993, nine months past the statutory deadline for doing so.

The final Title IV rules are fairly straight-forward in may respects, properly reflecting the simplicity of an annual market-based approach compared to a restrictive, unit-by-unit command and control approach. The rules are exceedingly complex in two areas, however, both of which have implications for a GHG trading

programme.

The first of these is referred to as "reduced utilization". This provision in the statute was intended to reflect the dichotomy of the first phase of the Title IV programme, which includes only 263 specific utility units *as* affected sources. Congress recognized that one method of compliance with the allowance allocation for such units would be to reduce generation from or completely shut down the unit, and shift generation to Phase II units which would not have to account for emissions until the year 2000. Thus, a brief, two sentence provision in the statute lead to the most complex permitting option for Phase I, under which a detailed accounting for each Phase I unit's actual operation is required during the five years of Phase I. Any process to develop a GHG trading programme must carefully consider the peculiarities of a phased approach.

The most technically complex sections of the Title IV regulations are clearly those implementing the requirement for continuous emissions monitoring. Even though the Title IV programme requires compliance on an annual basis only for both SO_2 and NOx, EPA interpreted Congress' use of the word "continuous" to require the collection of hourly data not just for SO_2 and NOx, but for a host of other parameters. Under the final rules, the operator of each continuous emissions monitoring system must collect and report approximately half a million data points each year, all to determine compliance with an annual limitation. Monitoring of GHG emissions and trades will be an incredibly complex undertaking if the approach taken under Title IV is adopted, considering the number and diversity of GHG sources.

The uncertainty over and delay in issuance of EPA's final rules did not completely impeded the allowance market. A number of private allowance transactions were reported, for the most part covering small numbers of allowances. Only one company, Illinois Power, appears to be relying on the allowance market for compliance purposes during Phase I of the programme. Most, if not all, other companies intend to be self-reliant during Phase I.

The SO_2 allowance programme has been held up as a shining example of the benefits of market-based environmental programmes. It is clearly premature to draw this conclusion, as only a small number of allowance transactions have occurred. On one level, however, the programme is a success in that it is allowing utilities to develop least-cost compliance plans on an intrasystem basis, instead of having to control each unit to a specific emission limitation. Whether the potential cost savings that could occur with trading on an intersystem basis will be achieved will take some time, possibly years, to determine. However, the genesis of the allowance programme can provide useful insights into the issues that must be addressed during the development of any trading programme for greenhouse gases.

Translating the Title IV Experience to GHG Trading

While the Title IV programme provides a useful strawman for the analysis of GHG trading, a number of issues must be addressed. First and foremost, GHG trading can be viewed as a rationing programme for GHGs, the primary one of which is CO_2.

Using the SO_2 allowance programme as a model, a GHG programme will require a cap on GHG emissions and some allocation of the total allowable emissions under that cap. Although the ability to incorporate CO_2 sinks into the programme provides some relief, the level of reductions in GHG emissions being called for by some (a return of emissions to 1990 levels and ultimately a reduction of 20% below 1990 levels) clearly will result in rationing of GHG emission allowances. With the primary GHG, C02, resulting almost exclusively from processes that supply a major portion of the world's energy, it is not unreasonable to conclude that a GHG trading programme will, in effect, become an energy-rationing programme until the time when non-fossil fuel sources of energy can technologically and economically compete with fossil sources. Within this context, the issues that must be addressed include:

Scope of the Trading Programme - will the programme be national, implemented unilaterally by each nation of the COP, or international, allowing trades to occur across borders? If implemented by only a few countries, the programme likely will prove ineffective in the long run. While a programme involving a certain number of countries may limit future growth in GHG emissions for those countries, global emissions of GHGs will continue to grow, quickly off-setting any benefit of these efforts. This issue is critical to any programme to limit GHG emissions, whether it includes trading or not.

The question of scope also applies to GHG source categories. The Title IV programme is fairly simple in at least one aspect - it applies to only one industry in one country, the electric utility industry in the US, which is already heavily regulated. The Title IV programme also has the advantage of a concentration of SO_2 emissions in this source category, with two-thirds of total US SO_2 emissions in this sector. Sources of GHGs are much more diversified, with more than one GHG to consider and no one sector as a dominant source for any GHG. (For example, the two largest source categories in the US for C02, transportation and electricity generation, are essentially equal with approximately one-third of total emissions, with industrial, commercial and residential energy use accounting for the remainder.) This will make the design of a trading programme much more difficult. Should the trading programme cover all GHGs, or focus on C02? How should the global warming potential (GWP) of each GHG be factored into the programme - different levels of credit given depending on the GWP? Should trades across GHG categories be allowed - for example, methane credits used against CO_2 emissions? It is notable that the Department of Energy was directed to address these issues under Sec. 1605 of the Energy Policy Act of 1992. The results of this study are critical to better understand the difficulties these issues raise prior to any decision to utilize a trading approach.

Joint Implementation - the issues noted above lead directly to questions of implementation, which, within an international context, are often referred to as joint implementation. Given the diversity of economic and technological development in the countries of the world, opportunities for cost-effective GHG reductions may occur in countries that do not have the economic resources or technical capability to achieve them. It is clear that technology transfer and resource allocation will be critical aspects of any programme to address GHG emissions. The key question in the context of a trading programme is how to allocate the credit for emission reductions that occur in one country but are paid for by another country or organization. Some sharing of the credit would be logical, but the determination of allocation of the credit could be contentious. In theory, resolution of these issues should be a natural outcome of a market-based trading programme. However, countries with small original allocations of allowances and limited resources to purchase additional allowances may be compelled to extract a disproportionate share of the credit for emission reduction activities.

In addition to providing more cost-effective opportunities for GHG emission reductions, a trading programme under a joint implementation approach could result in both emissions and employment benefits when compared to a unilateral programme. Under a unilateral approach, one simple way to achieve a reduction in emissions, and free up emission credits, would be to move operations to a country that does not have a GHG programme (or that has a programme that is not strictly monitored and enforced). Certain source categories such as transportation or utilities cannot take this approach, but many others can and may. The result would be little if any reduction in global GHG emissions and a shift in employment from the first country to the second. Joint implementation involves a host of other, similarly complex issues that must be addressed and resolved. At the same time, joint implementation provides some clear benefits over a unilateral programme, and should be an integral part of any GHG trading programme.

Baseline Determination and Allocation of GHG Allowances - the Title IV programme provides numerous insights into the issues that arise in determining the appropriate baseline for a trading programme and the allocation scheme. The experience of developing the Title IV legislation also underscores the difficulty of resolving these issues. If the premise that a GHG allowance programme is in effect a rationing programme for energy use is correct, these issues will be much more contentious when addressed in this broader context.

Under the Title IV programme, the years 1985-87 are used as the baseline period for the purpose of both measuring reductions and allocating SO_2 allowances, even though the goal of the programme is to reduce emissions from 1980 levels. However, it was determined that the quality of the emissions inventory for 1980 was inadequate to be the basis for the allowance allocations, and a period closer in time to the development of the legislative proposal was used. (This led to a major controversy over the determination of the amount of emissions reductions that had taken place from 1980 to 1985 which could be credited toward achieving the 10 million ton reduction goal.)

While it is not entirely clear what year or years would be appropriate under a GHG trading programme, the aim of the FCCC to reduce GHG emissions to 1990 levels in the year 2000 suggest that 1990 should be considered. Whatever period is chosen, the most immediate issue to address is an emissions inventory for that period. Under Title IV, which was limited to one source category which routinely reports operations and emissions data to the government, issues related to the baseline were still being resolved two and a half years after the legislation was signed into law. Translating this to a GHG programme, which will involve a number of GHGs instead of one gas, dozens of point and non-point source categories instead of one and thousands of sources instead of hundreds, is a daunting proposition even if limited to the US alone. The determination of an accurate historical emissions inventory on a global basis is likely to be a monumental task, and to take several years of research and negotiations to achieve.

Assuming that an appropriate baseline can be determined and an accurate emissions inventory developed to support this baseline, the next question to address is the limitation on emissions to be achieved by the programme (i.e., the emissions cap). Should this be a scientifically determined level or an arbitrary level related to what is perceived to be achievable at this time? The aim of the FCCC suggests a cap set at 1990 levels, but should this be the 1990 level for each GHG, or should the cap reflect the GWP for each gas? The goal of the climate treaty is to stabilize GHG concentrations in the atmosphere at a level to avoid dangerous anthropogenic interferences with the climate system. Should the cap be set to be adjustable to reflect the emissions level needed to

achieve the goal, once that level is determined? What impact on the market for GHG allowances will an adjustable cap have? Will the prospect of a lower emissions cap spur control actions or deter them? There is clearly a significant amount of scientific and policy research needed to answer these questions.

Finally, the allowance allocation process must address projected growth in emissions. An allocation scheme based on current emission levels may not be viewed as an equitable approach, as a significant portion of current emissions are in developed countries and future growth in emissions is expected to come largely from developing countries and countries with economies in transition. As noted above, when the implications of differential rates of growth for electricity demand and SO_2 emissions were realized, the result was a "feeding frenzy" for allowances, and a final allowance allocation scheme that includes dozens of ways to determine an allocation. Again, extrapolating this experience to a GHG allowance programme on an international basis where rates of growth in GHG emissions differ among the developed and developing countries to an even greater extent than for SO_2 emissions within the US electric utility industry suggests an incredibly complex and difficult allocation process. Any perception of inequities in the allocation process, coupled with the economic value associated with the baseline allocation, will result in a very contentious proceeding.

As part of this process, it must be determined to what segments of the economy allocations will be provided. Title IV takes a simple approach - give SO_2 allowances to the primary source of S02, the utilities. There is no primary source for GHGs, however. Sources range from large utility and industrial plants to residential and commercial heating systems to individual automobiles and trucks and more for C02, from landfills to natural gas pipeline systems to coal mines to land use changes for methane, to fertilizer applications for nitrous oxides, etc. Will oil companies be allocated allowances that determine how much gasoline can be sold into the market, or will individuals be given an allocation to use when purchasing transportation fuel? Similarly, will coal, oil and natural gas companies be given allowances or electric utilities that use such fuels to generate electricity? Will oil and natural gas companies be given allocations to cover the use of their products for residential and commercial heating? Will non-point sources be included, and how? All of these questions, and more, must be answered, and answered in the context of implementing a programme that will be fair to all.

Monitoring and Enforcement - as noted above, the monitoring provisions under Title IV are the most technically complex and regulatory stringent parts of the programme. Based on an argument that the integrity and success of the SO_2 allowance market demands that every ton of SO_2 emitted must be accurately measured and accounted for, EPA has established rules that require the collection and reporting of data for every hour of the year for not just SO_2 but for more than three dozen other parameters, for the application of various quality assurance procedures on daily, quarterly, semi-annual and annual bases, and for the application of procedures to determine if monitoring systems are biased which do not properly reflect the normal statistical variability of data of this nature. The underlying premise for this approach is that, given the economic value of allowances, utilities will find ways to undercount emissions and save allowances without rigorous monitoring requirements and enforcement of those requirements.

Transferring this premise to a GHG trading programme suggests the need for an even more complex monitoring effort. Does this approach make sense, even for sources of GHGs that can be monitored? At what cost? What level of regulatory oversight would be needed? How would sources that cannot be physically monitored be handled? How would credit for GHG sinks be

determined, such as for CO_2 sequestration from planting trees? It is clear that some form of verification protocol would be needed that could apply to both point and non-point sources of GHGs as well as for use in determining credits for sinks. It is also clear that the assumption in the Title IV monitoring rules that every ton of SO_2 actually must be measured is not a feasible approach to GHG monitoring.

Assuming that some workable monitoring system can be designed leads to the next step - enforcing the trading programme. The CAAA of 1990 give EPA significantly expanded enforcement authority. Under Title IV, EPA will provide limited oversight for allowance transactions, but closely scrutinize monitoring efforts to assure data accuracy and completeness. The Amendments also expand the sanctions EPA can apply for violations of its rules. What agency or organization will fulfill this role for a GHG trading programme? What level of oversight should be provided for an international trading programme? Who will keep the "books" on international trades? What remedies will be available if one country strictly enforces its programme but feels other countries do not? Once again, the simple model of the SO_2 allowance programme is inadequate in answering the numerous complex questions raised by the prospects of a GHG trading programme.

Conclusion

A cursory review of the issues associated with a GHG trading programme quickly leads to the conclusion that those pointing to the "success" of the SO_2 allowance programme are at best mistaken and at worst being somewhat disingenuous. While the experience to date for the Title IV programme provides many useful insights for a GHG programme, the complexities of the latter are significantly greater than those confronted during the statutory development and regulatory implementation of Title IV. These complexities will be very difficult to address, and, in the end may not be resolvable.

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