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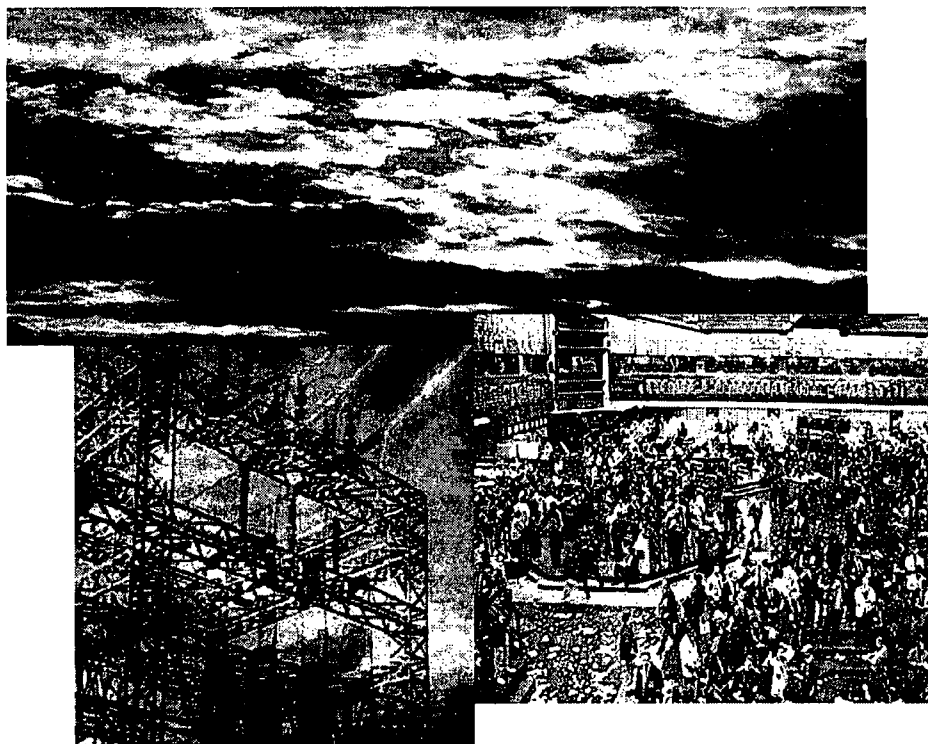
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From Obstacle to Opportunity:

How acid rain emissions trading is delivering cleaner air



September 2000



ENVIRONMENTAL DEFENSE

finding the ways that work

**From Obstacle to Opportunity:
How acid rain emissions trading is delivering cleaner air**
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Environmental Defense, a leading national, New York-based nonprofit organization, represents 300,000 members. Environmental Defense links science, economics, and law to create innovative, equitable and economically viable solutions to today's environmental problems.

This report was prepared by the following staff members in the Global and Regional Atmosphere Program at Environmental Defense: Andrew Aulisi, Daniel Dudek, Joseph Goffman, Michael Oppenheimer, Annie Petsonk, and Sarah Wade. It updates and expands a report issued in November 1997 entitled "More Clean Air for the Buck: Lessons from the

U.S. Acid Rain Emissions Trading Program,” which included contributions from Deborah Salon.

Special thanks are given to Byron Swift, Director of the Energy and Innovation Center of the Environmental Law Institute, for comments and assistance in the preparation of this report.

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A Note to Readers

This report has two related subjects. The first four parts of the report focus on the emissions performance and economic results of the acid rain emissions trading program—a system in the United States to reduce sulfur dioxide pollution from electricity plants. Our hope is that these sections will inform the public of our assessment of the program and influence a broad range of policy makers and stakeholders, particularly with regard to issues involved in the design of successful “cap and trade” mechanisms to reduce air pollution. The fifth part discusses specific design issues relevant to the Kyoto Protocol on climate change, which is presently under deliberation by international negotiators who are seeking to develop rules for greenhouse gas emissions reductions. This part will be of particular interest to readers concerned with the successful implementation of the international framework to mitigate climate change. The conclusion of the report enumerates a set of policy challenges characterized by the imperative of achieving substantial reductions in air pollution quickly and inexpensively. The report invites policy makers to assess the design and results of the sulfur dioxide program as they move forward with their own initiatives.

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Preface

The battle against acid deposition in the United States is far from over. The current federal program to reduce the major precursors of acid rain, namely emissions of sulfur dioxide (SO₂) and nitrogen oxides (NO_x), is only just beginning its second phase. Mounting evidence suggests that even more reductions in these pollutants, beyond those called for under the current law, will be necessary.

At least, however, the battle has begun.

This report presents the results of the first five years of the federal program to reduce the SO₂ emissions that are precursors of acid deposition. It also includes observations about these results and the lessons they can teach policy makers and other stakeholders as they grapple with the continuing, wide-ranging threats to human health and the environment posed by air pollution.

Advancing this kind of learning is critical if we are to find solutions to complex environmental problems. The problem discussed in this report—acid deposition—and the method used to address it—emissions trading—have been of special concern to Environmental Defense (formerly Environmental Defense Fund, or EDF) for almost 20 years.

Throughout the 1980s, EDF devoted extensive research and advocacy resources to the effort to solve the acid rain problem. EDF scientists engaged in a variety of research and public education activities, and, together with EDF economists and lawyers, worked energetically to promote the use of “market mechanisms” as the most effective way to achieve large reductions in SO₂ and NO_x emissions. In 1989 and 1990, EDF was widely credited for advancing the “cap and trade” proposal to reduce acid rain emissions embraced by the Bush administration and then enacted by Congress as part of the Clean Air Act Amendments of 1990.

Throughout the 1990s, EDF waged active campaigns to persuade policy makers on every level to use the “cap and trade” model of the SO₂ program in the battle against pollutants ranging from ozone smog precursors, to stratospheric ozone depleters, to greenhouse gases. Many of the critical elements of this approach are now reflected in regional NO_x programs in the United States and even in the Kyoto Protocol, to which Environmental Defense continues to devote considerable resources both in the United States and abroad.

This report, then, is part of an ongoing effort begun nearly 20 years ago. Although the results of the first phase of the SO₂ program are very promising, the struggle to protect human health and natural resources from the ravages of air pollution continues.

Thus this report is intended to offer useful material both to those looking backward and those looking forward across the horizon of environmental policy.

Executive summary

Since 1995, the United States has been conducting what ten years ago was widely regarded as a novel “experiment.” In 1990, President George Bush and the United States Congress enacted legislation that required all power plants in the continental United States to reduce and cap their total annual emissions of sulfur dioxide (SO_2), a precursor of acid rain. The legislation introduced the additional innovation of allowing the power plants to meet this requirement through the optional use of emissions trading. At the time, a pollution control program that made polluters explicitly liable as a matter of law for limiting their total emissions to a specified level while permitting them to use emissions trading was simply unprecedented.

From 1995 to 1999, or the period known as “Phase I,” the program yielded impressive environmental and economic results. Figure 1 summarizes one set: Phase I power plants reduced their SO_2 emissions far below the level that was legally allowable under all of the provisions of the program. Furthermore, in response to the economic dynamics created by the “cap and trade” design of the program, these plants released substantially less pollution relative to the more stringent level of “base” allowable emissions established by Congress. At the same time, the SO_2 emissions trading market has done what markets do best: drive down costs.

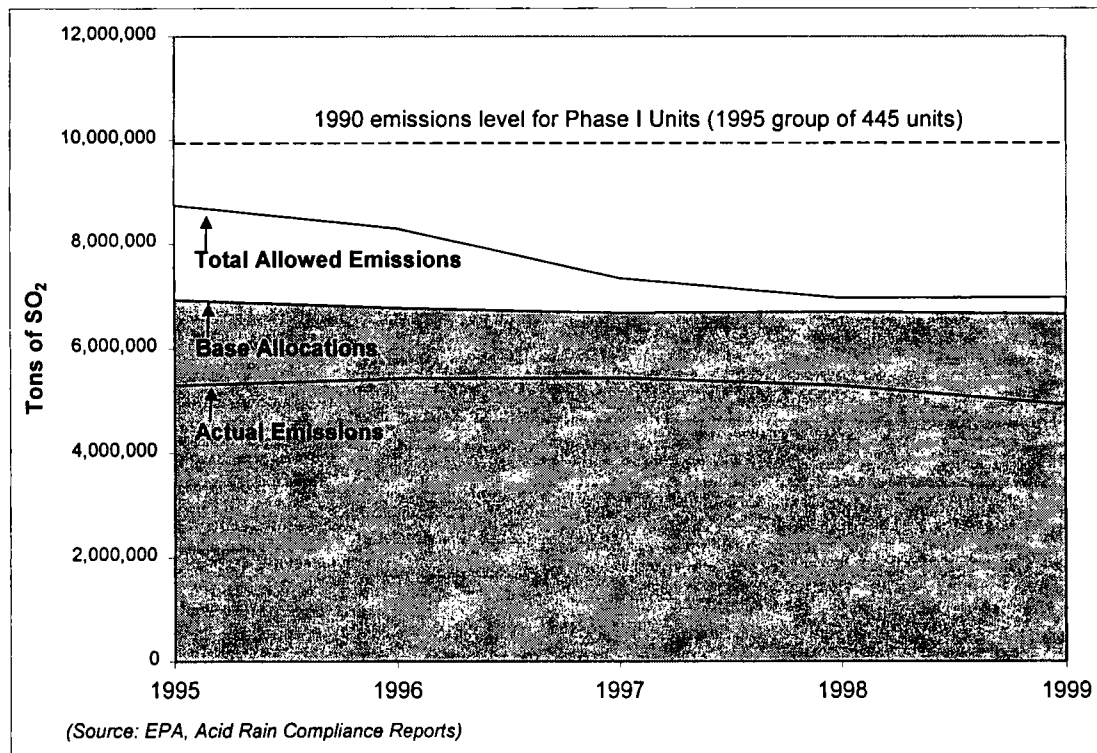


Figure 1: Phase I emissions performance: actual emissions vs. base allocations vs. total allowances

These results are especially critical now, since they can inform the actions of current policy makers—those who must respond to growing evidence that further reductions in SO₂ and NO_x emissions are needed to solve the problem of acid rain and protect public health. In addition, the reaction of polluters to this market-based program bears important lessons for those who are grappling with the control of greenhouse gases (GHGs) to protect the climate.

Largely through a series of graphs and illustrations, this report details the successful and encouraging results of the acid rain emissions trading program:

- While achieving *100% program compliance* during Phase I, power plants reduced SO₂ emissions *22% below* the levels required as compared to the restricted number of “base” allowance allocations initially allotted to them by Congress, resulting in *7.3 million tons of extra emissions reductions*.
- When taking into account *all* Phase I emissions allowances allocated under the program, such as “extension allowances” for certain technologies and allowances available through a statutory auction, actual emissions were *30% lower* than the level that was legally permitted, resulting in *11.6 million* unused allowances.
- The *extra reductions* in emissions were distributed across 22 of the 24 states whose power plants have participated in Phase I, and many sources in the highest-emitting states—such as those in Ohio, Indiana, Georgia, Pennsylvania, West Virginia, and Missouri—have made the greatest number of cuts in emissions.
- The extra reductions, which represent a concrete economic asset because of the banking and trading provisions of the program, have occurred in the absence of any federal or state action to restrict the saving or transfer of allowances.
- The cost of SO₂ reductions, as reflected indirectly in the price of traded SO₂ emissions allowances, is far below the cost predicted during the initial debates on the program.
- Despite the rapid fall in SO₂ emissions over the past five years, both electricity generation and the United States economy experienced strong growth during the same period. Thus the results of the program offer more evidence to disprove the supposed link between economic growth and emissions growth.
- Reductions in sulfate deposition have been observed in geographic areas affected by atmospheric transport of sulfur.

The superior environmental and economic results of Phase I of the SO₂ program are precisely what should have been expected of a program that matched an explicit emissions limit with a market that turned pollution reductions into marketable assets.

Despite these achievements, air pollution continues to pose serious threats to human health and the environment. Mounting evidence suggests that if the acid rain problem is to be

solved, even more emissions reductions are needed in SO₂ and, in particular, NO_x, which is not under the same regulatory limit on emissions as that specified for SO₂. In addition, these pollutants contribute to the formation of ground level ozone and fine-particle smog. Human health is also menaced by the release of mercury from power plants, while global emissions of GHGs from a variety of sectors and sources threaten damaging changes to the world's climate system.

The results of Phase I of the SO₂ program are so promising, however, as to create a clear imperative for stakeholders and decision makers—people facing the pollution-control challenges now looming on the political horizon—to test the potential performance of their own strategies and initiatives against the results of the SO₂ program.

This obligation applies to federal and state policy makers in the United States who are grappling with regional pollution issues and potential changes in the control requirements for the nation's electricity plants across the spectrum of four major pollutants: SO₂, NO_x, mercury and carbon dioxide.

This obligation also applies to international negotiators who are seeking to develop rules to bring forward the Kyoto Protocol on climate change. Accordingly, with particular emphasis on the dual objective of ensuring both the integrity of the emissions reductions mandates of the Protocol and the effectiveness of the international emissions trading market created by the Protocol, this report includes a discussion of certain issues currently facing the international negotiators. It offers a number of recommendations and lessons derived from the design of the SO₂ program:

- Clear, consistent rules that emphasize transparency, fungibility, and market performance have been the key factors in creating the investor certainty that has brought about the program's success.
- To foster extra, early reductions during the first compliance period of the Kyoto Protocol (2008-2012), nations should advocate "banking" of allowable emissions and establish, before 2008, their limits for GHG emissions for the second compliance period.
- To promote compliance, the Protocol framework should incorporate a key feature found in the SO₂ program: automatic deduction of excess emissions from a noncomplying party's subsequent "assigned amount."
- In view of the limited set of enforcement tools available to an international regime, nations should adopt a limited but effective form of "buyer liability" to create incentives in favor of compliance and to ensure that the environment is made whole.

- In weighing “compliance funds,” nations should ensure that any such programs adopted provide sufficiently high penalties to preserve the environmental and economic integrity of the GHG emissions reduction trading system. Parties and firms must be permitted “no exit” from their obligations to reduce GHG emissions.

I. Introduction and background

The program implemented in the United States to reduce SO₂ emissions, a major cause of acid rain, demonstrated dramatic success between 1995 and 1999, the Phase I period. With the advent of Phase II in January 2000 and the requirement for more reductions from more sources, the program took another important step forward in tackling what was once a seemingly intractable environmental problem.

Establishment of the SO₂ program

Throughout the 1970s, both lay and scientific observers noted the occurrence of acidified lakes and streams located across large areas of the eastern United States. Many of these waterways exhibited a startling decline in animal life. Anecdotal and scientific evidence also pointed to declines in some forests in roughly the same areas. Based on years of research at the Hubbard Brook Experimental Forest in New Hampshire, Dr. Gene Likens identified the cause as related to air pollutants, and popularized the term “acid rain” to describe the phenomenon.¹ In 1981, the National Academy of Sciences issued a broad report supporting the view that atmospheric emissions of SO₂ and NO_x result in acidic deposition (through rain, snow, and fog) that, in turn, caused this environmental damage.² The Academy's report also urged a “prompt tightening of restrictions on atmospheric emissions from fossil fuels and other large sources.”³

¹ Extensive research outside the United States, particularly Scandinavia, also demonstrated the connection between air pollution and acid deposition. Dr. Likens is the President and Director of the Institute of Ecosystem Studies in Millbrook, NY.

² Committee on the Atmosphere and the Biosphere, National Research Council, National Academy of Sciences, *Atmosphere-Biosphere Interactions: Toward a Better Understanding of the Ecological Consequences of Fossil Fuel Combustion* (Washington, DC: National Academy Press, 1981).

³ *Ibid.*, 7.

The ensuing scientific and policy debate about the link among air pollution, acid deposition, and adverse effects on ecosystems consumed the rest of the decade. It was fueled by bitter political and economic controversy among industrial and regional stakeholders over the cost of reducing SO₂ emissions and the perceived inequitable distribution of both those costs and the claimed benefits.

Specifically, as shown in Figure 2, the vast bulk of SO₂ emissions were from electric utilities, particularly coal-burning plants in the Midwest

and Southeast—a trend that continues to this day.⁴ These companies and regions would bear the cost of the reductions, as would that part of the coal industry that produced high-sulfur coal. The benefits would be gained by “downwind” regions, such as the Northeast (where acid deposition was having a strong effect) and by providers of low-sulfur fuel.

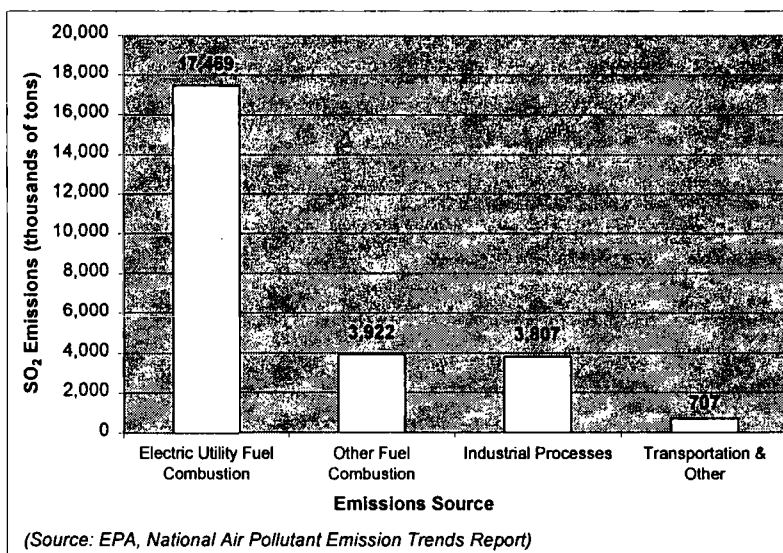


Figure 2: SO₂ emissions in the United States, 1980

These disputes stalled legislation until the Bush administration, with the ultimate support of a Democrat-led Congress, brought forward a plan to lower SO₂ emissions, cap them at the reduced levels, and allow sources to use emissions trading to lower costs. This approach enabled the deadlocked policy makers to defer to the emissions trading market itself as the forum in which a host of competing economic interests would be balanced. In 1990, Congress finally enacted the multifaceted Clean Air Act Amendments, which included a nearly 50% reduction requirement for SO₂ emissions from electric utilities (Title IV of the amendments).

Design of the SO₂ program

The reduction was implemented as an annual SO₂ emissions budget—literally a “cap” on total SO₂ emissions from power plants at levels substantially lower than those of the 1980s. This approach was unprecedented, as existing air pollution regulation relied on specific technical or operational requirements on sources, usually resulting in a restriction on the *rate* of emissions discharge but not on *total* discharges. Although such requirements were based on projections of actual emissions reductions, fixed levels of total reductions were never explicitly

⁴ Office of Air Quality Planning and Standards, Environmental Protection Agency, *National Air Pollutant Emission Trends: 1900-1998*, EPA 454/R-00-002 (Washington, DC: Environmental Protection Agency, 2000), A-19.

mandated. Consequently, as long as sources met their operational requirements, they were not held responsible if the projected levels of emissions reductions were not met.

Under the SO₂ program, however, the Environmental Protection Agency (EPA) distributes to each power plant a fixed number of emissions “allowances,” each of which gives the owner the authorization to emit one ton of SO₂ at any time. A plant may then sell the allowances to another plant (or to any interested buyer, including environmental groups and speculators) provided that at the end of the year it surrenders to the EPA enough allowances to cover its emissions for that year. Allowances that are not used to cover emissions in one year may be saved for use in later years, which is known as “banking.” The law requires each power plant to install continuous emissions monitors and to report the results on a quarterly basis to the EPA. The EPA is required, in turn, to operate an emissions and allowance tracking system, which has ensured the transparency and sound record-keeping needed to make the program successful.

Also critical to the character and success of the program is the fact that the aggregate number of allowances circulated every year is fixed, or capped. As a result of this design, power companies must plan for economic growth and change while operating against a limit on their total SO₂ emissions. This “cap and trade” regime gives utilities a direct financial incentive to reduce emissions below required levels. Extra reductions, in the form of unused allowances, give companies flexibility to offset increases in emissions in one location with reductions in another. In addition, utilities can optimize control by reducing emissions when it is least expensive to do so and then banking the allowances for future use or sale. Consequently, extra reductions give power plants the flexibility needed to respond to economic demands and opportunities while meeting their compliance obligations under the cap. Where extra reductions are achieved, the environment benefits from less pollution at an earlier time than required by law.

Furthermore, through emissions trading, power companies have the incentive to find the lowest-cost means of achieving compliance and to reap financial rewards for developing those means. Under this program, each power plant can choose between various compliance alternatives, for example, using low-sulfur fuel, investing in energy efficient technologies, chemically removing sulfur from smokestack emissions, or acquiring allowances from other utilities that can make reductions more cost-effectively. As a result, the different compliance alternatives have been forced to compete with one another. The expected result has occurred: compliance costs have been driven steadily downward.

Phase I of the acid rain program mandated participation by the largest emitters of SO₂—specifically, 263 sources at mostly coal-burning electricity plants (located primarily in eastern and midwestern states). They were joined by additional sources that voluntarily chose to participate in Phase I rather than wait until Phase II, as allowed under certain provisions of the legislation. The total program budget, or cap, for 1995 included 8.7 million tons worth of allowances, as shown in Table 1. By 1999, the budget gradually decreased to roughly 7 million tons due to the phase-out of provisions designed to promote certain control options and investments.

Table 1: Annual Allowance Budgets

Phase	Year	Number of Mandatory Units	Number of Voluntary Units	Total Number of Units	Total Allowance Budget (tons SO ₂)
I	1995	263	182	445	8,744,081
	1996	263	168	431	8,296,548
	1997	263	160	423	7,147,464
	1998	263	145	408	6,969,165
	1999	263	135	398	6,990,132
II	2000	> 2000	--	> 2000	9,200,000
	2010	> 2000	--	> 2000	8,950,000

Source: EPA, Acid Rain Program Compliance Reports

Phase II, which began in January 2000, imposed more stringent emissions limits on the units participating in Phase I. In addition, Phase II established caps on SO₂ emissions for virtually every other power plant in the continental United States (any with output capacity of greater than 25 megawatts) as well as all new utility units, thus bringing the total universe of regulated units to more than 2,000. The annual budget for these sources was set at 9.2 million tons. It will continue at that level until 2010 when the cap drops to a permanent level of 8.95 million tons, a level roughly equal to 50% of electric utility emissions in 1980.

Pollution in the atmosphere and emissions trading

Policy makers chose to focus the design of the SO₂ program on total *cumulative* emissions reductions and on *unrestricted* emissions trading and banking because of the atmospheric characteristics of SO₂ emissions. In the atmosphere, SO₂ reacts with other pollutants, including the various elements of “smog,” to form acidic particles and droplets. These are what constitute acid deposition. Various components of this “soup” of pollutants have been traced traveling over long distances, after being mixed from widely dispersed groups of sources.

In the United States, one common wind pattern moves air from the midwestern region to the northeastern region of the country. These winds mix and carry SO₂ and sulfate (a chemical derived from SO₂), as well as other pollutants involved in the formation of acid deposition. Figure 3 depicts the average trajectories of winds arriving at a monitoring station in central Pennsylvania during precipitation. The arrows represent the average trajectories for a six year period and the numbers represent the median sulfate concentrations in precipitation (expressed as milligrams per liter) associated with those trajectory directions. One should note that the highest concentrations occurred with air travelling over the midwestern region (the red arrow).

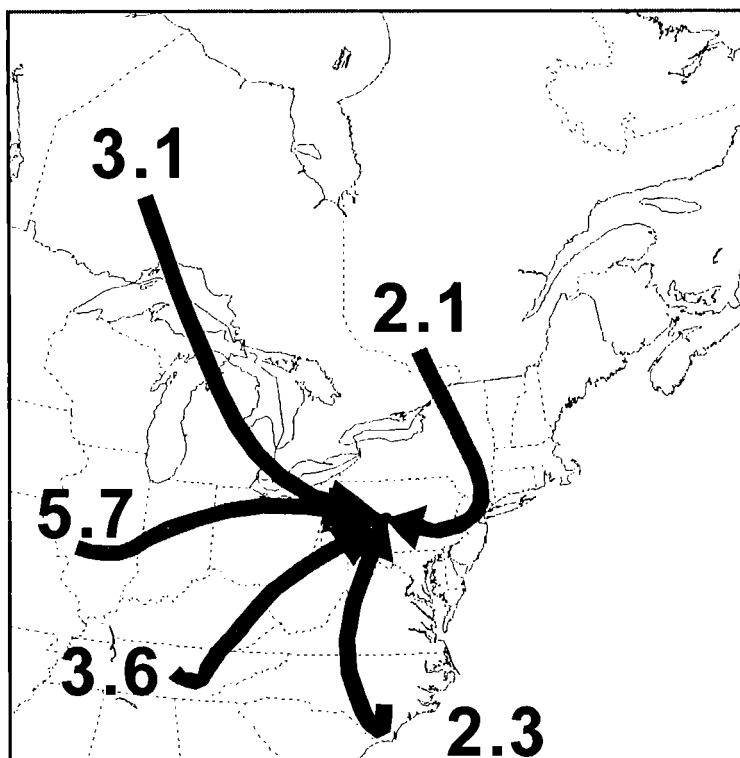


Figure 3: Typical wind trajectories and sulfate concentrations in precipitation at a site in central Pennsylvania⁵

Figure 4 shows the location and magnitude of SO₂ emissions in 1990 from *all* sources in the continental United States—roughly 23.7 million tons in total.⁶ The power plants covered by Phase I of the acid rain program released a total of 10 million tons of SO₂ in 1990—or 42% of total SO₂ emissions nationwide. Phase I sources are considered to be the major contributors of sulfur in acid rain.

⁵ The trajectory analysis and sulfate concentrations were contributed by Environment Canada from measurements at a site near State College, Pennsylvania. Environment Canada generously provided Figure 3 for inclusion in this report. The figure may also be viewed on the Environment Canada web site at <http://airquality.tor.ec.gc.ca/natchem>.

⁶ EPA, *National Air Pollutant Emission Trends*, A-19.

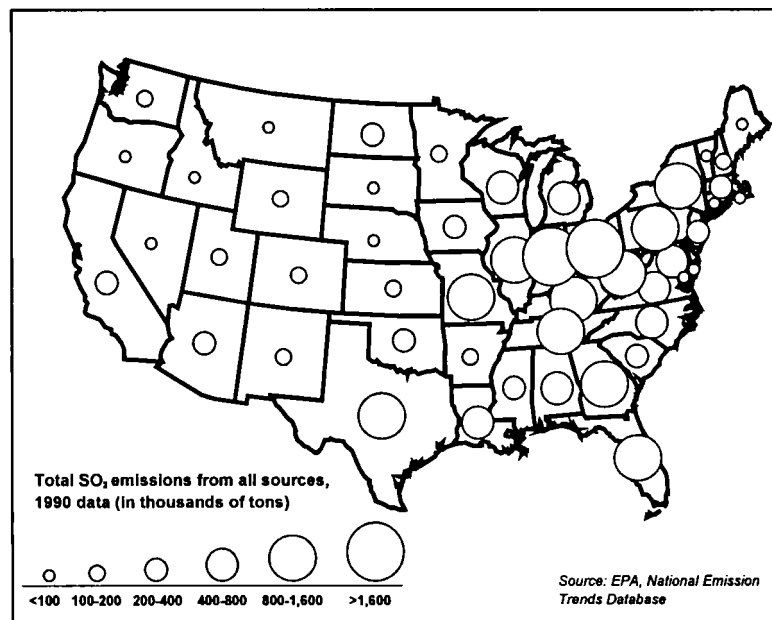


Figure 4: Total SO₂ emissions by state, 1990

Considering Figures 3 and 4 together supports the conclusion that general wind patterns prevailing over the eastern half of the United States capture the large amount of SO₂ emissions in the Midwest and South. Once the emissions are captured, they are dispersed widely over those parts of the country as well as over the Mid-Atlantic and the Northeast, where acid rain has had a severe local effect.

In view of this, Congress focused on reducing and capping the overall level of SO₂ emissions instead of trying to control local, source-by-source variables. Since it is the total accumulation of acid deposition that principally determines its effect on the environment, the reduction in total emissions of acid precursors (rather than reductions from any one source) appeared to be most critical. Consequently, Congress concluded that it was acceptable to allow emissions trading to occur *without restrictions*. As long as overall reductions were achieved, the emissions levels of individual sources could be permitted to adjust to market forces through trading.

The program's provisions that permit sources to bank allowances for future use also stemmed from the commitment of Congress to both the environmental and the economic performance of the program. Through banking, sources would enjoy much greater flexibility in operating under their SO₂ emissions constraints. In fact, banking could play a critical role in the formation of the overall SO₂ emissions trading market. Equally important, the opportunity to bank extra allowances could yield more and earlier reductions than Congress otherwise could mandate.

Wind captures SO₂ emissions in the Midwest and South and disperses them widely over those parts of the country as well as over the Mid-Atlantic and the Northeast.

At the time the program was proposed, a formal analysis of alternative policy designs was undertaken by Environmental Defense. The study strongly suggested that the very large quantity of SO₂ emissions in the Midwest and parts of the South would allow those regions and their sources to tap economies of scale in making SO₂ reductions.⁷ Because of their large inventory of emissions, power plants in those parts of the country would exploit opportunities to make substantial reductions relatively easily and inexpensively. The resulting lower marginal cost of an incremental ton of reduction would make it economically attractive for those sources to “over-control” their emissions—so that they could either sell their extra reductions to other sources or bank those reductions for use in offsetting future emissions. Consequently, the likely economic dynamics of an emissions trading and banking market favored making both mandatory and extra reductions at the high-emitting sources.

The banking component of this dynamic was particularly important. Even for those sources that were uncertain about the short-term economic value of creating extra reductions for the purpose of selling the unused allowances, the prospect of banking those extra reductions was likely to be appealing. While the market demand for extra reductions might not materialize in the short-term, sources knew that they would have to operate against a permanent cap on their emissions. The certainty of the cap and the expectation of economic growth over time would mean that the opportunity to bank extra reductions for future use all but guaranteed that those reductions would be economically valuable. Furthermore, with Congress taking a phased approach to control, both the banking provisions and the provisions that allowed Phase II sources to “substitute in” offered the opportunity to design system-wide control optimization.

At the same time, the common understanding of the adverse ecological effects of acid deposition strongly suggested both that reducing cumulative SO₂ emissions should be the goal of the program, and that early reductions were of significant environmental value. The earlier the reductions, the sooner the ecosystems affected by acid deposition could begin to recover their acid-neutralizing capacity. As a result, the economic dynamic created by an emissions cap with banking favored the environmental benefit of early, extra emissions reductions. Indeed, as shown in forthcoming sections, the cap and trade program for SO₂ emissions has provided immediate and significant reductions in emissions beyond the legal mandate.

Finally, Congress’ latitude in permitting unlimited emissions banking and trading, albeit in the implementation of a large mandatory cap and reduction requirement, was augmented by other existing provisions of the Clean Air Act. Beginning with its enactment in 1970, the Act has required the EPA and the states to regulate the release of SO₂ from sources whose emissions had local effects on public health. In fact, in the legislation establishing the SO₂ cap and trade program, Congress explicitly barred sources subject to SO₂ emissions limits under the local health-effects program from using SO₂ emissions allowances to meet their local limitations. As a result, plants subject to SO₂ emissions limits imposed for purposes of

⁷ Daniel Dudek, “Emissions Trading: Environmental Perestroika or Flimflam?” *Electricity Journal* 2 (1989): 32-43.

protecting local air quality cannot exceed these limits no matter how many SO₂ allowances they hold.⁸

More Reductions and a Cap: Environmental Victory Through Emissions Trading

The notion of using emissions trading as part of the implementation of national SO₂ emissions reductions was formally unveiled in June 1989 in a speech by President George Bush, introducing his administration's overall proposals for amending the Clean Air Act. At the time, emissions trading was highly controversial among both environmental advocates and the public at large.

That controversy was sparked because the initial focus of the ensuing debate revolved around emissions trading as a "market mechanism" and as a method for reducing compliance costs. To many, these were but shorthand for "industry loophole."

In 1989 and 1990, the issue of cost remained the pivotal point of the political debate. In the end, however, the link between emissions trading and cost savings played to the environment's advantage. Initially, the Bush administration's economic analysts were leaning toward supporting a reduction target of only 8 million tons. Moreover, legislation introduced in early 1989 and in previous Congresses had mandated an annual reduction in SO₂ emissions of only 8 million tons. It was the promise of cost savings through emissions trading that persuaded the Bush administration to propose in its Clean Air legislation that the SO₂ program stipulate an annual reduction of *10 million tons*.⁹ With a Republican president sending a 10 million-ton bill to a Democrat-led Congress, the enactment of the more stringent target was all but ensured. Thanks to the anticipated cost savings of emissions trading, the final legislation required the additional 2 million tons of annual SO₂ reductions.

Perhaps even more important, the inclusion of emissions trading led to another environmental victory. Throughout the 1980s, the environmental community and some of its congressional champions had sought to craft acid rain legislation that both reduced SO₂ emissions and *capped* total emissions at the reduced levels. None of these efforts succeeded. In legislation sent to Capitol Hill in July 1989, however, the Bush administration included the critical elements of just such a cap, which was made possible only by the operational flexibility offered to companies by emissions trading. In the ensuing legislative process, the Senate Committee on Environmental and Public Works (and subsequently the full Senate and the House of Representatives) used the allowance allocation system to construct a truly comprehensive emissions cap.

⁸ The legislation establishing the SO₂ program explicitly preserved the existing Clean Air Act authorities of Congress and the EPA to impose additional restrictions on SO₂. In addition to calls for Congress to require further reductions in annual SO₂ emissions beyond those mandated for Phase II, the EPA has issued new standards for fine particle emissions (these regulations are currently in litigation). Depending on how the implementation programs for these standards are designed, power plants may face either one of, or a combination of, additional reductions in the SO₂ emissions cap and/or additional source-specific reduction requirements.

⁹ Tom Wicker, "Who'll Stop the Rain?" *New York Times*, 16 June 1989, A27.

II. Market development and extra emissions reductions

One early concern about the “cap and trade” aspect of the acid rain program was that markets for allowances would not develop or would not function like conventional markets. The results of Phase I tell a different story. Although the SO₂ program experienced some of the characteristics of any startup exchange, it is growing into a full-fledged commodities market. Liquidity has increased dramatically, as shown in Figure 5, which charts the total number of allowance transfers recorded by the EPA’s Allowance Tracking System. The year 1999 witnessed a 460% increase in the total number of private transfers compared with 1995 (the first year of the program). This trend of increasing liquidity is continuing through the year 2000, with 2,223 transfers already recorded by mid-year.¹⁰

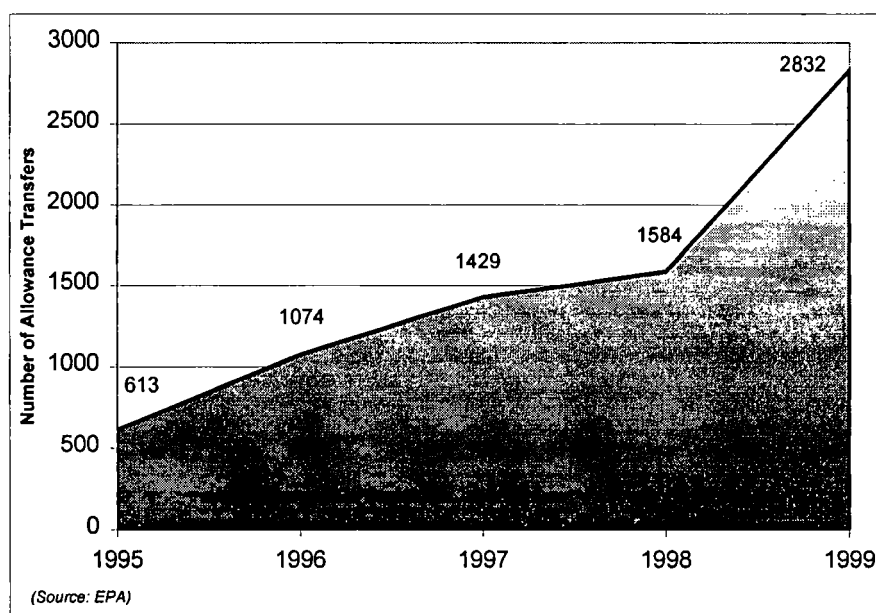


Figure 5: Total private transfer activity

It is notable that the majority of these transfers took place between individual boiler units within single operating systems. (An individual boiler unit is the level at which an emission source is legally defined and the level at which compliance is evaluated; there can be many boiler units within an operating system, and many such systems cross over state borders.) In other words, many of the transfers consisted of reallocations within a company. This type of transaction is sometimes referred to as “internal optimization.” When given the flexibility to determine the best means of reducing total emissions, a company will review the operations of its entire plant system. It will then phase in control measures at different locations, at times and of magnitudes that make economic sense within the constraints of the environmental program.

¹⁰ See EPA statistics at <http://www.epa.gov/acidrain/ats/cumchart.html>.

Inter-company transfers are also significant. In terms of tons of SO₂ allowances, Figure 6 indicates the variety and distribution of the types of allowance transactions that occurred in Phase I. In 1995, the high percentage of reallocations may be attributed to firms adjusting to the program and balancing their initial allocations among units. In 1999, reallocation activity may be attributed to firms preparing for the onset of Phase II reduction obligations.

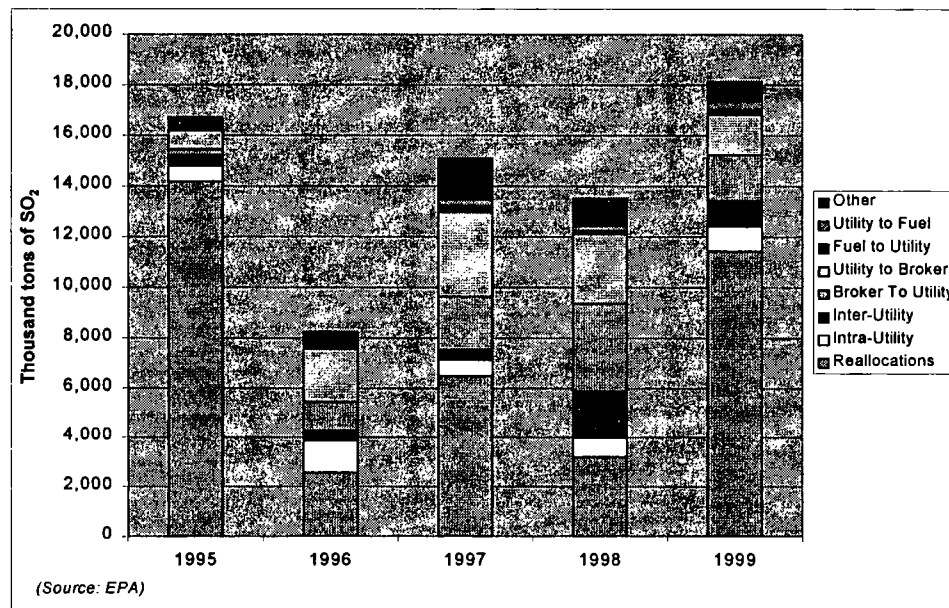


Figure 6: Type and quantity of SO₂ transfers, 1995-1999

In retrospect, the results of this trading activity should have been predictable. The value for SO₂ allowances created by a market in which unused allowances can be sold or saved forced sources to treat emissions, in effect, as a variable operating cost. As a result, utilities had to do what is sometimes called a “make or buy” analysis about the costs involved in reducing emissions. Many companies decided to “make” emissions reductions rather than buy them.

An important factor in the “make or buy” analysis for every plant operator was the limited amount of allowances that each plant received on an annual basis. This initial allotment, referred to as the “base allocation,” was allocated by the EPA according to an explicit statutory formula. When a plant emits less SO₂ than its base allocation, the plant is “over-controlling” and making extra emissions reductions, which, in turn, creates a bank of unused allowances. One indication of the remarkable success of the SO₂ program may be seen in Figure 7. In 22 of 24 states, power plants emitted less SO₂ than their aggregate number of base allocations.¹¹ Further, many high-emitting states/sources achieved the highest level of over-control, including Ohio, Indiana, Georgia, Pennsylvania, and West Virginia. Because of the financial value of SO₂ reductions, the “make or buy” analyses conducted by utilities led

¹¹ Only 24 states are represented because the program is phased in. Phase I required only the largest-emitting plants to make reductions, whereas all plants across the United States come under the program in the year 2000.

overwhelmingly to direct and indirect investment in reducing emissions. Only units in Illinois and Kentucky released more SO₂ than their aggregate base allocation, as indicated by a negative value in Figure 7—and these amounts are relatively small. This is not to imply noncompliance, however, since these emissions could be legally covered by a number of means, including purchasing allowances on the market or through the EPA auction. In fact, when utilities were required to reconcile their allowance holdings with their actual emissions, 100% compliance was achieved.

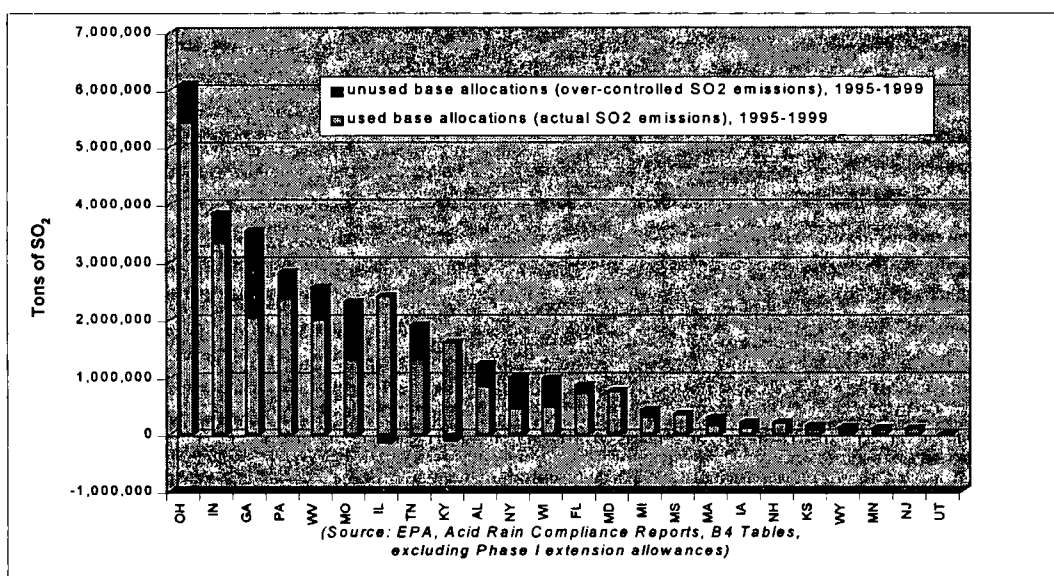


Figure 7: Cumulative over-control of emissions by state

The analysis underlying Figure 7 is conservative—it compares actual emissions to base allocations *only*. This comparison excludes bonus allowances made available by Congress as incentives for specific actions. In fact, an additional 3.3 million tons of “extension allowances” were distributed to plants that employed certain “scrubbing” technologies for achieving deep cuts in air pollution. The reason for excluding the extension allowances from the analysis is that their effect on the “make or buy” dynamics of the program is ambiguous.

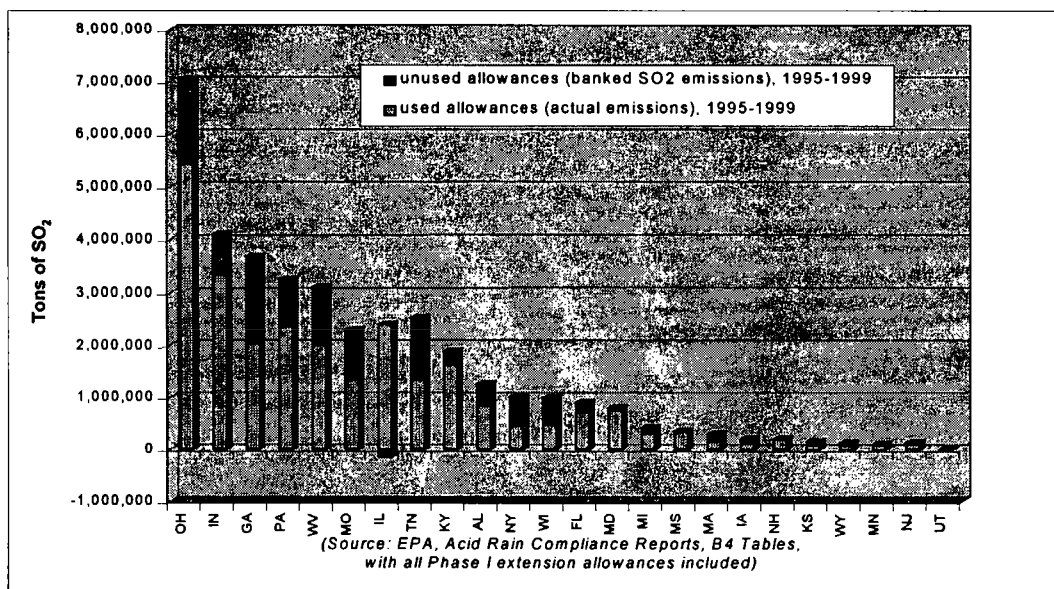


Figure 8: Emissions vs. base allocations and extension allowances (combined) by state

Figure 7 reflects the behavior of the regulated community in relation to stricter constraints on emissions, represented by the base allocations. In contrast, Figure 8 considers both the base allocations and the extension allowances, which were conditional incentives.¹² The availability of these additional allowances gave sources using “scrubbers” an extra two years to meet their Phase I emissions limitations. At the same time, however, under the extension provision sources could forego the time extension and operate their scrubbers to reduce pollution earlier (and to much lower levels) than required. In view of that, the comparison in Figure 8 may be significant. Sources doing this, however, would have saved or banked *both* an extension allowance *and* a base allowance for at least a portion of each ton over-controlled. Thus the comparison represented in Figure 8 may quantitatively overstate the extent of over-control that was achieved. What Figure 8 clearly shows, however, is that relative to the broader pool of allowances allocated—and the total allowable emissions “budget”—a significant level of banking occurred during Phase I.¹³

Environmental Regulatory Reform

In 1989, the rhetoric surrounding SO₂ emissions trading emphasized “market mechanisms,” “economic incentives,” and “cost-savings.” Less apparent, but equally significant, is that in the process of establishing the SO₂ program, Congress ended up creating a new paradigm for pollution policy. That paradigm managed to overthrow the traditional discretionary powers of environmental regulators even while making it more certain that the full measure of promised emissions reductions would be delivered to the public and the environment.

Between 1970, when the “modern” Clean Air Act was first adopted, and 1990, programs to control air pollution were characterized by requirements focusing on *how* sources of emissions operated. State and federal regulators were empowered and called on to assess the cost, feasibility, and effectiveness of various technologies, methods, and processes for reducing emissions from the operations of various classes of sources.

On the basis of those assessments, regulators would impose either specific technology requirements or operational parameters such as emissions rates. Compliance was defined in terms of meeting those operational parameters, not in terms of meeting specified emissions reduction targets. Often, plants were subject to detailed operating permits, and enforcement resources went toward ensuring that plants developed and submitted compliance plans and met the operational milestones delineated in the plans, rather than focusing on actual emissions performance. To a significant extent the approach worked. According to many key indicators, air quality in the United States improved substantially.

continued on next page:

¹² Figure 8 does not include the 750,000 allowances that were available through the EPA public auction, which was mandated by Congress as part of the program.

¹³ For example, Figure 7 shows that sources in Kentucky had actual emissions that exceeded base allocations. When the extension allowances are added in, as shown in Figure 8, sources in Kentucky had actual emissions that were below the level that was legally permitted by the sum of base and extension allowances. Further discussion of this issue can be found at Figures 16 and 17.

. . . Environmental Regulatory Reform (continued)

By 1990, however, the performance of the traditional approach was often burdened by a broad range of flaws. In many cases, the full increment of pollution reductions that had been promised, predicted, or assumed when operational requirements were adopted had not been achieved. Because compliance was defined simply in terms of technologies or operating parameters, however, nobody, including the polluters themselves, was legally accountable for the failure to achieve the expected levels of total reductions. With fewer than the expected and needed pollution reductions achieved, key ambient air-quality standards were often not attained. Specifying technologies or operating parameters was not enough to limit total emissions discharges.

At the same time, the costs of these programs were high. The regulatory community's resources often were inadequate for collecting and processing the range of information needed to formulate operational requirements for whole classes of sources. Of course, once the requirements and implementing permits were put in place, the capacity to absorb new information and respond to inevitable and ongoing economic and other operational changes was virtually nonexistent. Because the characteristics of sources varied, while requirements tended to be uniform, many sources were subject to expenses that could have been avoided in more flexible systems. Other sources could have adopted more effective or innovative control technologies, but had no incentive to do so. At the same time, regulators, mindful of the need to control costs, compromised the stringency of requirements either in setting the standards or in negotiating individual permits and "variances" to permits, all at the cost of total emissions reductions achieved.

In contrast, the SO₂ program replaced the regulator with the polluter itself as the pivotal actor in compliance, overthrew the traditional paradigm, and replaced it with a new one. Under the SO₂ program, the pollution sources are legally accountable for achieving a specified level of emissions reductions and for little else save continually monitoring and reporting their actual emissions. The only job that regulators have to do is ensure that each source meets its monitoring and reporting requirements and that its actual annual emissions equal the number of allowances the source holds.

How power plants reduce their SO₂ emissions has been left completely to the discretion of the plant operators themselves. As a result, it is up to them to manage the continually changing economic, technical, and other circumstances in which they are operating and to integrate their basic business activities with their obligation to meet their emissions cap. The burden and the opportunity of lowering costs are placed squarely on the power plants operators. In place of variances and other cost-relieving methods that entail compromise of standards and forego actual emissions reductions, plant operators under a cap and trade system must turn to emissions banking and trading for cost control. Because of the built-in cap-based structure of the program, cost savings through emissions trading in no way lessens the amount of total emissions reductions or their environmental benefit.

Today, the EPA proudly embraces the very coup that, at least as far as SO₂ is concerned, stripped it of much of the scope of its traditional regulatory power. Noting that the acid-rain program embodies the highest ratio of tons of pollution reduced to administrative resources expended, the agency reports approvingly that the program produced 100% compliance—all while giving regulators far less authority to exert direct control over the methods of compliance.

III. Economic performance and innovation

One of the foremost news stories of the 1990s was the strength of the overall U.S. economy, including the longest peacetime economic expansion in history and record growth in capital markets. From 1990 through 1999, the gross domestic product grew at an average annual rate of 5.4%.¹⁴ Likewise, demand for electricity increased throughout the decade. As shown in Figure 9, electricity generation by U.S. utilities grew in each of the first four years of the acid rain program, with significant growth relative to 1985. Despite early claims to the contrary by opponents of acid rain legislation, U.S. utilities were able to provide more electricity while reducing SO₂ emissions. At the same time that overall generation increased, so, too, did the amount of production fueled by coal—specifically a 6.8% increase from 1995 to 1999. Comparing this with total generation by utilities during the same period, the use of coal actually outpaced that of other fuel sources despite its higher sulfur content.

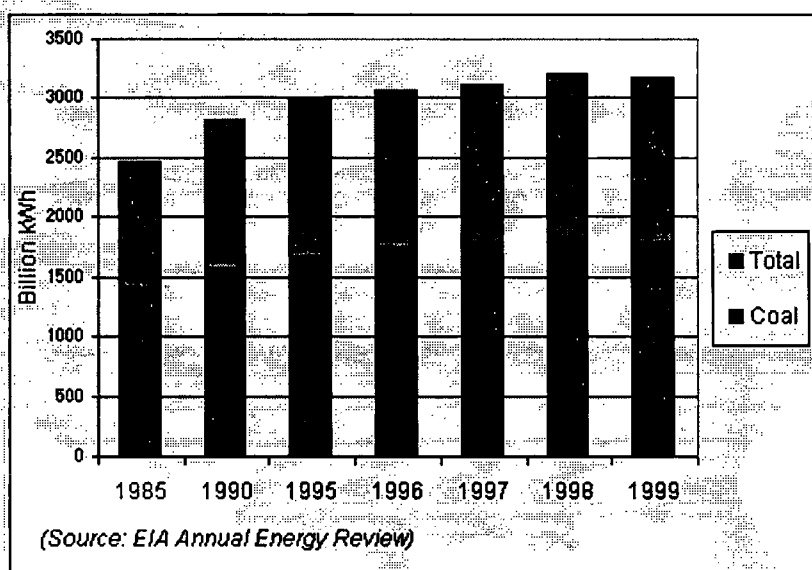


Figure 9: Net electricity generation by utilities in the United States, Total vs. Coal

Figure 10 depicts the regional breakdown of electricity generation in 1990, compared with that of 1995 through 1998. It is important to note that provisions of the acid rain allowance trading program prevent Phase I power plants from simply appearing to reduce SO₂ emissions by shifting electricity production to other plants not controlled during Phase I. All electric utilities are required to regularly report SO₂ emissions to the EPA. Consequently, the anticipated maneuver of generation-shifting could not possibly account for the continued growth of electricity generation while substantial SO₂ reductions are being achieved.

¹⁴ See Dept. of Commerce, Bureau of Economic Analysis statistics at <http://www.bea.doc.gov/bea/dn/gdppch.htm>.

Moreover, the obligation to control SO₂ emissions has not prevented those regions most affected by the regulations from expanding the production of electricity.

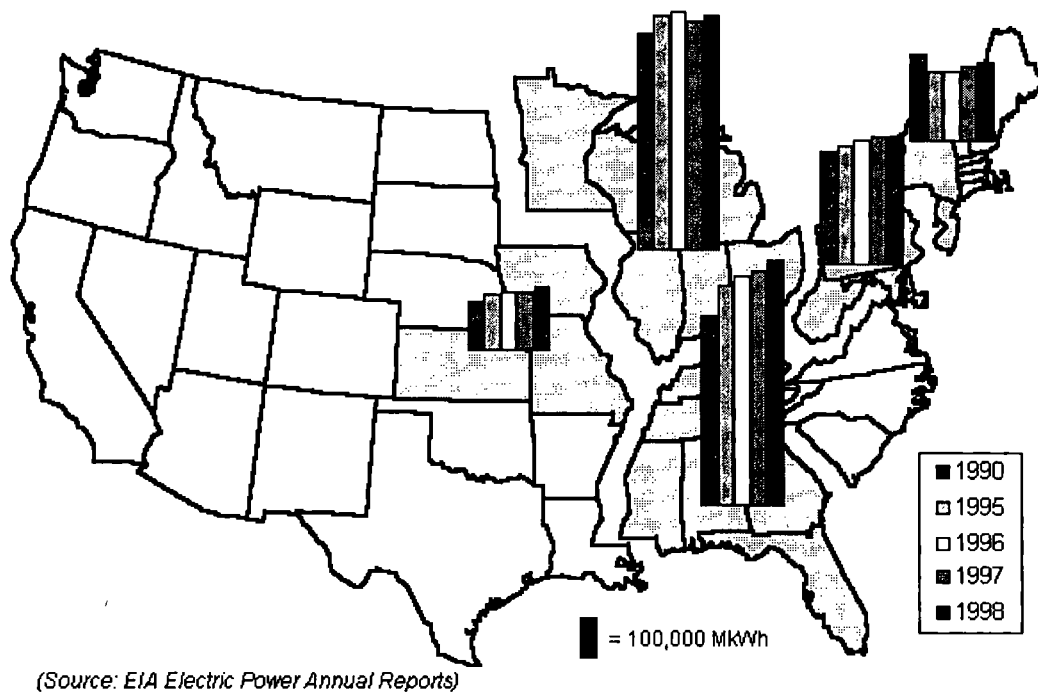


Figure 10: Regional net electricity generation by utilities in Phase I States, 1990 vs. 1995-1998

Thus during Phase I, electricity generation both increased and maintained relative regional distribution patterns despite the differential impact of controls. Furthermore, although demand increased, the price of electricity remained stable throughout the 1990s. As shown in Table 2, a cleaner national power supply was produced at no additional cost to consumers.

Table 2: Average Retail Prices of Electricity Sold by Electric Utilities in the United States (cents per kilowatt-hour)

Year	Residential	Commercial	Industrial	Other	Total
1991	8.04	7.53	4.83	6.51	6.75
1992	8.21	7.66	4.83	6.74	6.82
1993	8.32	7.74	4.85	6.88	6.93
1994	8.38	7.73	4.77	6.84	6.91
1995	8.40	7.69	4.66	6.88	6.89
1996	8.36	7.64	4.60	6.91	6.86
1997	8.43	7.59	4.53	6.91	6.85
1998	8.26	7.41	4.48	6.63	6.74
1999	8.14	7.18	4.40	6.55	6.60

Source: Department of Energy, Energy Information Administration

The experience in the United States in the latter half of the 1990s belies the initial claims of opponents of the SO₂ emissions cap that it would preclude economic growth. Through emissions trading, electric utilities and the overall economy were able to integrate large reductions in emissions with economic activity and growth in electricity production. In Figure 11, the two upper lines chart continued growth in U.S. gross domestic product and electricity generation, respectively, versus reductions in SO₂ emissions (the lowest line).

Through emissions trading, electric utilities and the overall economy were able to integrate large emissions reductions with economic activity and growth in electricity production.

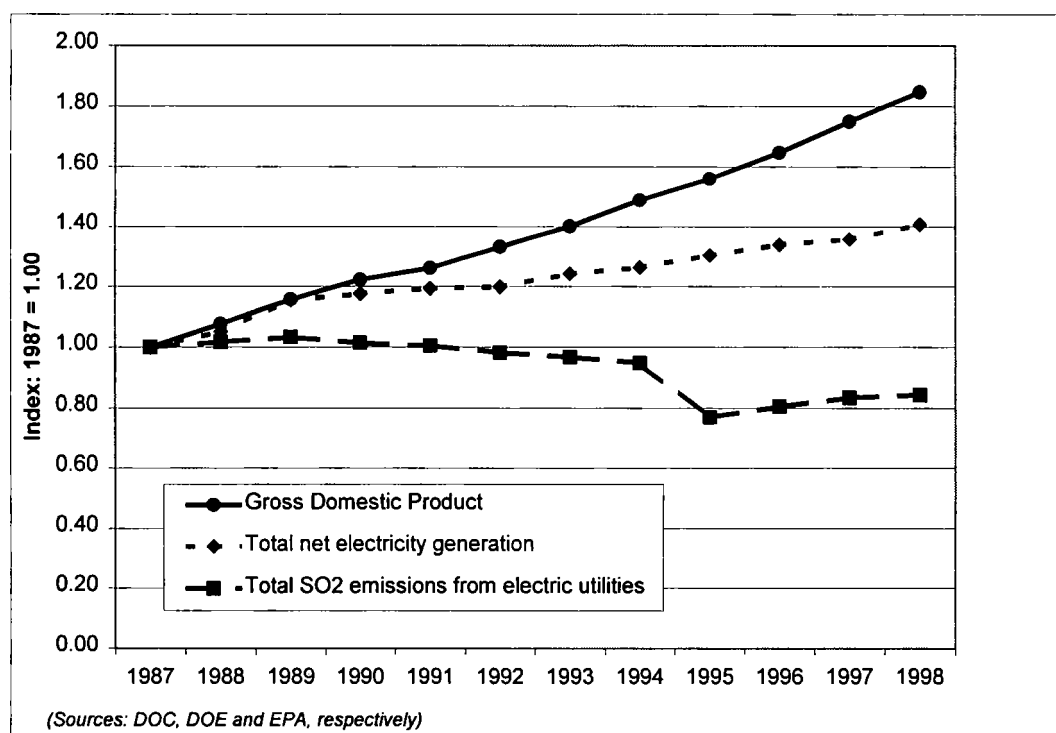


Figure 11: U.S. economic growth indicators vs. SO₂ emissions

That emissions trading is instrumental to this economic response is suggested by the path that allowance prices have followed since active trading began, first in anticipation of the program and then continuing into the present. At the time the legislation was enacted, predictions of marginal compliance costs and allowance prices were in the range of \$300 to \$1,000 per ton.¹⁵ However, allowances have traded at much lower levels, with prices between \$69 and \$212 per ton.¹⁶ These dramatically low prices correlate with the intensification of

¹⁵ Robert W. Hahn and Carol A. May, "The Behavior of the Allowance Market: Theory and Evidence" *Electricity Journal* 7 (1994): 28-33.

¹⁶ Cantor Fitzgerald Environmental Brokerage Services market data.

competition between and among the various compliance options (in addition to trading) available to power plants—competition that is uniquely created through the emissions trading market. Figure 12 tracks the prices paid for SO₂ allowances since 1994. Even at its peak, the price of SO₂ tons has been a fraction of the ominous estimates prior to program implementation.

Predictions of compliance costs and allowance prices were in the range of \$300 to \$1,000 per ton, yet allowances have actually traded at prices between \$69 and \$212 per ton.

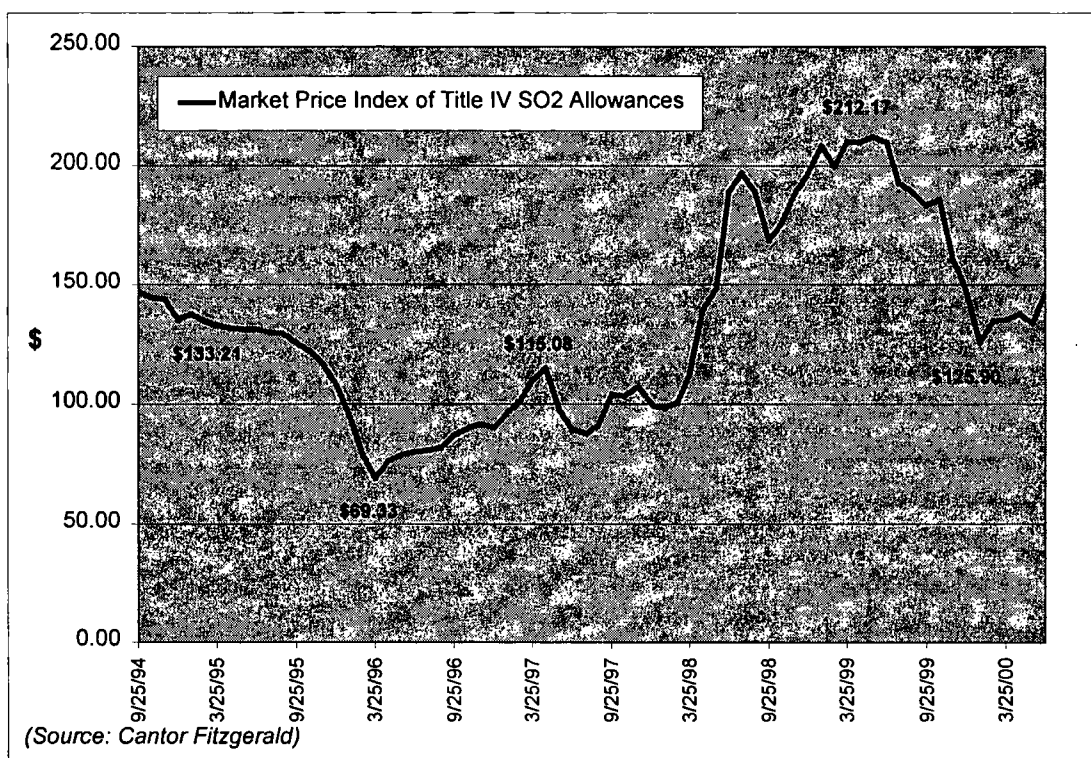


Figure 12: Market price index of SO₂ allowances

“As the final Clean Air Act Amendments neared passage in 1990, just how much money the new rules would cost was a matter of sharp debate. At the high end, some lobbyists, columnists, and industry advertisements were touting vaguely documented figures of ‘\$3 billion to \$7 billion per year, with the price tag rising to \$7 billion to \$25 billion by the year 2000.’ ...After the first two years of the Phase I limits, [emissions reductions] were done at a cost of about \$0.8 billion per year, according to two independent estimates. ...Phase I was expected to be cheaper than later reductions, but estimates of the long-term costs through 2010 have also been dropping. By 1995, [the ICF Consulting firm’s] estimate for the EPA had dropped to \$2.5 billion per year. [The Electric Power Research Institute’s] 1997 estimate was down to \$1.6 billion to \$1.8 billion per year, and [Resources for the Future’s] 1998 estimate is \$1.0 billion—a far cry from many early estimates and below the EPA’s early projections.”

Richard A. Kerr, “Acid Rain Control: Success on the Cheap” *Science*, 6 November 1998, 1024-27.

Proponents of emissions trading point to its value in stimulating innovation. Because the emissions trading market transforms emissions reductions into economic assets that can be bought and sold, those utilities that can find the best ways to make the most reductions at the lowest costs stand to gain the greatest reward. Furthermore, those companies that develop new control strategies have a ready market for their ideas or technologies. The results of Phase I seem to bear this out, while casting light on some of the more subtle features of the complex process of innovation.

During Phase I, innovation took its most obvious form in the development of low-cost “scrubbers.” Scrubbers are technologies that physically remove pollutants from the gases that escape through a plant’s smokestack. Under a separate program stipulated in the Clean Air Act, scrubbers were included in the operations of new and refurbished power plants throughout the United States. This program required individual sources to meet specific operational mandates. Neither specific limits on the total tonnage of emissions nor emissions trading was included in that program, which had been in effect since 1970. As of 1992, no significant progress in scrubber technology had been observed, a result attributed to the meager incentives for innovation in existing programs.¹⁷

Since the enactment of the SO₂ emissions trading program, the level of innovation in scrubber technology has changed dramatically enough to prompt a major study to state that “the striking contrast between technological stagnation in scrubber technology before 1992, under a regulatory regime of direct emission controls, and technological progress since then, under a regulatory regime with tradable permits is hard to ignore.”¹⁸ This progress has taken the form of both improved technical performance and cost decreases—hardly surprising since the driving force behind almost all innovation is cost savings. For example, scrubber manufacturers have been marketing scrubbers for Phase II at about half the cost of Phase I scrubbers.¹⁹

“The striking contrast between technological stagnation in scrubber technology before 1992, under a regulatory regime of direct emission controls, and technological progress since then, under a regulatory regime with tradable permits is hard to ignore.”¹⁸

At the same time, the connection between cost and innovation is illustrated by other ways in which the flexibility of the SO₂ program has enabled utilities to choose among various means of compliance. In contrast to regulatory programs that rely on specific operational mandates, the cap and trade structure of the SO₂ program fundamentally changes the decision making process for power plant operators as they weigh compliance options. As a result, all

¹⁷ A. Denny Ellerman, Richard Schmalensee, Elizabeth M. Bailey, Paul L. Joskow, and Juan-Pablo Montero, *Markets of Clean Air: The U.S. Acid Rain Program* (New York: Cambridge University Press, 2000), pp. 241.

¹⁸ *Ibid.*, 242.

¹⁹ *Ibid.*, 240.

forms of compliance—scrubbing, fuel-switching, investments in energy-efficient technologies, using non-sulfur energy sources, and changing the order in which electricity plants are dispatched—must compete with one another to succeed in the “compliance market.” That competition is intensified by emissions trading: because plant operators can buy reductions from other plants, they can evaluate these different options not just as applied to their own facilities, but as they might operate on others from which the reductions can be purchased. Not only does this competition lower costs, but the flexibility of the program, together with the drive for cost reduction, allows operators and other investors to use a combination of compliance options in innovative ways.

Before the enactment of the SO₂ program, for example, most observers assumed that expensive changes to the combustion technology of existing plants would be required for those plants to use lower-sulfur coal. From that perspective, low-sulfur coal was assumed to be an expensive option, making scrubbing appear more attractive, even at high cost. Instead, power plant operators and investors in the fuel and engineering industries, motivated by competition in the compliance market, have developed alternative means involving fuel-blending and new fuel-blending technologies to use low-sulfur coal at much lower costs.²⁰ Thus Denny Ellerman and his colleagues observe: “The high degree of innovation in adapting boilers built for bituminous coals has been one of the major surprises in Phase I.”²¹

Some have asserted that the “only” reason for the emissions reductions and cost savings during Phase I was the modernization of rail transport. Specifically, improvements in loading equipment and tracking reduced the cost to deliver low-sulfur coal from the Midwest (particularly the Powder River Basin in Montana and Wyoming) to utilities in the eastern United States. Some claim that the decreases in transportation costs would have produced the same results—lower emissions—even in the absence of the SO₂ program. In fact, under a more traditional “command-and-control” program, especially one that prescribes specific combustion technologies, the option to use this low-sulfur coal would have triggered significant capital investments. Thus the low cost of compliance during Phase I was the result of the flexibility it afforded to plant operators, particularly to choose and blend fuels. Together with advances in low-cost scrubbers, this led to reductions in SO₂ emissions that were “significant and clearly attributable to Title IV [the SO₂ program].”²²

²⁰ Byron Swift, “The Acid Rain Test” *Environmental Forum* 14 (1997): 19.

²¹ Ellerman et al., *Markets of Clean Air: The U.S. Acid Rain Program*, 243-44.

²² A. Denny Ellerman, Richard Schmalensee, Paul L. Joskow, Juan-Pablo Montero and Elizabeth M. Bailey, “Emissions Trading Under the U.S. Acid Rain Program: Evaluation of Compliance Costs and Allowance Market Performance” (Cambridge, MA: MIT Center for Energy and Environmental Policy Research, 1997), 5, 20.

IV. Environmental performance

The first five years of experience with the SO₂ program demonstrate the success of an emissions budget and trading program in delivering substantial and early emissions reductions and significant cost savings. Equally striking is the possible effect of the decline in emissions on the physical environment they are intended to protect. Figure 13 shows the sharp drop in SO₂ emissions in various multistate regions with Phase I units. Comparing emissions in 1999 with those in 1990, the North Central, Southeast, and Mid-Atlantic regions, whose plants contribute the bulk of sulfur in acid deposition, achieved reductions of 49%, 48%, and 43%, respectively.

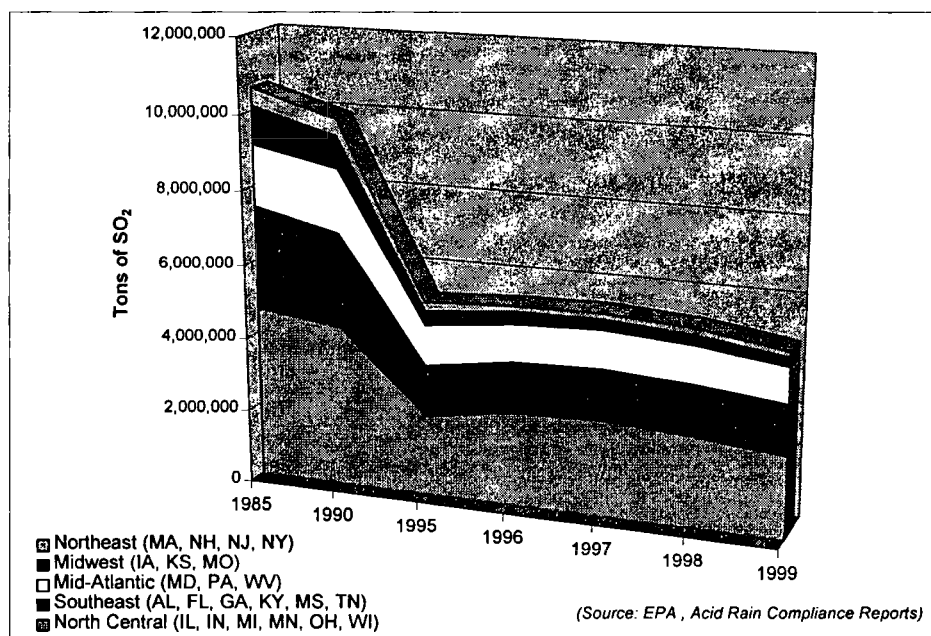


Figure 13: Regional SO₂ emissions, historic vs. Phase I levels

In addition to realizing substantial reductions relative to historic emission levels, Phase I facilities over-controlled SO₂ emissions every year relative to their initial, base allocation, and in so doing added to a significant bank of allowances, as shown in Table 3.

Table 3: Total Phase I Performance - Base Allocations

Year	SO ₂ Emissions	Base Allocation*	Tons Over-Controlled	% Over-Controlled
1995	5,298,429	6,936,618	1,638,189	24
1996	5,433,351	6,784,631	1,351,280	20
1997	5,474,440	6,686,718	1,212,278	18
1998	5,298,498	6,705,460	1,406,962	21
1999	4,944,666	6,669,460	1,724,794	26
Cumulative:	26,449,384	33,782,887	7,333,503	22

Source: EPA, *Acid Rain Program Compliance Reports, B4 Tables*
(*figures exclude Phase I extension allowances)

Has the decrease in SO₂ emissions resulting from the acid rain program begun to alleviate the problems caused by acid deposition? The short answer is that it is too early to tell and more research is required. So far, preliminary findings show that while the reductions in SO₂ emissions have lessened some of the burden on ecosystems, recovery is still slow or nonexistent in some areas, demanding further measures. According to Gene Likens and his colleagues, "Major declines in emissions of SO₂ ... have been correlated with significant decreases in [sulfate] concentrations in precipitation. Deposition, however, is the key variable ecologically as sensitive ecosystems respond primarily to deposition of acidifying substances, rather than to emissions directly. Unfortunately, many sensitive ecosystems have not yet shown improvement in response to decreased emissions of SO₂. Clearly, inputs of other chemicals, such as nitric acid and base cations, must be considered. ... [In addition], meteorological variability may contribute to significant changes in the long-term record of precipitation sulfur chemistry and may obscure (or exceed), at least on an annual basis, changes due to reductions in SO₂ emissions."²³ Thus while both SO₂ emissions and sulfate concentrations in precipitation have declined significantly, the role of other chemicals and variations in rain and snow can affect the short-term measurements of acid deposition.

Despite this complexity, important observations have been ongoing during the relevant time period. From 1989 to 1998, the total deposition of sulfur decreased by 26% in the eastern United States.²⁴ This marked decline is illustrated in Figure 14. In addition, in the Adirondack Mountains of northern New York, an analysis of a representative sample of lakes showed that sulfates declined in 92% of the lakes during the period from 1992 to 1999.²⁵

"In 1995, ... we saw the largest one-year drop in SO₂ 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. These emissions reductions resulted in a decrease of 10 to 25% in wet sulfur deposition over large areas of the eastern U.S. in 1995. Ambient concentrations of sulfur dioxide also declined by 17% between 1994 and 1995. By the year 2010, the reduction in fine sulfate particulate matter is expected to provide health benefits of \$12 to 40 billion per year and visibility benefits of \$3.5 billion per year."

Mary Nichols, Assistant Administrator, Air and Radiation, EPA, before the Congressional Joint Economic Committee, 9 July 1997.

²³ Gene E. Likens, Thomas J. Butler and Donald C. Buso, "Long- and short-term changes in sulfate deposition: Effects of The 1990 Clean Air Act Amendments" *Biogeochemistry* (in press). Quoted with permission from the primary author.

²⁴ General Accounting Office, *Acid Rain: Emissions Trends and Effects in the Eastern United States*, GAO/RCED-00-47 (Washington, DC: General Accounting Office, 2000), 10.

²⁵ *Ibid.*, 16.

Figure 15, which illustrates wet *nitrate* deposition in the eastern United States in the periods from 1983-94 and 1995-98, offers an interesting comparison. The federal acid rain program legally required aggressive reductions in SO₂ emissions. In contrast, the same program, relying on a largely conventional “command-and-control” design, called for only minor decreases in uncapped NO_x emissions. As a comparison of Figures 14 and 15 shows, while wet sulfate deposition declined, wet nitrate deposition remained approximately constant or even rose in much of the Phase I and “downwind” regions.

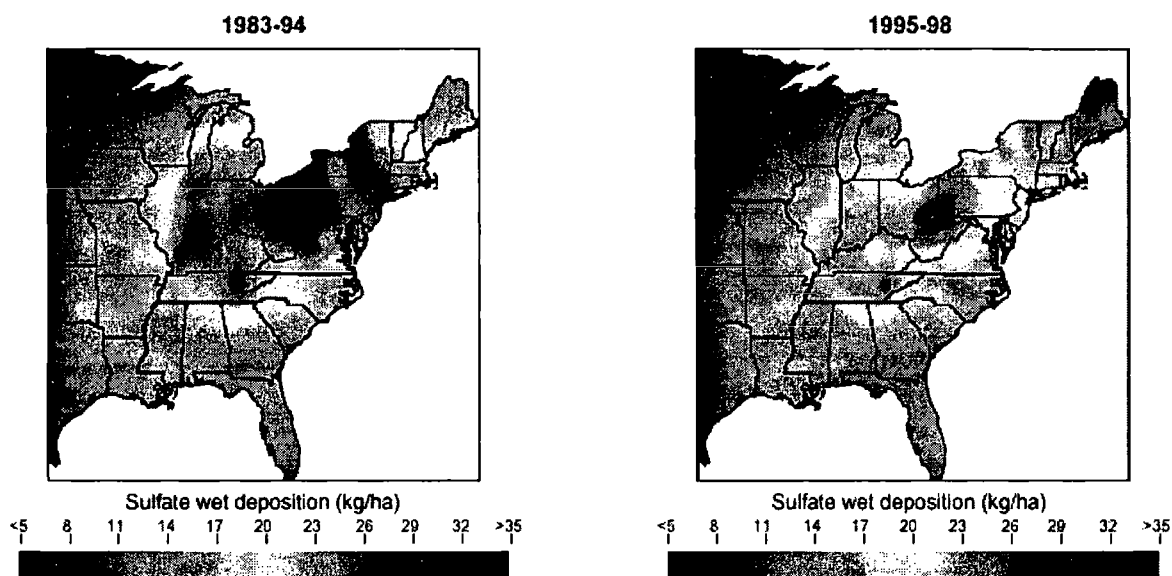


Figure 14: Wet sulfate deposition in the eastern United States, 1983-94 and 1995-98²⁶

²⁶ Figures 14 and 15 are reproduced as published in *ibid*, which credits the original source: J.A. Lynch, V.C. Bowersox and J.W. Grimm, “Changes in Sulfate Deposition in the Eastern U.S.A. Following Enactment of Title IV of the Clean Air Act Amendments of 1990” *Atmospheric Environment* 34 (2000): 1665-68. Graphs are reproduced here with permission from the primary author.

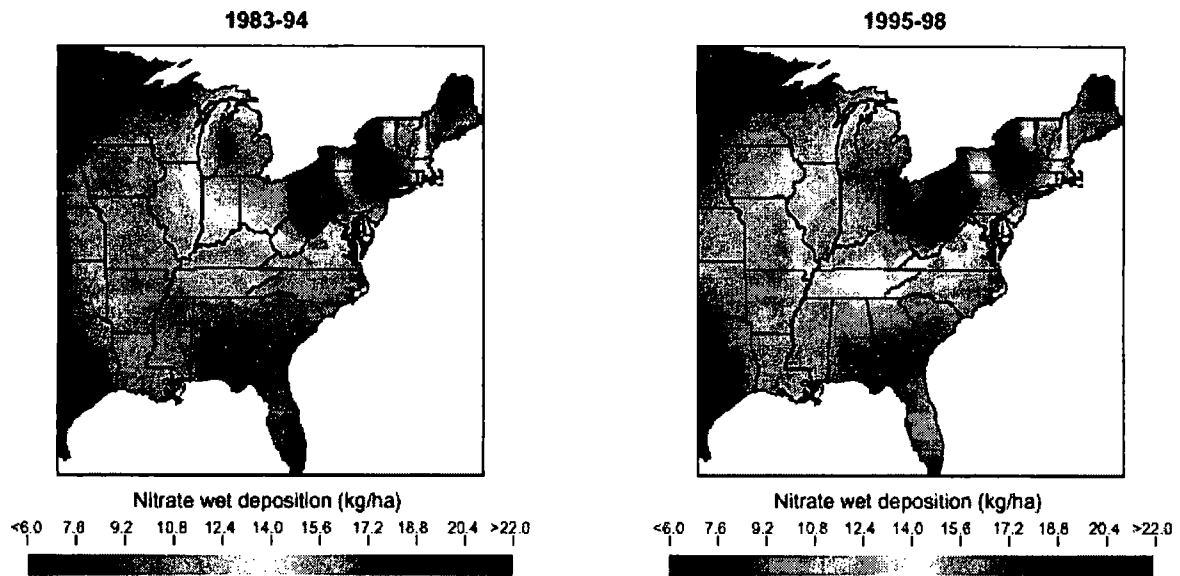


Figure 15: Wet nitrate deposition in the eastern United States, 1983-94 and 1995-98

When the acid rain program was implemented, one concern was that emissions trading would allow utilities that emitted large amounts of SO₂ to purchase allowances and continue to release SO₂ at high levels, leading to so-called hot spots of sulfur deposition. This consideration played to regional fears, in particular that utilities in the Northeast would sell allowances to large emitters in the Midwest and Southeast, whose continued high levels of emissions would, in turn, exacerbate the acid deposition problem in the Northeast. The experience of Phase I does not support this concern: "The effects of trading have been minimal in regards to such hot spots, and likely even positive. On a regional level, no significant trends can be discerned in the flow of traded allowances, and net inter-regional trades of allowances constitute only 3 percent of all allowances used. On a source-by-source basis, the opportunity to trade has led many of the largest emitters of pollution to clean up the most, such that trading has had an effect of cooling potential hot spots, not creating them."²⁷

"In practice, trading may be expected to have little relation to hot spots in the first place, for several reasons. First, the potential for hot spots must be evaluated in the total regulatory context of the pollutant: for SO₂ this includes both the existing ambient limits on SO₂ emissions and the major added reductions made under the Acid Rain Program. The second consideration is the relative importance of trading in relation to other factors of an economic, circumstantial, and operational nature that are likely to have far greater influence on local pollution levels than the operation of a regulatory program. The third set of issues involves the nature of the regulatory program, where it is does not appear that a cap-and-trade program has a greater tendency to cause elevated local pollution levels than a more traditional rate-based approach. In fact, the evidence suggest a cap-and-trade program may help to even out pollution levels."

Byron Swift, Director, Energy and Innovation Center of the Environmental Law Institute, Washington, D.C., "Allowance Trading and SO₂ Hot Spots: Good News from the Acid Rain Program," *BNA Environment Reporter*, 12 May 2000, O-2.

An analysis of inter-regional allowance trading shows that the high-emitting sources that participated in Phase I generally made reductions before purchasing allowances in the market. Looking at midwestern utilities in particular (because they had the highest combined emissions), Phase I units in 11 midwestern states relied on their direct allocations for 81% of their emissions compliance between 1995 and 1998.²⁸ During that period, midwestern states imported a total of 2.68 million tons of allowances, 20% of which originated in the Northeast and Mid-Atlantic regions (where acid deposition is most severe), and 80% of which originated in the Southeast and West.²⁹ Midwestern states *exported* 2.12 million tons of allowances, for a net import of 560,000 tons.³⁰

²⁷ Byron Swift, "Allowance Trading and SO₂ Hot Spots: Good News from the Acid Rain Program" *BNA Environment Reporter*, 12 May 2000, O-1.

²⁸ GAO, *Acid Rain: Emissions Trends and Effects in the Eastern United States*, 21. The states considered here are: Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Ohio, West Virginia, and Wisconsin.

²⁹ *Ibid.*, 22.

³⁰ *Ibid.*, 29.

From 1995 to 1998, the 11 midwestern states had a base allocation of 16.4 million tons. In comparison, their net import of allowances was only 3.4% of this amount. More important, the *actual emissions* from these states during the period were 13.9 million tons³¹—15% lower than their initial allotment. In other words, sources in these states banked roughly 2.5 million tons of extra reductions, far exceeding the 560,000 tons of net imports. As Figure 16 shows, many of the states that were net importers of allowances also achieved substantial reductions in SO₂ emissions below their base allocations.

Following Figure 7 above, the analysis of over-control in Figure 16 uses a conservative formulation by comparing actual emissions to base allocations only. As discussed in Section II, this conservative formulation could be viewed as *understating* the extent of emissions over-control achieved in Phase I. Specifically, 3.1 million extension allowances were issued between 1995 and 1998 pursuant to the intent of Congress to provide incentives for the use of certain scrubber technologies. Although the unused portion of these extension allowances may correspond, to some extent, to extra emissions reductions, they do not do so on a strictly ton-for-ton basis. Limiting the comparison to actual emissions and base allocations may provide a clearer distillation of the environmental performance of the program, especially with respect to the over-control of emissions.

At the same time, the presence of the more than 3 million additional extension allowances may obscure the broader issue of whether *emissions trading* itself resulted in higher emitting sources' continuing to release large quantities of SO₂ rather than making reductions. In contrast to Figure 16, Figure 17 presents Phase I sources' actual emissions in comparison to the sum of their base allocations and extension allowance allocations. As Figure 17 shows, this comparison reveals, for example, that the actual emissions of sources in Kentucky fell *below* their total allowable level and that sources in other states generated even more unused allowances than suggested by Figure 16. The comparison of the two figures suggests that it was not *emissions trading* that contributed to the lessening of the difference between actual emissions and even base allocations, and to Kentucky sources' emitting more SO₂ than their base allocation.³² Rather, this outcome appears to be the result of the wholly unrelated decision of Congress to use the allocation of additional allowances—which could be used to delay emissions reductions for up to two years—to favor a specific technological means of compliance.³³

³¹ Ibid., 27.

³² For both Figures 16 and 17, interstate allowance transfer data is from GAO, *Acid Rain: Emissions Trends and Effects in the Eastern United States*, Appendix III; and allowance data is from EPA, Acid Rain Compliance Reports (1995-1998), B4 tables, with adjustments for extension allowances. In states where the bar colors are inverted (blue over yellow), the aggregate emissions of units in the state exceeded the aggregate base allocation (Figure 16) or the combination of aggregate base allocation + aggregate extension allowances (Figure 17).

³³ Congress believed that these additional allocations would not result in additional *cumulative* emissions since the legislation it enacted required emissions reductions to begin one year earlier than the Bush administration's bill.

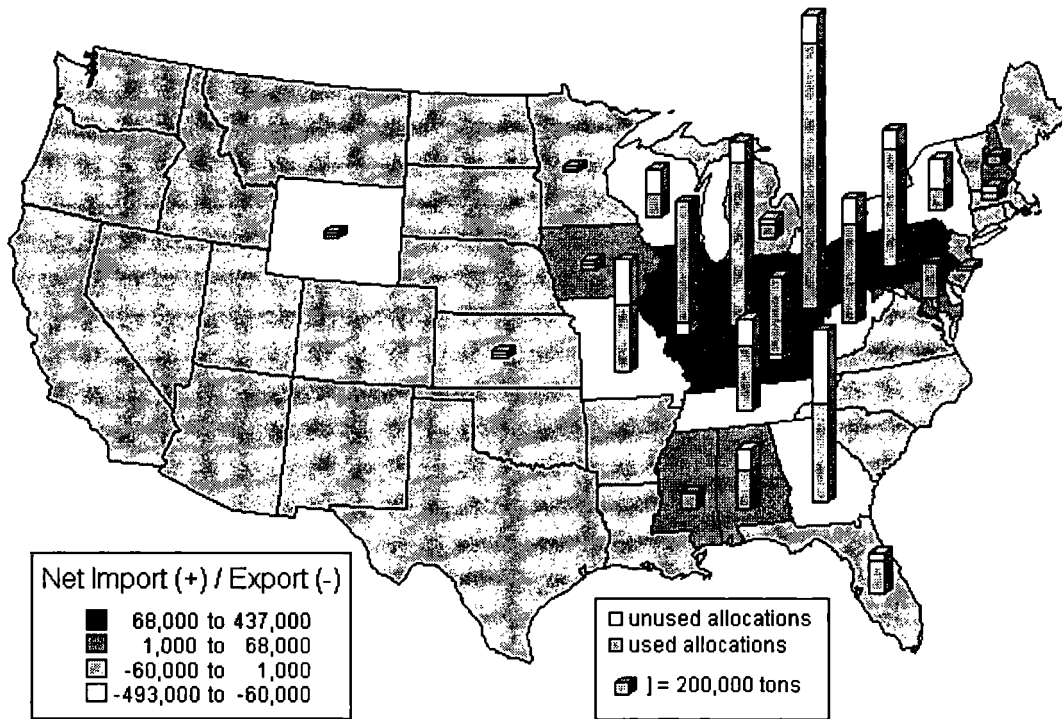


Figure 16: Interstate allowance flows (in tons) and over-control by state, 1995-1998

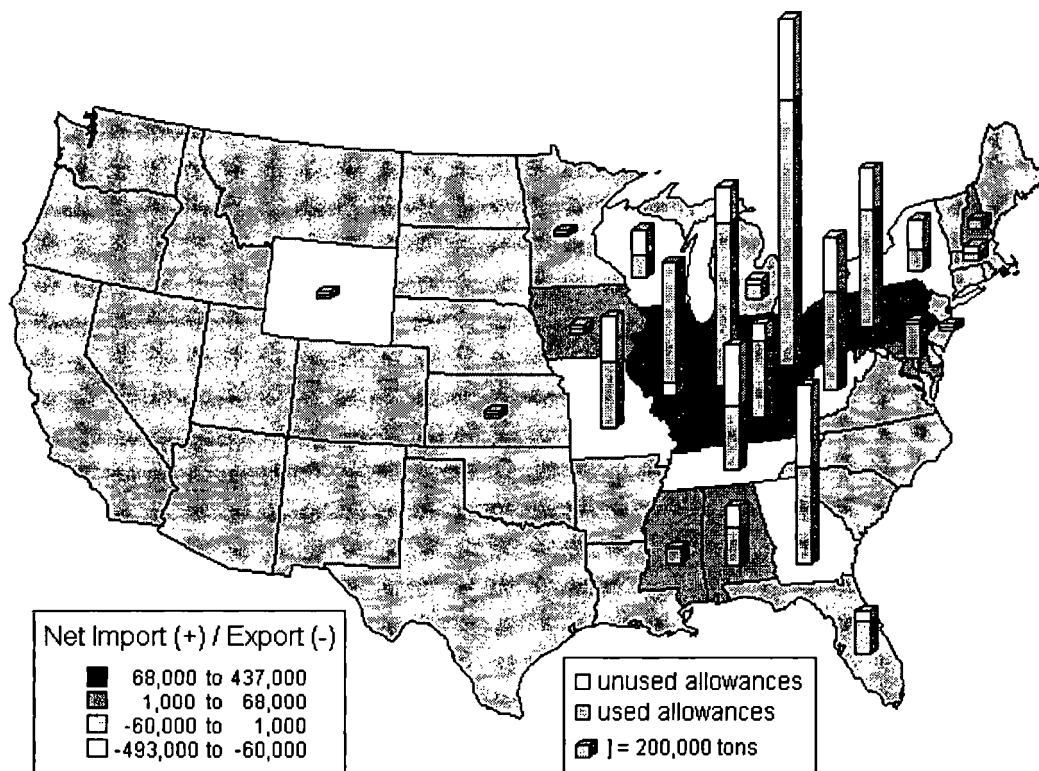


Figure 17: Interstate allowance flows (in tons) and aggregated base allocations + extension allowances by state, 1995-1998

Banked Tons and Environmental Protection

Relative to the total cumulative budget for Phase I, the EPA estimates that a bank of 11.6 million tons worth of unused allowances accrued from 1995 to 1999. This bank includes both unused bonus allowances, such as "extension" allowances, as well as unused base allocations. Looking specifically at *base allocations*, the environment saw 7.3 million tons of *extra reductions* in SO₂ emissions—beyond the base reduction levels. As a result, geographic areas afflicted with high levels of sulfate deposition had a better chance of beginning the recovery process because plants made *early* cuts in emissions rather than delaying those obligations until the year 2000 or later. The reason for these early reductions is that they could be saved for Phase II, when limits would be tighter and compliance would be potentially more expensive.

In Phase II, there is a chance that many utilities seeking low-cost compliance with the more stringent limits in fact will turn to the current bank of unused Phase I allowances. If so, then annual emissions during the first few years of Phase II may be higher than the annual budget of 9.2 million tons established in the Clean Air Act.

That outcome would be perfectly legal under the Act, which explicitly permits power plants to keep unused Phase I allowances to cover emissions in Phase II. That outcome would be part of a trade-off deliberately made by Congress, which saw the environmental problems caused by sulfuric deposition as linked to *cumulative* emissions. Again, the remarkable emissions reduction performance of Phase I almost certainly would not have occurred without this trade-off. Thus the risk that SO₂ emissions during Phase II may be higher than the annual budget of 9.2 million tons is the exchange for the 7.3 million tons of extra SO₂ reductions that occurred between 1995 and 1999. Unfortunately, this risk is aggravated by the fact that the 7.3 million tons of over-control are essentially a subset of the total cumulative bank—specifically, 11.6 million unused allowances, which include more than 3 million extension allowances for scrubbers. This added risk is as much a function of the independent decision by Congress to favor scrubbing technology through the additional allocation as it is of banking—and thus would seem to be far less justified, if at all, environmentally.

Will all the saved allowances be used and, if so, over what period? The answer could become clear in early 2001, when the first year of Phase II is completed. One outcome that seems unlikely is that all of those allowances will be used without being replaced by ongoing emissions over-control. As long as that is true, then the program will always be creating, or at least maintaining, more cumulative SO₂ reductions than required.

Fortunately for the environment, the logic of maintaining a substantial SO₂ allowance bank will persist indefinitely for power plant operators. That is because at any given time, the option of drawing from a bank of emissions reductions functions as a kind of insurance policy against costs of compliance becoming too high—at any time in the future. That insurance policy gives utilities flexibility as they continually respond to economic change and growth while operating against an emissions cap. Of course, if a surplus is to be maintained in the bank, then it is necessary for legislators and regulators to continue to honor those assets under any future regulatory changes.

V. The SO₂ program and the Kyoto Protocol: A matter of design

Since 1992, the parties to the United Nations Framework Convention on Climate Change have been working to design a global system to reduce emissions of greenhouse gases (GHGs). In particular, they are currently negotiating rules for market mechanisms that were put forward in the 1997 Kyoto Protocol on climate change. It is logical that the SO₂ program in the United States has been invoked countless times as an important precedent for the structure of the Kyoto Protocol. Although the differences between the SO₂ program and the Protocol are numerous, the environmental and economic results of Phase I are likely to command some attention among the international negotiators. Perhaps even more important, the results themselves—full compliance, dramatic levels of early, extra emissions reductions, and low costs—will reaffirm the negotiators' commitment to the fundamental cap and trade framework of the Protocol.

This section of the report examines some of the design choices that Congress made in developing the SO₂ program—choices that might parallel those available to the Kyoto Protocol negotiators. In that way, the design of the SO₂ program may shed light on pressing issues involved in global control of greenhouse gases—such as the timely achievement of significant GHG reductions, compliance, cost containment, and “compliance funds.”

Extra and early reductions

The Kyoto Protocol has the potential to deliver emissions performance similar to that seen during Phase I of the SO₂ program—that is, the achievement of *more* GHG reductions than are required in the first compliance period. Realizing that promise, however, may depend on the willingness of the Conference of the Parties (COP) to negotiate a *second* compliance period, specifically before 2008 (the beginning of the first compliance period).

Article 3.13 of the Protocol parallels the provisions in the SO₂ legislation that permit the banking and saving of allowances. The article specifies that parties that do not use all of their “assigned amounts” of GHG emissions during the compliance period may add the unused assigned amounts in later compliance periods.

The results of Phase I of the SO₂ program indicate that the bank-and-save feature has been critical to stimulating power plants to make significantly more reductions in emissions than mandated in the Clean Air Act. Those extra reductions may be attributable to the acid rain program's more stringent emissions requirements in Phase II, which imparted financial value upon banked allowances.³⁴ The assessment of that value logically depended, in turn, on the clear understanding among power plant operators of their Phase II obligations. Those obligations were spelled out both in the legislation and in regulations issued by the EPA two years before the start of Phase I (and seven years before the start of Phase II). As a result, electricity companies and other investors were able to calculate with some precision the potential costs of meeting a specific set of more stringent reduction requirements before

³⁴ Ellerman et al., *Markets of Clean Air: The U.S. Acid Rain Program*, 264.

making their initial compliance decisions and investments. Based on those cost calculations, they were also able to see the value in achieving extra reductions in Phase I. Again, the result in the United States has been the achievement of SO₂ emissions levels that are 30% below those required by law.

Because of the cumulative effects of acid deposition, those extra, early SO₂ reductions offer better hope for the ultimate environmental efficacy of the program. Likewise, the atmospheric build-up of GHGs presents a similar situation. Because of the persistence and effect of these gases in the atmosphere, the current rapid increase and accumulation of emissions of GHGs are increasing the likelihood that global warming will occur at a faster rate and to a greater extent that will be environmentally and socially sustainable. That prospect puts a very high premium on achieving reductions in GHG emissions as soon as possible.

Article 3.13 of the Kyoto Protocol offers an incentive pathway for achieving such early reductions, and involves more than just “flexibility” for countries that must manage their assigned amounts. Article 3.13 offers these countries (known as “Annex B parties” in the parlance of the Kyoto Protocol) an opportunity and a rationale for achieving reductions in GHGs sufficient to bring them *below* their cap. As in the case of power plants in the United States, Annex B nations looking forward to continued economic growth in concert with a GHG emissions limit may value the future flexibility offered by assigned amounts that are saved from the first budget period. If so, they will seek early on to make more reductions in GHG emissions, presumably at a lower cost.

As in the case of power plants in the United States, Annex B nations looking forward to continued economic growth in concert with a GHG emissions limit may value the future flexibility offered by assigned amounts that are saved from the first budget period.

As currently negotiated, however, the Protocol does not fully sustain this logic. It includes specified total-emissions limits for Annex B parties only for the first compliance period. Although the Protocol has provisions that assume the establishment of an ongoing series of compliance periods and assigned amounts, these subsequent assigned amounts are not specified. Neither policy makers nor private investors can apply the kind of calculus available to power plant operators under Phase I of the SO₂ program. As a result, their investment calculus during the first compliance period is less likely to spur early reductions in GHG emissions, which the environment greatly needs.

However, the COP can take steps to change this omission simply by agreeing before 2008 to adopt targets for the second compliance period. With both their first and second compliance period obligations in place, public and private-sector decision makers would be forced to follow GHG reduction strategies with a longer-term scope. In the case of long-lived capital investments common to energy-intensive processes and industries, this time perspective would allow more choices for control in the context of long-term financial planning. To the

extent that incentives based on temporal flexibility can drive governments and firms to reduce GHG emissions quickly, as well as through the coming decades, then the Protocol would have that much better a chance of serving its ultimate environmental objective—limiting global GHG emissions to a level that will forestall or avoid dangerous changes in the global climate.

Compliance

Despite the many differences between the SO₂ program and the Kyoto Protocol, at least one crucial design feature of the SO₂ program should also be adopted by the COP: if a party releases excess emissions in the first compliance period, then there should be an automatic deduction of emissions from subsequent compliance periods. Further, the contrast between the SO₂ program and the Protocol highlights the need for the Protocol to use a modest “buyer liability” device to reinforce the parties’ incentives to comply with their GHG obligations.

At first glance, international negotiators might assume that the approach of the SO₂ program to compliance and cost containment has little to offer in the way of solutions to international problems in the implementation of the Kyoto Protocol. After all, the U.S. Congress had the relatively easy task of establishing a compliance system that affected only domestic legal entities. Protocol negotiators, in contrast, must devise a system that governs the compliance of sovereign nations. Nevertheless, both the SO₂ program and the Kyoto Protocol rely on an emissions trading market as a primary means for delivering compliance with a fixed emissions limit. For that reason, it may be useful to examine the design choices

Transparency and Record-Keeping

The operational linchpin of the SO₂ emissions trading program has been the EPA’s Allowance Tracking System (ATS) and Emissions Tracking System (ETS). Most observers agree that the ATS/ETS has been essential for ensuring compliance, vouchsafing environmental integrity, and facilitating investment and trading. The ATS/ETS provides the ultimate transactional “ledger”—a *publicly accessible* electronic database that records each source’s actual SO₂ emissions as reported by its emissions monitoring system (ETS) and each source’s allowance holdings (ATS). The ATS reflects all allowance transfer and banking activities. In the ATS, allowances are deducted from transferors’ accounts and added to acquiring source accounts whenever both parties report that a transaction has taken place. The parties report their transactions for compliance purposes, that is, for ensuring that they have sufficient allowances in their accounts to cover their actual emissions. At the end of each year, the EPA deducts, from each source’s account the allowances equal to the party’s reported actual emissions for the year. Unused allowances are automatically carried forward to the account for the next year.

The demands on the Kyoto Protocol’s implementation system for a reliable compliance structure, environmental integrity, and a record of ultimate “ownership” of AAUs/ERUs/CERs are the same as those placed upon the compliance and reporting system of the SO₂ program. That is why it is critical that the Protocol’s implementation rules establish a publicly available double-entry “ledger” system for all Annex B parties and for CDM participants. Under such a system transfers would be recorded through the appropriate deductions and additions to parties’ accounts. Deductions for actual GHG emissions would be similarly made, along with additions of unused portions of a parties’ assigned amount. Additional features for such a system may be necessary depending on the particular compliance and liability ruled adopted. At the same time, the Protocol’s reporting system must function as a public and transparent ledger accurately reflecting each party’s emissions performance and its transactions under the flexibility mechanisms.

that Congress made in the areas of compliance and cost containment in order to ensure both the environmental integrity of the program and the economic efficiency of the emissions trading market.

Both the SO₂ program and Article 3 of the Protocol codify a primary system of “seller liability.” Under the acid rain program, power plants that sell allowances must reduce their emissions to an amount equal to or less than the remaining balance in their allowance accounts. The effect of Articles 3.10 and 3.11 in the Protocol is identical. These articles require Annex B parties to deduct from their assigned amounts those “assigned amount units” (AAUs) transferred under Article 17 (on emissions trading) and those AAUs/emissions reduction units transferred under Article 6 (on joint implementation). As a result of these provisions, Parties must limit their GHG emissions to their assigned amount *net* of these deductions in order to be in compliance.

Under the SO₂ program, Congress determined that only “sellers” are liable if their SO₂ emissions exceed the number of allowances remaining after transfers. This choice seems inevitable since it was built into the fundamental measure of compliance—matching annual SO₂ emissions to the number of allowances held for a given year. In addition, Congress relied on a stringent compliance regime that rested on two critical pillars. First, when the SO₂ emissions of a power plant exceed its allowances, the EPA must automatically deduct allowances from the plant’s next annual allocation in an amount equal to the excess emissions. This creates an ongoing legal obligation for noncomplying power plants to “make the atmosphere whole” by restoring the reductions in emissions that were lost through noncompliance.

Second, the program provides for an *automatic* penalty of \$2,000 per ton of excess SO₂.³⁵ (This penalty burden is augmented through enforcement provisions under the Clean Air Act that impose steep judicial fines on noncomplying sources.) Even taking into account the predictions of high compliance costs advanced by the utility industry during the public and legislative debates about the program, Congress determined that this penalty would represent a cost at least twice as high as, and likely three or four times higher than, the marginal reduction cost. Current SO₂ allowance prices, which are selling in the range of about \$160 per ton, certainly validate this determination. Congress’ strategy was to ensure that it would be irrational for a power plant operator to opt for suffering the penalty price in lieu of achieving compliance, particularly given the availability of diverse compliance options and unrestricted allowance trading.

As Congress did in the SO₂ program, the negotiators must ensure the environmental and legal integrity of the Protocol by automatically deducting assigned amounts in the second

The negotiators must ensure the environmental and legal integrity of the Protocol by automatically deducting assigned amounts in the second compliance period equal to a party’s excess emissions in the first period.

³⁵ The penalty is adjusted for inflation. As of July 2000, the penalty stood at \$2,682 per ton.

compliance period equal to a party's excess emissions in the first period. Only in this way will the Protocol create full-fledged, truly binding obligations on parties to limit their total GHG emissions. At the same time, the rules will ensure that the atmosphere is "made whole"—that the GHG reductions lost as a result of a Party's initial non-compliance are recovered eventually when the Party comes into compliance with its more stringent assigned amount. The integrity of this provision would be weakened, however, if parties were able to delay negotiation of their obligations in the second compliance period until after the first period began. This is another reason for the COP to adopt assigned amounts for the second compliance period before 2008.

Of course, the efficacy of an automatic deduction depends on the sovereign party's willingness to participate in the Kyoto regime as well as the establishment of a second budget period. It remains to be seen whether a future international consensus about the urgency of reducing GHG emissions will sustain support for automatic penalties for noncompliance. Until that time, negotiators must look to other strategies to prompt Annex B parties to meet their assigned amount obligations.

Because the Protocol is the artifact of the willing participation of sovereigns, negotiators must resort to a substantially different approach from the reliance on financial penalties used by the Congress in the SO₂ program. While the Protocol cannot impose the stark economic calculus created by the SO₂ program's steep monetary fines, it can take advantage of the economic incentives potentially created by the GHG emissions trading market fostered by Articles 17 and 6. Through the judicious application of a supplemental "buyer liability" rule, the COP can tap those incentives.

Specifically, a "dynamic balance" rule³⁶ for assigning liability to buyers, as well as sellers in some circumstances, would create additional incentives favoring compliance. Under such a rule, buyers of AAUs, in specified circumstances, would know that they would share liability with sellers if the sellers ended the compliance period with excess emissions. As a result, buyers would place greater value on AAUs marketed by parties more likely to be in ultimate compliance. Those parties, in turn, would be more richly rewarded by the

A "dynamic balance" rule for assigning liability to buyers, as well as sellers in some circumstances, would create additional incentives favoring compliance.

³⁶ The proposed dynamic balance rule is intended to identify the continually changing point at which a Party's actual emissions and assigned amounts are sufficiently out of balance that a buyer (by purchasing AAUs from the Party in question) demonstrably adds to the risk that the Party will be out of compliance at the end of the compliance period. In that circumstance, the rule would impose a share of the seller's ultimate liability under Article 3 on the buyer as well. To define this point of imbalance, the rule asks three questions: How many AAUs does the Party have remaining in its account for the commitment period?; How many emissions is the Party likely to have during the remaining commitment period?; and, How do those two numbers compare? If those numbers were out of balance beyond a certain threshold, any AAUs transferred at that point would be subject to a discount in their emissions-offset value if the selling Party ended the compliance period with excess emissions. By establishing a threshold of liability between buyers and sellers, the dynamic balance rule uses market forces to deter noncompliance without placing undue burden on the GHG emissions trading market.

emissions trading market when they sold their AAUs. Thus, the emissions trading market itself would play a role in building incentives for compliance—or at least in steering participants away from parties whose transfer of AAUs contributed to their noncompliance.

Cost containment

Perhaps the issue that looms largest over the Kyoto Protocol is that of cost. The same was true for policy makers in the United States throughout the acid rain debate. In the end, Congress rejected every temptation to reach for a “quick fix,” such as a price ceiling, to limit costs. Instead, it designed a program to take full advantage of market mechanisms to allow the market itself to act as the bulwark against unacceptably high compliance costs. This commitment was key both to the environmental integrity and economic performance of the program. No lesson may be more important for international negotiators confronting the challenge of limiting GHG emissions, especially because the size and diversity of the potential GHG emissions trading market imparts the critical mass and strength that allows all successful markets to do what markets do best: lower cost. That promise could be jeopardized, however, if negotiators create distortions in the market—distortions that would inevitably result from attempts to inject explicit limits on costs.

Congress constructed the SO₂ program with a firm cap and gave power plants a variety of compliance options, including emissions trading. In addition, an important element of this construct was an automatic penalty of \$2,000 per ton of excess emissions. The amount, so much greater than the actual cost of achieving an incremental ton of reduction, compelled all sources to achieve or acquire through trading the reductions necessary to be in compliance. “Paying to pollute” is simply not a rational option under the SO₂ program.

Congress did include some provisions aimed at addressing concerns about dependence on the emissions trading market as a low-cost compliance option. These provisions were designed, however, to favor direct emissions reduction and emissions trading for compliance. Specifically, the EPA is required to withhold from the annual budget approximately 2.8% of the total number of allowances. About half of these are auctioned annually through the Chicago Board of Trade. Neither a floor nor a ceiling price is set for these allowances. As a result, participants must bid at or above a market-clearing price to obtain allowances. In effect, the auction is simply a segment of the overall market for emissions allowances.

The remainder of the withholding must be offered for “direct sale” at a price specified in the legislation—\$1,500 per ton. Congress selected this price precisely because it was 50% *higher* than the highest per-ton compliance cost estimates offered during the legislative debate. By setting the direct sale price at this level, Congress deliberately created a stark disincentive to participating in the direct sale option in lieu of purchasing allowances in the emissions trading market. The design was so successful that the EPA, by regulation, suspended the direct sale account simply because of lack of participation.

The most obvious benefit of this “no exit” strategy of the SO₂ program is that it guarantees the environmental integrity of the program. Even if both the auction and the direct

sale program were fully subscribed, total emissions would not exceed, even by a single ton, the program cap. This is because every allowance transferred through these provisions is deducted from the total amount allocated. These mechanisms are but emissions trading—under the cap—by other means. The “no exit” approach may also be key to the economic success of the program, as demonstrated by its lower-than-predicted costs. Not only are allowances available through the auction and direct sale deducted from the total budget, but both the automatic penalty and the direct sale price are set so high above expected (and actual) market prices for allowances as to be economically intolerable. Consequently, the resources of the power plants and of other investors are directed exclusively at finding the *lowest cost methods of achieving actual reductions*.

The most obvious benefit of the “no exit” strategy is that it guarantees the environmental integrity of the program, and it may be the key to economic success.

One of the most striking aspects of the 7.3 million tons of over-control achieved during Phase I is that those reductions represent the willingness of power plant operators and other investors to expend present-day capital. In return, they are creating or receiving assets (the saved allowances) whose value will emerge only in the future, when, according to their assessments, compliance costs would be high enough, and operational flexibility needs great enough, to make a bank of these allowances valuable. At the same time, these early, low-cost reductions are integral to the success of an emissions trading market in driving down costs. Early investment in low-cost reductions produces a supply of relatively cheap allowances, which, in turn, ignites greater market demand and thus stimulates fundamental, cyclical market forces.

A prescribed ceiling price on trading, or “cost cap,” at so-called “reasonable” levels would likely deter the cycle of early investment in a supply of low-cost reductions. If power plants in the SO₂ program could have counted on their costs being capped at a “reasonable” level, their incentive for making investments in early, bankable, low-cost reductions would have been greatly reduced. In the absence of robust investment in early low-cost reductions, the market and the attendant cost-reducing dynamic would have been slower in forming. A slowly forming market, in turn, would have signaled to firms to place their reliance in the future cost cap and to delay or eschew the search for, and purchase of, near-term low-cost reductions. With the investment in low-cost reductions not being made the market’s cost-reducing capacity would dwindle. Furthermore, any cap on costs arbitrarily set by a political process introduces unaccountable uncertainty into any investment process, further dimming the interest in over-control. Thus, ironically, a cost cap could have made the SO₂ program *more* expensive than the actual outcome that emerged in an emissions trading market free of regulatory price distortions.

Compliance fund

In the ongoing effort by negotiators to formulate rules for compliance under the Kyoto Protocol, some have offered proposals to levy fees on noncomplying parties, and to use the fees to purchase GHG reductions that would offset the excess emissions. The details of the proposals vary; some would specify in advance the amount of the penalty, while others would calculate the penalty by levying a tax on GHG reductions transferred in the global emissions trading market. Such “compliance fund” proposals have been advanced for possible adoption at the global level, at national levels, and at regional levels among groups of nations. For evaluating these proposals, the design and initial success of the acid rain program offer a point of comparison that suggests these conclusions:

- The fees paid into any compliance fund should be high enough to ensure that parties and private firms have a strong incentive to invest in and achieve sufficient low-cost reductions (including through flexible market mechanisms), before subscribing, either voluntarily or involuntarily by dint of noncompliance, to one or more official, non-private compliance funds.
- The fees should be high enough to ensure that the compliance fund mechanism has more than adequate resources to invest in and acquire the full amount of additional GHG emissions reductions needed to offset all excess GHG emissions. The fees would also have to cover administration expenses for managing the fund, with all expenses recorded in a transparent manner.
- The rules that govern the compliance fund mechanism should be integrated into those that govern the other flexible mechanisms of the Protocol in order to ensure that the reductions acquired by the fund represent true, additional GHG reductions that offset excess emissions and achieve the goal of avoiding dangerous anthropogenic interference with the climate system.

The Kyoto Protocol already provides for a variety of distinct “flexibility mechanisms” that represent the pillars of a potential international emissions trading system. Those mechanisms and the market they purport to create will be the most likely sources of compliance for nations that choose not to achieve the full measure of emissions reductions domestically. Furthermore, the creative energy engendered by this market will produce the affordable and effective solutions needed to permanently address the global warming problem. From this perspective, a Protocol-sanctioned compliance fund may be viewed as wholly superfluous, if not compromising of the environmental effectiveness of the Protocol. Still, the notion of a compliance fund mechanism may find support among Parties committed to fulfilling their obligations, but uncertain about their own ability to take full advantage of the flexibility mechanisms. Thus the impetus to provide those Parties with an additional voluntary pathway in the form of a compliance fund may prevail. Lest fears of crippling costs and infeasibility become the reality, however, a compliance fund should not be allowed to curtail the potential of the market itself to meet the demand for low-cost reductions.

Regardless of the choices made by the COP, what is critical in assessing designs for a compliance fund is that the COP adopt a “no exit” strategy similar to that in the SO₂ program. Such an approach ensures that no matter how high the level of participation in the compliance fund, the full measure of GHG reductions mandated under Article 3 and Annex B will be achieved. At the same time, the mechanism likely would reinforce incentives to use the primary means of compliance—policies to reduce GHG emissions, direct investment in such reductions, and participation in the emissions trading system—which make up the Protocol’s flexibility mechanisms. The more those means are used, the greater the likelihood that the Protocol will produce full compliance, and do so at the lowest possible cost. Conversely, the less these means are used by governments and firms, whose resources would be diverted simply to paying compliance fund fees rather than directing their resources to the creation of low-cost reductions, the greater the risk that the Protocol would either fail to meet its environmental goal or create unnecessarily high costs – or both.

Accordingly, the COP should ensure that a compliance fund does not become, *de facto*, a path by which Parties can simply “pay to pollute.” In that case, the Protocol would simply fail to achieve the full measure of GHG reductions mandated in Article 3. In addition, the key economic and environmental functions of the flexibility mechanisms and the overall global GHG emissions trading market—the stimulation of successful investment in low-cost reductions—would be frustrated. The paradoxical effect would not only be to make all compliance unnecessarily expensive, but also to leave even the fund managers with reduced options for finding an affordable supply of GHG reductions adequate to offset excess emissions. In the end, no compliance fund should function in a way that makes it a competitor to the primary compliance options that foster low-cost compliance.

The COP should ensure that a compliance fund does not become, de facto, a path by which Parties can simply “pay to pollute.”

The key, then, for an effective compliance fund mechanism is that the fee for noncompliance, or voluntary participation, must be set at a *high* level. First, and foremost, this would ensure that the fund had adequate resources to acquire all of the GHG reductions necessary to offset the excess emissions generated by Parties opting to use the fund in lieu of complying by other means. At the same time, through the use of a high fee, a compliance fund would be able to serve what would perhaps be its most important function: steering governments and firms toward their own active pursuit of low-cost reductions. That, in turn, would ensure that a compliance fund truly reinforced the critical function of the global GHG emissions trading system itself: driving public and private energy and investment directly toward the ongoing harvest of sufficient and affordable GHG reductions. After all, it is the bounty of that harvest that will determine whether the Protocol meets both its environmental and economic objectives.

Finally, during 1989 and 1990, Congress weighed a variety of arguments from stakeholders that the emissions trading market would not deliver an adequate supply of low-cost SO₂ reductions. In addition, some power companies asserted that participating in an SO₂

emissions trading market was outside of their core business capacities. In the end, Congress rejected all compliance mechanisms that would directly compete with, and divert investment and energy from, the SO₂ emissions trading market itself. It concluded that if the program was based on a “no exit” structure, then even if concerns about participation in the market proved valid, the emissions trading market itself would generate solutions. The results of Phase I strongly suggest that the market has performed precisely this task with respect to the achievement of low-cost emissions reductions. At the same time, during Phase I, the market succeeded in prompting several private firms to establish brokerages and other mechanisms to aid power plants and reduce transactions costs that otherwise might stymie participation in emissions trading and other means of compliance.

This experience, too, should inform the deliberations of the COP if and when it focuses on the question of establishing a compliance fund. Perhaps the COP, too, will conclude that in a market as potentially diverse and deep as an international GHG market, Parties and firms will devise *their own* compliance fund mechanisms. These could range from insurance instruments created by private legal entities to mutual assistance agreements among parties with existing political and economic affinities and parallel interests. Indeed, it is hard to imagine that such tools will not be established, and they are likely to be more robust if the COP refrains from devising its own compliance fund that competes directly with the proposed flexibility mechanisms.

Conclusion

Despite decades of real progress, air pollution continues to threaten both natural resources and human health. Policy makers at all levels who wish to meet the growing public demand for protection of people and the environment from the threats posed by ozone smog, fine particulates, acid rain and global climate change will be forced to require additional large-scale reductions of a range of air pollutants, such as NO_x, SO₂ and GHGs. Growing evidence suggests that mercury and other airborne toxins pose a serious threat to human health as well, and their release into the environment will have to be reduced.

Since 1990, a variety of pollution-control programs have been developed that closely resemble the “cap and trade” model of the SO₂ program.³⁷ At the same time, policy makers in both the United States and other nations are faced with still more pollution-control challenges to which the approach taken by the SO₂ program might suggest a solution:

- In 22 eastern states, air regulators and, in some cases, legislators must develop state plans for complying with federal requirements to reduce summertime NO_x emissions. The EPA has put forward a “model” cap and trade rule that any of the states may voluntarily choose to adopt.
- Ongoing scientific analysis suggests that in the absence of substantial additional reductions in annual NO_x emissions and another increment of SO₂ reductions, critical natural resources will continue to be plagued by acid deposition.
- At a time when the electricity industry in the United States is undergoing a period of dramatic economic change, necessitating substantial new investment and new business strategies, both the public and some in the industry itself are looking to the EPA and Congress to formulate a definitive set of comprehensive pollution control requirements for NO_x, SO₂, carbon dioxide and mercury.
- In November 2000 and in subsequent years, international negotiators will be called on to elaborate the implementing rules of the system of emissions trading authorized by the Kyoto Protocol on climate change, which also imposes explicit limits on the total GHG

³⁷ These include: (1) the “NO_x Budget” Program of the Ozone Transport Commissions of the northeastern states seeking to limit summertime emissions of NO_x as groundlevel ozone precursors; (2) the “model rule” propounded by the EPA through which a group of Eastern states can meet their federal requirement to limit summertime NO_x emissions transport as it affects groundlevel ozone formation; (3) the “RECLAIM” program established in Southern California to limit SO₂ and NO_x emissions in connection with their local health effects; (4) the program developed by the state of Illinois to limit stationary source emissions of volatile organic compounds, as precursors of groundlevel ozone in the Chicago metropolitan area; and (5) the Kyoto Protocol negotiated by the third COP, which limits the total GHGs of specified industrialized countries while permitting those countries and their “legal entities” to engage in emissions trading. In addition, “cap and trade” legislation has been introduced in the United States Congress for further reducing annual SO₂ and NO_x emissions to deal more aggressively with continuing environmental problems associated with acid deposition. Finally, in March, 2000 the European Commission issued a “green paper” outlining ways in which the European Union could apply a marketable permit, or “cap and trade,” system for limiting greenhouse gas emissions in the EU.

emissions of industrialized nations. In addition, government policy makers in those nations, anticipating participation in the Protocol, will be developing domestic greenhouse gas reduction policies. A number of nations—including the United Kingdom, Germany, Norway, Denmark, and France—have developed or are considering domestic GHG trading programs.

For those intent on achieving large-scale reductions in air pollutants, the results of Phase I are extremely promising, even compelling. They are so much so as to create a great temptation to extrapolate a set of “lessons” for stakeholders and policy makers who are grappling with the present and future challenges of controlling air pollution. Fortunately, stakeholders and policy makers will have the benefit not only of any “lessons” they wish to draw from these results, but also of a much wider range of continuously unfolding knowledge and understanding of the challenges they face.

At the same time, however, to deal with the ongoing problems of acid rain, the long-range transport of ground-level ozone precursors, climate change, and perhaps the release of fine particles and mercury into the atmosphere, policy makers will find that their immediate problem is to achieve large-scale reductions in pollutants like SO₂, NO_x and greenhouse gases as quickly and as inexpensively as possible. In pluralistic societies that pursue environmental protection, prosperity, and other social goals simultaneously, it will behoove those policy makers to consider the outstanding environmental and economic performance of the SO₂ program when weighing the programs they themselves are developing. Otherwise, their constituents would have every right to ask: How can we accept alternative approaches if they do not deliver the critical pollution reductions as assuredly and as cost-effectively as the SO₂ program has in Phase I?

“Allowance Trading: This unique aspect of Title IV has been successful both in terms of the volume of trades and in its effectiveness in keeping compliance costs down. Economic analysis shows the market of SO₂ emission allowances is functioning, liquid, and effective and can serve as a model for other air pollution control programs.”

National Science and Technology Council, Committee on Environment and Natural Resources, National Acid Precipitation Assessment Program, *Biennial Report to Congress: An Integrated Assessment* (Silver Spring, MD: National Acid Precipitation Assessment Program, 1998), Executive Summary.

Does Trading Have to Be Regulated or Restricted?

The best answer to the question of whether or not trading must be regulated (including geographic or temporal restrictions) may be that it depends on the environmental and public health problem being addressed, including issues of environmental justice.

The results of Phase I suggest that restricting trades and banking may come at both an environmental and an economic cost. This notion stems from the 7.3 million tons of extra SO₂ reductions achieved between 1995 and 1999. Thanks to the banking and trading system established under the acid rain program, power plants were given a direct economic rationale for making these reductions. The extra reductions represented an economic asset in that they could have been sold during Phase I or banked for later use or sale in Phase II. To the extent that none of those options was restricted temporally or geographically or was subject to regulatory approval, the potential usefulness, and therefore economic value, of the extra reductions was that much greater. To the extent that the volume of extra reductions achieved was directly related to the power plant operators' calculation of the size of their economic value, *then regulatory constraints restricting their value might have diminished the total number of extra reductions achieved.* Consequently, policy makers should use a high level of care when considering restrictions of any kind on banking and trading or on individual sources.

The legislative history of the Clean Air Act Amendments of 1990 shows that Congress discarded provisions requiring the EPA to create geographically distinct "trading zones." Given that Congress believed that the sheer volume of SO₂ reductions was critical to curbing acid deposition, it appears that it also believed that the cumulative reductions mandated would be sufficient to swamp the effects of any geographic pattern of trades. Moreover, the legislative history also suggested that Congress anticipated that in any emissions trading market, economies of scale would encourage high-emitters in the "upwind" regions to control their emissions, rather than buy allowances from elsewhere. The results of Phase I bear this out.

In the case of the Ozone Transport Commission's (OTC) NO_x Emissions Budget Program, the OTC chose to include a feature that limited the use of banked emissions reductions. The OTC cap and trade program is intended to limit NO_x as a precursor of ground level ozone, whose health effects are chronic and not cumulative. The OTC concluded that extra emissions reductions in one year did not fully offset emissions in later years. At the same time, the Commission believed that banking yielded both economic benefits and environmental benefits in the form of early over-control of NO_x emissions. Accordingly, rather than precluding or directly limiting banking per se, the OTC program includes a modest discount on the use of already banked allowances. The discount is applied in certain limited circumstances suggesting that the use of banked allowances would create an unacceptable environmental risk. The EPA's "model rule" of implementing NO_x trading through State Implementation Plans follows a similar approach.

Perhaps the most challenging design problem for banking and trading arises in the context of pollutants that threaten human health and/or raise the issue of environmental justice. Recent studies suggest, for example, that SO₂ emissions and, perhaps, mercury emissions in part directly affect people within short distances of the sources of these emissions and in part are transported long distances to threaten human health and natural resources much farther away. Even leaving aside the issue of cost, if emissions trading and banking systems can help accelerate the achievement of greater levels of emissions reductions, policy makers will have to consider whether and how to use emissions trading in future programs.

If they decide to do so, should they restrict trading by limiting trades to prescribed geographic areas?

Alternatively, programs may be designed to impose certain emissions limitation requirements on a strict source-by-source basis while requiring additional increments of reductions that may be achieved through emissions trading. Without far more scientific investigation and analysis, it may still be impossible to reach the threshold conclusion that some form of trading is permissible. However, there are clearly a variety of ways that trading programs can be limited to ensure environmental justice and public-health protection without compromising their capacity to create incentives for achieving early and extra reductions.

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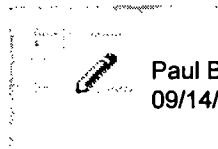
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Paul Bledsoe
09/14/2000 04:36:38 PM

Record Type: Record

To: See the distribution list at the bottom of this message

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Subject: Pew Center:Design of Kyoto Mechanisms Is Critical To Overall Success
Pew Center Report Provides Insights, Recommendations

Press Release
For Immediate Release
September 11, 2000

**Design of Kyoto Mechanisms Is Critical To Overall
Success
Pew Center Report Provides Insights, Recommendations**

Lyon, France — As international negotiators develop rules to implement the Kyoto Protocol, they can lower the costs of meeting their commitments by making sure that certain provisions strike the right balance between economic efficiency, environmental integrity and global equity. Likewise, domestic climate change policies will need to mesh well with the international rules.

Those are the views of the Pew Center on Global Climate Change, which today released a report with recommendations on the Kyoto Mechanisms: International Emissions Trading, Joint Implementation and the Clean Development Mechanism (CDM). The report, entitled Kyoto Mechanisms and Global Climate Change: Coordination Issues and Domestic Policies, examines the institutional and regulatory implications of the Mechanisms and ways to unlock their full potential.

The report was authored by two leading experts on the Kyoto Mechanisms: Erik Haites of Margaree Consultants Inc. in Toronto, and Malik Amin Aslam of ENVORK: Research & Development Organization in Pakistan.

"The Kyoto Mechanisms were designed to lower the costs of achieving emissions reductions," said Eileen Claussen, President of the Pew Center. "However, there are numerous proposals on the table that could severely limit the use of the Mechanisms or even encourage non-compliance with the Kyoto commitments. The report we are releasing today is intended to help the negotiators strike the right balance between environmental integrity, global equity, and economic efficiency."

Making the Mechanisms Work

The Kyoto Protocol sets greenhouse gas emissions limits for 38 developed countries, to be achieved by the 2008-2012 time period. Negotiators meeting in Lyon, France, this week are working on detailed rules for implementing the Protocol, including the three Mechanisms. Governments hope to reach agreement at the Sixth Conference of Parties (COP6) in The Hague in November.

A number of countries have proposed limiting the use of the Mechanisms to achieve environmental or equity objectives, such as those preventing the participation of private companies in emissions trading or those restricting substitution among allowances. In addition, the lack of integration among the Mechanisms may inadvertently restrict or bias their use. The extent to which countries avail themselves of the Mechanisms also depends in part on the domestic policies developed countries adopt to meet their commitments.

To avoid the economic efficiency losses that will result if the Mechanisms are restricted in these ways, the report says decision-makers can, without losing environmental benefits:

- Craft rules that allow substitution among the allowances created by each Mechanism to improve economic efficiency by equating prices across the three Mechanisms;
- Develop rules for International Emissions Trading that allow legal entities — like private companies, or emissions brokers — to participate subject to the approval of their national governments;
- Heed the caution that binding complementarity rules could increase costs, thereby increasing the risks of noncompliance; and
- Allow private entities easy access to the Kyoto Mechanisms through domestic cap-and-trade systems, since other domestic mitigation options will diminish the potential economic benefits.

Further, significant penalties for non-compliance and effective enforcement of those penalties are crucial to the environmental integrity of emissions trading. If these penalties are relatively weak, negotiators should adopt a liability rule that is maximally effective in encouraging compliance with a minimal increase in costs or environmental risk.

This report complements two others previously released by the Pew Center: *International Emissions Trading & Global Climate Change* (1999) and *Market Mechanisms & Global Climate Change* (1998). A complete copy of this report, and information on all previous Pew reports, is available on the Pew Center's web site, www.pewclimate.org.

The Pew Center was established in May 1998 by the Pew Charitable Trusts, one of the United States' largest philanthropies and an influential voice in efforts to improve the quality of the environment. The Pew Center is a nonprofit, non-partisan and

independent organization dedicated to providing credible information, straight answers and innovative solutions in the effort to address global climate change. The Pew Center is led by Eileen Claussen, the former U.S. Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs. The Pew Center includes the Business Environmental Leadership Council, which is composed largely of Fortune 500 corporations all working with the Pew Center to address issues related to climate change. The companies do not contribute financially to the Pew Center -- it is solely supported by contributions from charitable foundations.

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David D. Doniger

Fax:

The EPA is taking steps **NOW** to ensure no disruption in service or environmental protection occurs when our data systems convert to the year 2000. We are preparing for the year 2000 — are you?

The Office of Air & Radiation moved to the Ariel Rios (AR) Building, 1200 Pennsylvania Avenue, N.W., Washington, DC 20004, on September 23, 1999. The main office number is 202-564-7400. Thank you.

DATE: 11/30/99

MESSAGE:

Page 1 of 12 (including cover sheet)

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To: Distribution
From: David Doniger
Re: AEP Presentation On International Emissions Trading
Date: November 30, 1999

Attached is a presentation given by Dale Heydlauf of American Electric Power on compliance issues in international emissions trading, at an EDF/EPRI workshop on the margins of COP5. Please note his support for most elements of the US position on compliance issues, ranging from monitoring at the front-end to binding consequences at the back-end. Note also his points on seller and buyer liability.

To:
Roger Ballentine
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David Gardiner
- Ian Bowles
Joe Aldy David Sandalow
Jeff Miotke
- Dan Bodansky
Sue Biniarz
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- Rick Bradley
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Paul Stolpman

Allocation of Risk

Buyer Liability:

- ▶ Requires Appropriate Due Diligence Based on Accurate Information
- ▶ Could Chill the Market and Depress Unit Values
- ▶ Imposes Higher Transaction Costs
- ▶ Escrow Accounts Could Protect Investors from Losses
- ▶ Insurance Should Also Be Available to Safeguard Investments

Allocation of Risk

Seller Liability:

- ▶ Already Contemplated by Protocol
- ▶ Consistent With Existing Commodity and Allowance Markets
- ▶ Simple To Administer
- ▶ Transaction Costs Minimized
- ▶ Makes Parties Accountable for Non-Compliance
- ▶ Promotes Buyer Confidence and Leads to More Active and Efficient Market
- ▶ Requires Strong National Legal Institutions to Enforce Domestic Compliance
- ▶ Only Works With Strong Penalties for Non-Compliance and Protections Against Treaty Abdication

Viability of Trading System

Parties and Private Sector Must Have Confidence
Trades are Legitimate and Sellers Are Likely To
Abide Their Commitments

► Ensures High Value of Assigned Amount Units

Must Provide Assurance to Buyers that Units Purchased in
the Market Will Not Become Worthless Based on the
Future Compliance Status of Seller

Compliance Enforcement Regime Should Provide for
Dispute Settlement and Legal Recourse for Buyers and
Sellers

Binding Consequences for Non-Compliance Are Essential

Enforcement Mechanisms Must Deter Non-Compliance

- ▶ Strong Domestic Enforcement Laws are Imperative
- ▶ Automatic Reduction of Assigned Amounts in Second Commitment Period to Cover Excess Tons in First Period With an "Interest" Penalty (After Reasonable "True-up Period")
- ▶ Prohibition From Selling Units in Subsequent Compliance Period
- ▶ Fines and/or Trade Sanctions

***WITHOUT STRONG ENFORCEMENT MECHANISMS,
THE ENVIRONMENTAL OBJECTIVES OF THE TREATY
WILL NOT BE REALIZED***

AEP

Consistent Accounting and Public Disclosure

The Compliance Administrator Must Develop a Standard Accounting System for Tracking Assigned Amounts and Transfers Between Trading Participants

- ▶ Simplest Format Would be Serialization of Units (AAUs, ERUs, CERs)
 - ▶ Parties Must Develop Complementary National Programs
 - ▶ Public Reporting of Trades Should be Instantaneous
-

The Administrator Must Disclose Compliance Report to the Public Annually

- ▶ Such Reports Should NOT Include Information on Unit Prices or Contract Terms

Comparable Approaches to National Inventories is Critical

Parties Must Agree on Consistent Methods for:

- ▶ Collecting Data
- ▶ Developing Accurate Emission Factors
- ▶ Accounting for Uncertainties
- ▶ Calculating Emission Estimates and Removal by Sinks

National Inventories and Communications Must be Timely, Complete, Accurate, Uniform and Transparent

- ▶ Failure To Comply Should Lead to Imposition of Penalties

Inventories Should be Reviewed Annually for Each Major Sector and Adjustments Made as Appropriate

Verification Should be Performed by Impartial Entity With Thorough Data Review and Periodic Country Inspections

Information's Key to Compliance Determination

The Foundation of a Compliance System:

- ▶ Comprehensive Measurement/Monitoring
- ▶ Reporting
- ▶ Review/Verification

These Procedures Must Be Simple, Impartial, Consistent and Transparent

Parties and Firms Must Have Confidence in Quality of Inventory Data and Compliance Status Information

Integrity of Protocol Requires Adoption of Binding Procedural Rules Rather Than Discretionary Guidelines

What Is Needed?

- ◆ Binding Procedural Rules for National Inventory Development, Reporting and Verification
- ◆ Uniform International Accounting System With Public Disclosure
- ◆ Binding Consequences for Non-Compliance
- ◆ Appropriate Allocation of Risk

The Essential Elements of an Effective Compliance Enforcement System A Private Sector Perspective

**EDF/EPRI Workshop on International Emissions Trading
Monday, November 1, 1999
Bonn, Germany**

**Dale E. Heydlauff
V.P. - Environmental Affairs
American Electric Power
Columbus, Ohio U.S.A.**



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An Effective Compliance Enforcement System will assure:

1. *Environmental Integrity*
2. *Viability of Kyoto Mechanisms*
3. *Economic Efficiency*
4. *Sustainable Development Assistance*

**EXISTING KYOTO PROTOCOL PROVISIONS
ARE INADEQUATE TO ACHIEVE THESE GOALS**

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By Martha M. Hamilton

Washington Post Staff Writer

Wednesday, January 19, 2000; Page E03

The World Bank launched a new venture yesterday designed to help create a market for buying and selling reductions of emissions that have been blamed for global warming.

Bank officials said four governments and nine companies have committed \$85 million so far to the fund, which will be capped at \$150 million.

The fund, which plans to begin operating in April, essentially is a pilot program that assumes that the Kyoto Protocol on global warming eventually will be ratified. The Kyoto rules would allow companies in developed countries to meet obligations to reduce carbon emissions by buying offsetting reductions in less energy-efficient countries, where cuts can be achieved more cheaply.

The plan would be similar to a system that already exists in the United States that allows companies to trade credits for reducing emissions of pollutants that cause smog or to buy or create new wetlands to offset their destruction elsewhere.

World Bank President James D. Wolfensohn and Ken Newcombe, the manager of the fund, said the international organization's involvement in helping to create market incentives to reduce emissions is consistent with its goal of alleviating poverty because the world's poor often live in the places that are most vulnerable to damage from global warming--low-lying coastal regions and areas where agriculture is marginal and medical treatment is unaffordable.

Newcombe said the fund will finance a portfolio of 15 or 16 projects during a period of about three years, hoping that what it learns will make getting a market for emissions reductions underway easier after the rules are written. "We want people to steal our know-how. It's not stealing--it's a business objective," he said.

He said fund officials believe they can reduce carbon emissions for a cost of \$20 a ton or less, compared with costs of more than \$50 a ton in energy-efficient industrialized nations. One of the projects supported by the fund will reduce the amount of methane gas produced by 27 open dumps in Latvia by creating a regional waste-treatment facility, increasing recycling and capturing methane gas to produce electricity.

The nations that are investing in the fund are Finland, the Netherlands, Norway and Sweden. The private-sector participants include six electric power companies in Japan, the trading companies Mitsubishi Corp. and Mitsui & Co., and the electric utility Electrabel SA of Belgium.

Not surprisingly, most of the interest has come from Japan and Western Europe, where energy costs are higher and the cheapest and easiest steps to reduce energy consumption and their accompanying emissions have already been taken, Newcombe said. Other companies, including Statoil of Norway and Gaz de France SA, have also discussed participating, he said. In the United States, where energy costs are relatively low, there is less interest, he said.

One U.S. firm, Environmental Banc & Exchange LLC, a privately held company headquartered in Baltimore, is also discussing investment in the fund, according to the World Bank. George W. Kelly, managing director of the company--which invests in, manages and trades environmental rights--said it is exploring whether it can put together enough investors at \$500,000 or more to meet the World Bank fund's \$5 million threshold for participation.

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>

Evaluation of EU Trading Constraint Proposal

The European Union has proposed quantitative restrictions on both Annex B buyers and sellers of emissions allowances in international emissions trading, joint implementation, and the Clean Development Mechanism. We analyze the effects of the restriction on Annex B trading and joint implementation. This proposal would significantly increase the costs of compliance without providing any additional climate benefits. For the United States, permit prices would double to quadruple. Moreover, this proposal would create a complicated emissions trading bureaucracy that would likely raise costs further.

Our analysis illustrates three key points:

- The EU claims that so-called “qualitative” language provides significant additional flexibility. This analysis shows that this language does not do this.
- Restrictions on sellers prove more onerous than restrictions on buyers. Even if restrictions on buyers were relaxed, there would be little economic impact on buying countries’ compliance costs.
- If trading rules required sellers to choose between selling “hot air” and “real verified reductions”, costs for all buying countries would remain high.

Below we discuss the following:

I. Description of Trading Constraints¹

II. Annex I Costs with Trading Constraints

III. Transaction Costs with Trading Constraints

IV. No Additional Climate Benefits with Trading Constraints

¹ While we use the term “trading constraint” throughout this paper, we imply a constraint on international emissions trading, joint implementation, and the Clean Development Mechanism.

I. Description of Trading Constraints

Purchase Constraint

The EU proposal provides a formula for net purchases, where the constraint is the higher of:

- 1) 5% of the average of base year emissions and emissions target², or
 - 2) 50% of the difference between highest year's emissions during 1994-2002 period and emissions target.
- Preliminary analysis for the United States indicates that option 1 would allow us to purchase 13% of the reductions necessary to comply with our target. Option 2 would allow us to purchase close to 40%. Some may be concerned that the second option would create the perverse incentive to increase emissions through 2002 or delay early action to increase the level of the ceiling.
 - In addition to the formula, the text provides that the ceiling on purchases can increase subject to an evaluation of domestic abatement efforts. If an expert review team can *verify* total domestic reductions in excess of the purchase ceiling, then the ceiling would be adjusted up to the level of domestic abatement. For the United States the ceiling is "flexible" within a range, but hard at 50%. For some countries, however, the ceiling could be greater than 50%.
 - Evaluating ceilings as a function of emissions reductions is very sensitive to emissions forecasts. The EU's forecasts for its member countries reflect much slower emissions growth than most independent assessments. These forecasts could affect estimates of demand in the international emissions markets, and subsequent permit prices. For example, the EU estimates that its emissions of all 6 greenhouse gases will be 6% above its Kyoto target in 2010 under business as usual, while projections by the Energy Information Administration and the International Energy Agency would imply business as usual carbon dioxide emissions 19 to 26% above the EU target in 2010.

Selling Constraint

The EU proposal provides a constraint on net sales set equal to:

5% of the average of base year emissions and emissions target.

² All constraints are normalized to a common period of time.

- Most economic analyses find that only former Soviet bloc countries will likely be net sellers during the first commitment period (without developing country participation). This constraint would allow the Former Soviet Union to sell only approximately 20% of its so-called hot air. This formula alone would also provide no incentive for domestic abatement.
- However, like the purchase constraint, a country can raise its ceiling up to the level of its *verified* domestic abatement. In this case, if a country wanted to sell allowances in excess of its ceiling as specified by this formula, it would not be able to sell any of its so-called hot air. Every sale would have to be backed by a verified reduction.

II. Annex I Costs with Trading Constraints

Some preliminary analysis of the trading proposals indicates that the costs of all Annex I countries could increase significantly. For the United States, permit prices would double to quadruple, depending on the ability of former Soviet bloc countries to prove and verify actual reductions. Since it is unclear how the trading constraint formulas could apply to as yet unspecified non-Annex I country targets, we have focused these illustrations on Annex I trading only. In addition, given the difficulties in modeling a project-based approach, we have not incorporated the CDM in these analyses. We provide below three scenarios that vary based on the extent that countries can raise their purchase and selling ceilings through “verified emissions reductions.”

- *Scenario 1: Assuming that neither buyers nor sellers can meet the burden of proof established for increasing their ceilings above the formulas provided in the EU proposal, all buying countries see their resource costs increase by 80 to 170%.*

Scenario 1: Annex I Trading, with and without EU Proposal

Country	Permit Price, Unconstrained	Resource Cost, Unconstrained	Permit Price, Constrained	Resource Cost, Constrained
United States	\$51/ton	\$22.7 billion	\$174/ton	\$41.3 billion
Japan	\$51/ton	\$5.1 billion	\$227/ton	\$14.0 billion
Canada	\$51/ton	\$2.7 billion	\$208/ton	\$7.2 billion
EU	\$51/ton	\$11.6 billion	\$174/ton	\$23.9 billion
Australia	\$51/ton	\$0.7 billion	\$154/ton	\$0.8 billion

International Emissions Permit Price with EU Proposal: \$174/ton

In addition to the much higher resource costs for buying countries, selling countries (Former Soviet Union and Eastern European countries) would see their transfers fall by 35 to 55%. The international price for an emissions permit would be so high that Australia would find it economic to become a net seller.

The high international permit price makes it economic for both the United States and the EU to undertake a vast majority of their emissions reductions at home. The United States only purchases 2% of its reductions abroad, while the EU only purchases 10% of its reductions abroad.

- *Scenario 2: Assuming that the buying countries can adjust their purchase ceilings to reflect all their real reductions, but that selling countries cannot meet the burden of proof established for increasing their selling ceilings (the 5% formula on sales is binding), the international permit price would be almost equivalent to the U.S. permit price under no trading.*

Scenario 2: Annex I Trading, with and without EU Proposal

Country	Permit Price, Unconstrained	Resource Cost, Unconstrained	Permit Price, Constrained	Resource Cost, Constrained
United States	\$51/ton	\$22.7 billion	\$178/ton	\$41.3 billion
Japan	\$51/ton	\$5.1 billion	\$178/ton	\$13.8 billion
Canada	\$51/ton	\$2.7 billion	\$178/ton	\$7.2 billion
EU	\$51/ton	\$11.6 billion	\$178/ton	\$24.0 billion
Australia	\$51/ton	\$0.7 billion	\$178/ton	\$0.7 billion

International Emissions Permit Price with EU Proposal: \$178/ton

Note that in this case, the selling constraint is so stringent, that the United States effectively does not participate in international trading (the United States is estimated to purchase 1.5 MMTCE per year, on net, in this scenario).

Like scenario 1, some of Australia's resource costs are offset because the permit price is high enough for it to switch from being a net buyer to a net seller.

Since buyers can increase their buying constraint through "verified emissions reductions", Japan and Canada are not constrained like they were in scenario 1. (In scenario 1, the buying constraint prevented these countries from bidding on lower priced emissions permits, so their domestic permit price was higher than the international emissions permit price.) Their additional demand for international emissions permits increases the

international emissions permit price from \$174/ton in scenario 1 to \$178/ton in this scenario.

- *Scenario 3:* Assuming that the buying countries can adjust their purchase ceilings to reflect all their real reductions, and that selling countries can do so as well, i.e., selling countries cannot sell any hot air and all reductions can be verified, the international permit price would be more than \$100/ton, and more than double the unconstrained price.

Scenario 3: Annex I Trading, with and without EU Proposal

Country	Permit Price, Unconstrained	Resource Cost, Unconstrained	Permit Price, Constrained	Resource Cost, Constrained
United States	\$51/ton	\$22.7 billion	\$106/ton	\$35.7 billion
Japan	\$51/ton	\$5.1 billion	\$152/ton	\$9.9 billion
Canada	\$51/ton	\$2.7 billion	\$137/ton	\$5.1 billion
EU	\$51/ton	\$11.6 billion	\$106/ton	\$19.5 billion
Australia	\$51/ton	\$0.7 billion	\$106/ton	\$1.0 billion

International Emissions Permit Price with EU Proposal: \$106/ton

III. Transaction Costs with Trading Constraints

Difficulty in Identifying Real Reductions

The EU proposal provides an opportunity to revise upward ceilings (to a limit) based on an evaluation of domestic action taken to reduce emissions through an expert review process. While some may argue that this could make the proposed constraints less stringent, our analysis shows that the costs would still be considerably higher than in an unconstrained system. However, it would be very difficult to operationalize such a procedure.

- Evaluating whether a specific reduction, or set of reductions, resulted from direct domestic actions (as opposed to simply an economic downturn), requires knowing the counterfactual. However, business as usual can never be known with certainty, so estimating “domestic effort” with sufficient precision to adjust a trading constraint could be very problematic.
- The process of attempting to identify and verify emissions reductions from domestic activities can be costly, especially for fiscally-constrained countries, like some of the potential Annex I sellers. Some are already concerned that Russia will not have a

sufficient monitoring and inventorying system for trading. Adding another layer of requirements for trading may negatively impact their participation.

- Instead of undertaking real reductions and selling both the real reductions and the so-called hot air as predicted by most economic models, this proposal requires that countries choose between selling hot air and real reductions. Contrary to its stated intent, the EU's proposal could raise the costs of undertaking real reductions enough that Russia and other countries simply sell the fraction of their hot air they are allowed to with the selling formula and then avoid any further actions.

Problems with Devolution to Private Sector

By constraining both the purchase and sale of permits, the EU proposal would complicate the interaction between domestic trading program involving private firms and international emissions markets. Just as importantly, the limit would create an allocation problem domestically, i.e., how to allocate the "right" to import or export emissions permits. If allocated by some method other than open bidding, the process could create a domestic lobby for perpetuating the limit. Firms could view their allocation as an "entitlement."

- There are a number of ways to implement a limit, but the simplest might be for the government to issue "right-to-import" or "right-to-export" certificates up to the limit through a process of open bidding. If, for example, international purchases were recorded at the national trading registry, then the buyer would have to present one right-to-import certificate along with a foreign permit for it to be officially accepted. Similarly, anyone wanting to sell a permit internationally would have to acquire one right-to-export certificate and combine it with one domestic permit in order to export.
- Arbitrage would equate the price of domestic permits to the international price of permits plus the certificate price. The price of the certificates would fluctuate on the market, depending on whether the limit is binding. Their price would be zero -- i.e., the domestic price and foreign price would be the same -- if the constraint were not binding.
- The additional administrative burden of implementing a dual permit program or some other quota allocation system would raise the costs of trading beyond those reflected in the illustrative quantitative assessment presented here.

IV. No Additional Climate Benefits with Trading Constraints

Regardless of where a greenhouse gas emission reduction occurs, it has the same effect on total greenhouse gas emissions and the same effect on the climate.

- In proposing trading constraints, the EU has focused on countries such as Russia, that will have emissions below their Kyoto targets during the commitment period because of the decline in their economic output associated with the transition to market economies. If trading constraints are established that restrict the ability of Russia to sell permits, then emissions during the first commitment period would be lower than in the absence of such constraints.
- However, Russia would simply bank its allowances and use these allowances in a subsequent commitment period when its emissions exceed its target. While a trading constraint might lower emissions during the first commitment period, the cumulative emissions over several commitment periods from Annex I countries would be the same with and without the trading constraint. Given the long residence times of greenhouse gases (on the order of a 100 or more years), the cumulative effect is what is most relevant in terms of changes in the global climate.

EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL OF ECONOMIC ADVISERS

July 16, 1999

TO: Roger Ballentine

FROM: Joe Aldy

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE

SUITE 2320 RAYBURN HOUSE OFFICE BUILDING

WASHINGTON, DC 20515-6301

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TTY: (202) 226-4410

<http://www.house.gov/science/welcome.htm>

cc: JV
JA
AC
RL

Received
GEORGE E. BROWN, Jr., California
Ranking Minority Member
6/14/99

June 3, 1999

The Honorable Janet L. Yellen
Chair, Council of Economic Advisers
Executive Office of the President
Old Executive Office Building
Washington, DC 20502

Dear Dr. Yellen:

I am writing to you about the proposal adopted by the European Union (EU) on May 17, 1999, that apparently attempts to define the term "supplemental to domestic actions" in regards to the mechanisms authorized by Articles 6, 12 and 17 of the Kyoto Protocol. I do so particularly in light of your April 29, 1999 remarks to the House Committee on Small Business where you reiterated that the costs of achieving the U.S. target under the Protocol "would be modest" if the U.S. "can succeed" regarding two conditions, namely "meaningful participation" in the Protocol through legally binding commitments by developing countries and implementation of the Kyoto mechanisms "in an efficient manner." In the case of the Kyoto mechanisms, you said such implementation "is critical to reducing the costs of achieving the targets established in the Kyoto Protocol," although you do not explain what is encompassed by the phrase "in an efficient manner." You also said:

"Assuming that effective mechanisms for international trading, joint implementation, and the Clean Development Mechanism are established, and assuming also that the United States achieves meaningful participation by key developing countries, the Administration's overall assessment is that the economic cost of attaining the targets and timetables specified in the Kyoto Protocol will be modest for the United States in aggregate and for typical households."

The EU, however, in its May 17 pronouncement restates that "the provisions in Articles 6, 12 and 17 of the Protocol require that domestic action should provide the main means of meeting the commitments under Article 3 of the Protocol and that a concrete ceiling on the use of the Kyoto mechanisms should be defined." The EU paper goes on to propose a definition of the "concrete ceiling" as a "basis for further negotiations," and press reports indicate that the EU's proposed "concrete ceiling" is 50 percent. Also on May 17, the State Department expressed disappointment that the EU is "seeking to restrict the use of emission trading" and stressed, as I would expect based on prior comments, that the U.S. will "strongly oppose" such restrictions in "future negotiations," saying that the matter was settled at Kyoto, "as part of the complex set of compromises that formed the Protocol." However, the EU obviously does not agree.

The Honorable Janet L. Yellen
June 3, 1999
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Based on your testimony and the importance you place on unfettered availability of the Kyoto mechanisms as the basis for your economic analysis, I presume that the U.S. negotiators will stand fast through 2000 and beyond. However, I believe it important for Congress and the public to understand how and to what extent the EU definition, if adopted, would limit not only the trading mechanism, but also the project-based Kyoto mechanisms. I therefore request your analysis of the EU proposal and its impact on your claim of only "modest" costs in achieving the U.S. target "in an efficient manner without such a limit."

At the same time, I note that as to the Protocol's Articles 6 and 17 term "supplemental to domestic actions," the State Department said, in response to Senator Hagel's questions of February 11, 1998 (see questions 6.13 (c)(ii)(A)), that it was accepted by the Kyoto negotiators "as long as no specific quantified limits were imposed." In a September 18, 1998 reply to me, the Department said that the Conference of the Parties is "not authorized to further define (or quantify) that term." Assuming that the U.S. position on quantification is sustained, there still remains a lack of a clear explanation of the meaning of the term as it applies to the U.S. In its response to Senator Hagel, the State Department also said: "Our understanding of the Protocol text would be that any domestic action (and a considerable amount would be envisaged, including through the establishment of a domestic emissions trading program, as well as through domestic policies such as those described in the response to question 5.9 above) would satisfy the 'supplemental' requirement." Of course, the domestic emissions trading program does not now exist and it would require legislation if and when the Protocol is ratified. As to the other "domestic policies" in reply to "question 5.9," the State Department said:

"U.S. actions to mitigate climate change have been underway since the Bush Administration first negotiated our commitments under the UN Framework Convention on Climate Change — and are independent of any actions that we might take should the Protocol be ratified and enter into force. Furthermore, these actions make sense by reducing our energy costs, reducing local air pollution, and promoting the development and export of clean energy technology. The Administration intends to continue to take such actions, and expects that Congress will fully endorse such actions pursuant to U.S. undertakings under the Convention ratified in October 1992 after the advice and consent of the Senate.

* * * * *

"The G-8 agreement does not require additional commitments from the U.S. prior to entry into force of the Kyoto Protocol.

"Attached is a copy of (1) the U.S. Climate Change Action Plan, (2) the President's statement to the National Geographic Society from October 1997, and (3) the budget materials for the proposed Climate Change Technology Initiative; collectively, they outline actions currently proposed and anticipated to be taken to reduce emissions. In order for the United States to become a party to the Protocol, the Senate would need to give its advice and consent to ratification, and Congress would need to appropriate funding for, and where necessary, enact legislation to implement our commitments. The Administration would seek to work with Congress in the development of such legislation."

The Honorable Janet L. Yellen

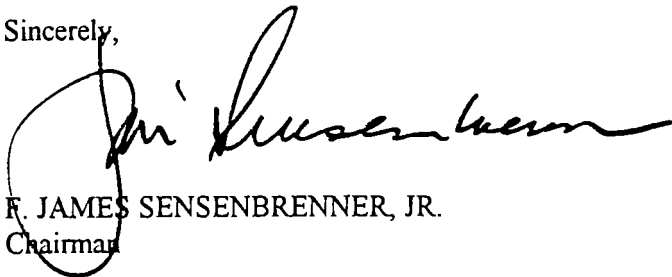
June 3, 1999

Page three

All of that is quite vague and uncertain and, to some extent, properly so because the Protocol has not been submitted to the Senate as yet. Nevertheless, your economic analysis is heavily dependent on unfettered use by the U.S. of the Kyoto mechanisms, while it does not address the issue of whether the U.S. can meet its target, if and when the Protocol is ratified, solely on the basis of the Kyoto mechanisms. It only addresses, as I understand it, the question of "modest" costs. The above reply to questions would suggest that the Kyoto mechanisms are not nearly enough to achieve the target and, of course, if the EU limitation or some form of a "quantified and qualitative" limitation is ultimately accepted by the U.S. at COP-6 or thereafter, the need for domestic policies would be exacerbated. I therefore would like to know to what extent is it expected from your analysis that the U.S. will achieve its target solely on the basis of the Kyoto mechanisms without any limitation on their use and without domestic policies requiring legislation or regulations. Can the U.S. continue to accept the Protocol's Article 3 target and commitment period if there is any limitation, quantified and/or qualitative, on one or all of the Kyoto mechanisms?

I would like your response to these matters within 60 days after receipt of this letter. In responding, please consult with the State Department and such other agencies as you believe necessary for a complete reply.

Sincerely,

A handwritten signature in black ink, appearing to read "F. James Sensenbrenner, Jr.", with a large, stylized initial "F" and "J".

F. JAMES SENSENBRENNER, JR.
Chairman

FJS/hlw

cc: Hon. Frank E. Loy, Under Secretary of State for Global Affairs
Hon. Bill Richardson, Secretary of Energy
Hon. Jay E. Hakes, Administrator, Energy Information Administration
Hon. Carol M. Browner, Administrator, U.S. Environmental Protection Agency

Possible Framework for Early Greenhouse Gas Emissions Trading Agreements with Russia

Purpose of Early Trading Agreement

This paper describes a potential agreement between the U.S. and the Russian Federation on a framework for early international emissions trading under the Kyoto Protocol. The agreement would allow U.S. private sector firms to make early contracts with the Russian government (or legal entities empowered by the Russian government) for purchase of GHG emissions allowances drawn from the Russian emission budget under Kyoto. U.S. firms could use these allowances to substantially reduce the costs of meeting potential GHG reduction obligations. On the seller's side, Russia would agree to dedicate proceeds from these early contracts to (1) early development of the national emissions measurement and reporting system needed for compliance and trading eligibility under Kyoto, and (2) early investment in GHG reducing measures such as energy-saving plant modernizations, as well as in forest carbon sequestration projects — investments that would improve the Russian economy and further reduce GHG emissions.

Since it is not our intention to be exclusive, this agreement could also be open to other potential seller countries (principally the Ukraine) and to the private sector in other potential buyer countries (members of the Umbrella Group and beyond). This framework could lead to early market activity that benefits all participants and helps get international emissions trading "off the ground."

How Would Early Trading Work?

An early trading framework agreement would allow a U.S. private entity (or entity from another buyer nation) to enter into a contractual commitment with the government of the Russian Federation (or another seller nation, such as the Ukraine) for future delivery of GHG emission allowances drawn from the seller country's "assigned amount" under the Kyoto Protocol. The contract would commit the seller government to transfer an agreed-upon number of tradeable allowances (denominated in one-ton units of carbon dioxide equivalent) to the buyer firm; the actual transfer of the allowances would take place at a specified time, probably following the seller country's ratification of the Kyoto Protocol. In exchange, the buyer firm would pay a portion of the purchase price "up front" and the remaining amount upon actual delivery of the allowances.

The framework agreement would also include a specific commitment by the Russian Federation (or other sellers) to dedicate the proceeds of early trading to two purposes: (1) the development of the monitoring and reporting infrastructure that they will need in order to be eligible to trade under the international trading rules being negotiated in follow-up to Kyoto; and (2) investment in concrete modernization and efficiency projects to further reduce their emissions and in projects to increase absorption by forests and other sinks.

As an alternative to paying the proceeds into the dedicated fund, the agreement could also provide for buyer firms to make direct investments in specific modernization or efficiency projects (i.e., "joint implementation" projects) in return for a legal commitment for future delivery of tradeable allowances by the seller government.

The agreement could also include commitments by Russia (or other sellers) to take concrete steps to remove current barriers to direct investments in emission reduction and absorption projects.

Participation by U.S. private entities would be entirely voluntary. The proposal does not involve any transfer of U.S. government funds to the Russian Federation (or other sellers) for purchase of allowances, although limited technical assistance from USAID/EPA/DOE would be expected to continue. This proposal also does not require early implementation of a domestic emissions trading program in either the U.S. or Russia.

The number of firms that would be willing to make such contracts, and the prices they would be willing to pay for contractual promises to deliver allowances in the future, will depend critically on how certain and reliable such promises appear to be. While establishing a favorable investment climate in Russia or other potential seller countries is a much broader task, specific steps towards developing confidence in government sales of GHG allowances could be taken by entering the proposed framework trading agreement. Other confidence-building steps forward specific to GHG emissions trading are suggested below.

Russian government representatives who work on climate change have already indicated great interest in an early trading arrangement and willingness to dedicate the funds from early trading as proposed here. Given their limited authority, however, we would have to pursue this issue at much higher levels of their government. Discussions on this type of arrangement have not yet begun with the Ukraine.

Basic Elements of the Framework Agreement

The U.S. and the Russian Federation would negotiate an inter-governmental agreement, memorandum of understanding, or other appropriate instrument that would commit the two countries to an early trading arrangement on the basis of the principles described above. (Other countries could be included in the same agreement, or there could be a number of parallel bilateral agreements.) The principal elements would provide for:

- Contracts between buyer-side private sector legal entities and seller country governments (or legal entities empowered by their government) for the future delivery of tradeable units, with partial payment up front and full payment on delivery after seller ratification;
- Seller country agreement to dedicate the proceeds of early trading to development of the needed measurement and reporting infrastructure and to investment in specific emissions-

reducing modernization and efficiency projects and forest projects to increase absorption by sinks;

- Buyer country agreement to recognize tradeable allowances purchased by and delivered to its private sector entities as valid for use against domestic obligations if and when Kyoto is ratified.

What Would the Russian Federation (or Other Seller Governments) Need To Do To Advance This Proposal?

The Russian Federation (or other seller country) would need to develop the legal structure and administrative arrangements to enable itself to enter legally binding contracts to deliver tradeable allowances to purchasers at a set point in the future. This would include giving a competent ministry the obligation to carry out such transactions and to set up and maintain a national registry to account for sales of allowances, including those that have been obligated, and actually delivered, to purchasers. In addition, the Russian Federation (or other seller country) would need to establish the legal and administrative framework to dedicate funds received to needed monitoring and reporting enhancements, as well as to emission abatement and absorption projects.

A firm legal basis in these areas would increase certainty for foreign investors and, therefore, increase the value of early tradeable units. This may require issuance of a new Russian Federation government directive and possibly passage of legislation.

What Would the United States Need To Do To Advance This Proposal?

The U.S. government would need (1) to set up a domestic means for tracking early trades and (2) to provide assurances that allowances purchased by U.S. private entities from Russia (or other sellers) will be accepted to meet domestic obligations in the event that the Kyoto Protocol is ratified. In addition, it would be essential to continue providing potential seller countries with limited technical assistance through USAID, EPA, and DOE.

How Would This Arrangement Be Perceived in the United States?

Since the early trading arrangement would be on a purely voluntary basis, much of the U.S. private sector should be supportive. Broad issues of uncertainty about doing business in Russia would discourage investor interest and lead to significant price discounting of tradeable allowances. Low prices may attract investors and entities wishing to hedge against domestic restrictions in the future.

Opponents of Kyoto in the private sector or in Congress may try to classify this activity as premature or "back door" implementation. However, because U.S. private sector participation would be voluntary and without governmental expenditures (beyond limited technical assistance),

such a characterization is unlikely to take hold.

Some U.S. environmentalists would likely view this arrangement as a positive step. A Russian commitment to dedicate the funds to needed monitoring and reporting infrastructure, as well as to concrete emissions-reducing projects, would go a long way to meet their concerns about "hot air trading."

How Would This Arrangement be Perceived by the European Union?

One of the European Union's objections to trading with Russia is concern over "hot air." Russian representatives have already proposed to dedicate the funds from early trading as described above, in part to diffuse the "hot air" issue. As with U.S. environmentalists, a Russian commitment to dedicate the funds to green purposes as described above would go a long way to meet their concerns. Maintaining an open, non-exclusive arrangement would also reduce tensions with the EU.

How Would This Arrangement be Perceived by Russia?

Russian government representatives working on trading have expressed great interest in an early trading arrangement. Their first thought and clear preference is for a U.S. government-funded purchase. It will take some work to familiarize them with the arrangement suggested here, in which the U.S. government role is to facilitate private sector investment. More important, it will take very high-level interaction to gain sufficient attention and commitment from levels of the Russian government who are capable of taking the actions needed on their side to make this arrangement viable.

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Since it is not our intention to be exclusive, this agreement could also be open to other potential seller countries (principally the Ukraine) and to the private sector in other potential buyer countries (members of the Umbrella Group and beyond). This framework could lead to early market activity that benefits all participants and helps get international emissions trading "off the ground."

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Participation by U.S. private entities would be entirely voluntary. The proposal does not involve any transfer of U.S. government funds to the Russian Federation (or other sellers) for purchase of allowances, although limited technical assistance from USAID/EPA/DOE would be expected to continue. This proposal also does not require early implementation of a domestic emissions trading program in either the U.S. or Russia.

The number of firms that would be willing to make such contracts, and the prices they would be willing to pay for contractual promises to deliver allowances in the future, will depend critically on how certain and reliable such promises appear to be. While establishing a favorable investment climate in Russia or other potential seller countries is a much broader task, specific steps towards developing confidence in government sales of GHG allowances could be taken by entering the proposed framework trading agreement. Other confidence-building steps forward specific to GHG emissions trading are suggested below.

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reducing modernization and efficiency projects and forest projects to increase absorption by sinks;

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What Would the Russian Federation (or Other Seller Governments) Need To Do To Advance This Proposal?

The Russian Federation (or other seller country) would need to develop the legal structure and administrative arrangements to enable itself to enter legally binding contracts to deliver tradeable allowances to purchasers at a set point in the future. This would include giving a competent ministry the obligation to carry out such transactions and to set up and maintain a national registry to account for sales of allowances, including those that have been obligated, and actually delivered, to purchasers. In addition, the Russian Federation (or other seller country) would need to establish the legal and administrative framework to dedicate funds received to needed monitoring and reporting enhancements, as well as to emission abatement and absorption projects.

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The U.S. government would need (1) to set up a domestic means for tracking early trades and (2) to provide assurances that allowances purchased by U.S. private entities from Russia (or other sellers) will be accepted to meet domestic obligations in the event that the Kyoto Protocol is ratified. In addition, it would be essential to continue providing potential seller countries with limited technical assistance through USAID, EPA, and DOE.

How Would This Arrangement Be Perceived in the United States?

Since the early trading arrangement would be on a purely voluntary basis, much of the U.S. private sector should be supportive. Broad issues of uncertainty about doing business in Russia would discourage investor interest and lead to significant price discounting of tradeable allowances. Low prices may attract investors and entities wishing to hedge against domestic restrictions in the future.

Opponents of Kyoto in the private sector or in Congress may try to classify this activity as premature or "back door" implementation. However, because U.S. private sector participation would be voluntary and without governmental expenditures (beyond limited technical assistance),

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Some U.S. environmentalists would likely view this arrangement as a positive step. A Russian commitment to dedicate the funds to needed monitoring and reporting infrastructure, as well as to concrete emissions-reducing projects, would go a long way to meet their concerns about "hot air trading."

How Would This Arrangement be Perceived by the European Union?

One of the European Union's objections to trading with Russia is concern over "hot air." Russian representatives have already proposed to dedicate the funds from early trading as described above, in part to diffuse the "hot air" issue. As with U.S. environmentalists, a Russian commitment to dedicate the funds to green purposes as described above would go a long way to meet their concerns. Maintaining an open, non-exclusive arrangement would also reduce tensions with the EU.

How Would This Arrangement be Perceived by Russia?

Russian government representatives working on trading have expressed great interest in an early trading arrangement. Their first thought and clear preference is for a U.S. government-funded purchase. It will take some work to familiarize them with the arrangement suggested here, in which the U.S. government role is to facilitate private sector investment. More important, it will take very high-level interaction to gain sufficient attention and commitment from levels of the Russian government who are capable of taking the actions needed on their side to make this arrangement viable.

EMISSIONS TRADING STRATEGY TOWARDS COP-6: SUMMARY

The U.S. and its Umbrella Group partners have made substantial strides on emissions trading. We still face three kinds of obstacles, however, before our blueprint commands sufficient acceptance to be adopted at COP-6:

- Continued lack of understanding and fear.
- Continued pursuit of restrictions by many countries.
- Collateral linkages to other matters, both related (like CDM) and unrelated (like compensation).

This summary of the attached paper focuses on five areas where the U.S. can take steps to overcome the first two kinds of obstacles (linkage issues fall outside the scope of this paper):

(1) Guidelines for emissions measurement and reporting. To address concern that countries and legal entities participating in emissions trading will not accurately monitor or report their emissions, the U.S. should continue to emphasize the need for strong monitoring and reporting requirements for *all* Annex I Parties, traders and non-traders alike. We should continue our leadership role in efforts in the IPCC, Annex I Experts Group, and other venues, to develop the guidelines required under Articles 5 and 7 for national systems to estimate emissions and for reporting on emissions inventories. This includes the IPCC process for preparing "good practice guidance" to beef up the existing measurement methods; the U.S. is a co-chair of that process and is represented on a task force to coordinate activities relating to the measurement and reporting guidelines. Monitoring and reporting is an area where common interest is already evident among participants from the Umbrella Group, the EU, and the G-77.

(2) Guidelines for national registries. To address concern over how to keep track of trading activity, the U.S. should continue to push proposals for a system of computerized and interlinked "national registries" (based on our acid rain program), which has generally found favor with American and foreign business interests, and which has reduced concerns in the EU and elsewhere about the participation of legal entities.

Our goal for COP-6 is (1) to include a requirement for national registries in the trading rules, and (2) to adopt a guideline containing technical specifications for compatible computer hardware and software for registries. This would enable countries that want to move ahead right away with trading (and CDM and JI) to set up compliant registries immediately thereafter. The next phase of our efforts is focused on showing more concretely how a computerized registry system would work, with presentations at the workshop on mechanisms in Bonn in April and a two-computer demonstration planned for the SBSTA meeting in June.

(3) Compliance and liability. In the context of emissions trading, "compliance" has been used as a shorthand for a range of measurement, reporting, and accountability issues. The U.S. has tried, with increasing success, to bring order and structure to this discussion, by breaking the issues down into three groups:

First, as already described; we have focused attention on the need to elaborate the measurement and reporting requirements of Articles 5 and 7 applicable to *all* Parties with binding

emissions targets, whether they trade or not. Second, in order to bolster the credibility of the trading regime itself and to promote compliance with the Protocol's key accountability requirements, we have proposed to suspend a Party's access to trading if the Party has been determined to be out of compliance with Articles 5 or 7, or with its obligation to maintain a national registry. Third, we need to address procedures should used to determine if a Party is in non-compliance with trading-related requirements, and what consequences should follow. These are a subset of broader issues being discussed in the compliance process set up in Buenos Aires.

The specific issue of "liability" — how to address the risk that a Party may exceed its target in part because it traded away some of its assigned amount that it needed — is difficult to resolve on its own. Our strategy has been not to concede anything, if at all, until the end-game, when other major issues, including supplementarity, are resolved. In the meantime, we should take steps summarized below to address the EU's fear of potential Russian overselling, the primary concern underlying the liability issue.

(4) Reducing pressure for "supplementarity" restrictions. It is a fundamental objective of the U.S. position that the rules for the flexibility mechanisms must not be restricted by elaborating the meaning of the word "supplemental," setting "concrete ceilings," or placing other "quantitative or qualitative" restrictions on trading. The strongest tool we have to resist these restrictions is the knowledge on the EU side that they are incompatible with a strategy to obtain U.S. ratification. The greatest danger is that the EU will be under some equally strong compulsion to stand its ground, potentially leading to a stalemate. Our goal in the meantime should be to find ways to make it easier for the EU to back down on this position.

One avenue is domestic action. We should recognize, however, that more measures on the scale of our current voluntary programs, tax incentives, and budget proposals are unlikely to have the desired impact on international perceptions.

A second avenue is to work with Russia and the other economies in transition (EITs) to take steps that mitigate EU concerns about those countries' participation in trading. We are discussing with the Russian government a possible commitment to dedicate all or part of the proceeds from the first phases of emissions trading to (1) building their emissions monitoring system and (2) making project-level investments in energy efficiency and other emission-reducing or sink-enhancing measures. We also intend to work with Russia to establish its national registry. Getting the appropriate commitments from Russia will take sustained highest-level diplomacy and technical cooperation. If successful, however, these steps might be sufficient, if put forward at the right time, to allow the EU to retreat from its proposed restrictions without losing face.

We should also address potential EU fallback positions. As a "qualitative" measure, a simple reporting requirement on how much use a country made of the flexibility mechanisms might not be objectionable as an end-game outcome. On the other hand, an effort to couch harmonized policies and measures as a "qualitative" response to emissions trading concerns would be completely unacceptable.

(5) Communications and education. A wide array of education and outreach activities on trading is listed in the strategy memo.

EMISSIONS TRADING STRATEGY TOWARDS COP-6

Since the adoption of the Kyoto Protocol in December 1997, the U.S. and its Umbrella Group partners have made substantial strides in showing concretely how the international emissions trading system could work, and in designing a simple set of rules and guidelines under which it could operate. We still face obstacles, however, before our blueprint commands sufficient acceptance to be adopted at COP-6.

The obstacles appear to be of three kinds. The first is continued lack of understanding and fear. Despite our many papers and presentations, too many key players still do not have a clear grasp of how emissions allowance trading works and of the components needed to make a trading system function (e.g., emissions measurement and allowance tracking). Second, many countries are still pursuing restrictions such as ceilings on the amount of emissions allowances that a country may buy or sell. Third, a number of countries are seeking to link decisions on trading to other matters, both related (like CDM) and unrelated (like compensation). This paper focuses on five strategic areas where the U.S. can take steps over the next two years to overcome the first two kinds of obstacles (linkage issues fall mainly outside the scope of this paper):

- Guidelines for emissions measurement and reporting
- Guidelines for national registries
- Compliance and liability
- Reducing pressure for "supplementarity" restrictions
- Communications and education

(1) Guidelines for emissions measurement and reporting

Concern is often expressed that international emissions trading will lack accountability because participating countries and legal entities will not accurately monitor or report their emissions. In responding to this argument, the U.S. has staked out a leadership position on the necessity of strong monitoring and reporting requirements for *all* Parties that are subject to binding emissions budgets, traders and non-traders alike.

As a result, in several decisions last year, the Parties established a process to strengthen the existing monitoring and reporting guidelines adopted under the Framework Convention. In June 1998, SBSTA asked the IPCC to prepare "good practice guidance" to beef up the existing measurement methods. In November, COP-4 asked the Secretariat to develop by COP-6 the guidelines for monitoring and reporting required under Articles 5 and 7 of the Protocol, including guidelines for "national system[s] for the estimation of anthropogenic emissions" (which must be in place in all Annex I countries by 2007), and for "supplemental reporting" on emission inventories.

U.S. technical and policy staff will have a leading role in guiding this effort. This process will require coordination of four bodies with a piece of the action (an IPCC subgroup on

inventories, the Secretariat, the Annex I Experts Group, and a Japanese technical support unit) so as to complete the necessary technical work and ready the needed decisions by COP-6. A "task force" of 8-12 representatives appointed by governments will be the key coordinating group; the U.S. is nominating an EPA monitoring methods expert (Dina Kruger), who also co-chairs the "good practice guidance" process. She is working with a team of technical experts from DOE, EPA, and other agencies, several of whom are directly involved in developing the guidelines for specific industrial sectors. (Where policy issues arise for the U.S., this team will bring them forward for decision through the IWG and Assistant Secretaries process.)

The "good practice guidance" will cover all of the greenhouse gases and all types of emission sources (except sinks, which are subject to a separate IPCC special report). There will be a half-dozen technical workshops on different sectors over the coming year, the first of which was successfully held in Washington in January. The result will be improved IPCC measurement guidelines that include more rigorous data collection and quality assurance procedures, as well as more complete and transparent requirements for reporting.

At some point later this year, this work will move from predominantly technical issues to more policy-laden questions such as the level of rigor that should be deemed "good practice," and the institutional requirements for "national systems" for collecting and managing emissions inventory data. The Annex I Experts Group and the Secretariat will play a greater role here. This effort will also intersect with other ongoing projects, such as revision of the guidelines for Annex I Parties' third national communications. It will culminate in the framing of guidelines for adoption by SBSTA and COP-6. The "task force" mentioned above will have to play a crucial role in keeping things coordinated.

While a large and complex undertaking, this is an area where common interest is already evident among participants from all factions. Experts from the Umbrella Group (including Russia), the EU, and the G-77 have contributed positively in a low-key, non-political manner in initial phase of this work. Thus this area represents an opportunity to bridge differences and come to practical decisions on something approaching a consensus basis. At the same time, building up the monitoring structure will help build confidence that emissions trading can be conducted on a rigorous and accountable basis.

This process should allow us to sort out the suggestion made on occasion by some EU representatives and others that the participation of legal entities in emissions trading requires some special level of monitoring and reporting rules at the international level. Our best approach is to argue that each type of national program needs its own type of monitoring and reporting regime. For example, programs based on policies and measures or taxes may also require certain kinds of entity-level reporting. Given the variety of possible program structures, the best way for the international guidelines to address this subject probably is to set forth principles regarding the "fit" between the type of program a Party chooses and the type of monitoring and reporting it needs. In this way, we can address a legitimate issue without focusing disproportionately on trading programs.

In short, the U.S. seems to be well positioned on monitoring and reporting issues for the coming two years.

(2) Guidelines for national registries

Concern is also expressed over how to keep track of trading activity. The U.S. has begun making substantial progress on this issue with our proposals for a system of computerized and interlinked "national registries" (based on our acid rain program), which has generally found favor with American and foreign business interests and some EU governments. The registry concept is proving successful in giving newcomers a concrete vision of how trading works and in reducing concerns in the EU and elsewhere about the participation of legal entities.

Our goal for COP-6 is to include a requirement for national registries in the trading rules under Article 17 (or possibly the reporting rules under Article 7). We also want to develop and gain acceptance of technical specifications for compatible computer hardware and software for registries, which could be embodied in a technical guideline referenced in the rules. This would enable countries that want to move ahead right away with trading (and CDM and JI) to set up compliant registries immediately thereafter.

Towards that end, the next phase of our efforts is focused on showing more concretely how a computerized registry system would work. For the Annex I Experts Group in March and the Kyoto Mechanisms workshop in April, we plan to present a slide show illustrating such a computer system and simulating the making of international trades by countries and companies. For the June meeting of the subsidiary bodies in Bonn, we plan to have an actual demonstration with two interlinked computers representing the registries of two different Parties. We presented a draft of the registry presentation to the Umbrella Group in Australia and it was very well received.

The presentations and the demonstration will tangibly show how each Party's "assigned amount" under Kyoto would reside in a computer system, with a serial number assigned to each tonne of carbon dioxide equivalent. Each Party's national registry would contain accounts recording which agency or entities have what holdings of that assigned amount. The system would leave each country the flexibility to handle emission trading in the manner it found best: A country could retain all of its assigned amount at the national government level, or to devolve some or all of it into the hands of legal entities. The country could trade countries (or their companies) directly from its national account, or it could allow its own legal entities to engage in such trading. Brokers and other kinds of non-emitting middlemen could also be involved, holding accounts in the country's registry.

Under any variation that a Party chose, international trading would take place by electronically transferring the appropriate serial numbers from an account in one Party's registry to an account in another Party's registry. Registries could also serve to track JI and CDM credits and to make them fungible with emissions allowances. As it does for acid rain, the registry

system could provide for transparency, accountability, and protection against fraud in both domestic and international greenhouse gas trading.

Moving beyond the June meeting in Bonn, our next step would be to begin detailed design and vetting of the computer software needed for registries. Several Umbrella countries are interested in sharing the costs of developing the full-scale computer software.

In summary, we are well positioned for further work on registries.

(3) **Compliance and liability**

Compliance. In the context of emissions trading, "compliance" has been used as a shorthand for a range of measurement, reporting, and accountability issues. The U.S. has tried, with increasing success, to bring order and structure to this discussion. We have broken this bundle of issues down into three groups:

First, as described in part 1 of this paper, we have been able to focus the Parties' attention on the need to elaborate the measurement and reporting requirements of Articles 5 and 7 that are applicable to *all* Parties with binding emissions targets, whether they trade or not; these issues are now getting serious attention.

Second, in order to bolster the credibility of the trading regime itself and to promote compliance with the Protocol's key accountability requirements, we have supported a linkage between trading and those requirements. Specifically, we have proposed to include a provision in the Article 17 rules suspending a Party's access to the trading system if the Party has been determined (after an appropriate procedure, see below) to be out of compliance with Articles 5 or 7, or with its obligation to maintain a national registry.

The EU supports the linkage we have proposed, but with the twist that a Party's compliance with Articles 5 and 7 and the registry obligation must be determined *in advance* before the Party may trade. In other words, we take the view that Parties should be presumed to be in compliance with their accountability requirements and may trade unless they are proved to be out of compliance, the EU takes the view that Parties must prove their compliance before they may trade.

The EU view is unacceptable, because it creates the risk that an Annex I Party's ability to trade could be held hostage by even a single Party opposed to trading or pursuing a collateral agenda (such as compensation). Our differences with the EU on this point are probably best engaged through discussion of the appropriate procedures to resolve non-compliance issues; there is some reason to believe that they have not themselves thought through the "hostage-taking" potential of their own proposal.

The third group of trading-related compliance issues involves the question already mentioned of what procedure should be used to determine if a Party is in non-compliance with trading-related requirements, and what consequences should follow. These are a subset of the broader compliance issues being discussed in the compliance process set up in Buenos Aires. Key questions to be addressed in our upcoming compliance and emissions trading submissions include:

- *What procedure will be used?* Do we want non-compliance issues generally to be addressed by a subgroup of the COP, such as an implementation committee? If so, do we want a single such committee for all types of non-compliance issues, or do we want a special committee to address trading-related compliance issues? In either case, should the committee have the authority to make final determinations, or should it only recommend determinations for action by the COP? (The answers may turn on the balance of seats on the committee(s), and on whether we feel the integrity of the trading regime requires swift decisions.)
- *What consequences can be imposed?* We have suggested that the main consequence for trading-related non-compliance should be suspension of access to trading. This can be accomplished under Article 17, avoiding the "binding consequences" amendment required under Article 18. Further questions include how to ensure that *de minimis* shortcomings (such as truly minor delays in reporting, or minor flaws in monitoring) do not result in suspension from trading. Closely related questions that might have to be addressed under Article 18 include: What consequences should fall on a Party that has exceeded its budget (whether or not because of trading)? Should the Party have to deduct the excess, with a penalty, from its next budget?

Liability. "Liability" in the emissions trading context has been used as shorthand to address the risk that a Party may exceed its target in part because it traded away some of its assigned amount that it actually ended up needing to meet its own target. There appear to be at least three different approaches, proposed sometimes alone or in combination, to dealing with this possibility.

First, this case could be treated the same as any other case of exceeding assigned amount. In short, the problem would be that the Party has exceeded the target, not that it has violated the emissions trading regime. Thus, if the generally-applicable penalty for exceeding the target — whether or not the Party is trading — is to deduct the excess tonnes from the assigned amount for the next commitment period with a penalty, then that would be the sole penalty that would apply to this case. This is referred to as "seller liability" (or "issuer liability").

Second, the transferring Party's excess could be made up by somehow returning some or all of the transferred assigned amount to the transferring Party (e.g., through an across-the-board devaluation of all allowances transferred, or by canceling the sales in reverse order until the shortfall is made up). This is referred to as "buyer liability."

Third, the Parties could build additional safeguards into the trading regime that seek to reduce the likelihood of such a situation's arising. In addition to current reporting and tracking provisions, these could include additional provisions limiting on how much may be transferred each year, or annual requirements to retain and retire enough assigned amount to cover the year's emissions (rather than waiting for such accounting until the fifth year).

The EU favors buyer liability, notwithstanding the fact that seller liability prevails under their Article 4 bubble.¹ To date, the U.S. and other members of the Umbrella Group have favored some variant of seller liability, coupled with some additional safeguards (so-called "seller-plus").

The liability issue is difficult to resolve on its own, because it depends in part on how other compliance issues are resolved. It is also linked (in perhaps a more political than logical way) to EU concerns about the monitoring and tracking issues covered earlier in this paper, and to their "supplementarity" agenda to be discussed below. Consequently, our strategy has been to engage internationally in analyses of various options (including through the Annex I Experts Group), but not to concede anything — if at all — until the end-game, when other major issues, including supplementarity, are resolved.

At the same time, it should be noted that the concern underlying the liability issues is fear of potential Russian overselling. Thus, steps we can take to reduce international anxiety about Russian overselling will be helpful in reducing tension over liability. In this regard, we should continue to work with the Russians to get them to announce responsible steps concerning emissions trading, such as the dedication of proceeds from trading to emissions measurement and to concrete emission reduction projects (see below).

In sum, we are basically on track concerning compliance and liability issues specific to emissions trading, and we have a sound domestic and international process underway to address broader compliance issues.

(4) Reducing pressure for "supplementarity" restrictions

It is a fundamental objective of the U.S. position that the rules for the flexibility mechanisms must not restrict either the fraction of a Party's target that can be met through the mechanisms or the fraction of its assigned amount that a Party may transfer under those mechanisms. Consequently, we have consistently rejected EU proposals to elaborate the

¹ Under the EU reallocation agreement, Germany gives part of its assigned amount to Greece. If the EU exceeds its aggregate target, Germany is individually responsible for meeting its reallocated (smaller) target; it may not look to Greece for a return of the assigned amount it transferred away.

meaning of the word "supplemental," to set "concrete ceilings," or to place other "quantitative or qualitative" restrictions on trading.

In the COP-6 end-game, the strongest tool we have to resist these restrictions is the knowledge on the EU side that they are incompatible with a strategy to obtain U.S. ratification. The greatest danger is that the EU will be under some equally strong compulsion to stand its ground, potentially leading to a stalemate. We know, however, that while several EU countries (especially Germany) feel their position very strongly, most EU countries are not in fact deeply dug in on this issue, and some in fact are quite sympathetic to our view. Our goal, then, should be to find ways to make it easier for the EU to back down on this position. There are several avenues we can pursue toward this end.

One avenue is domestic action. The more we can show we are doing at home, the more we respond to concern that the U.S. merely wants to buy its way out and keep emissions growing. We should recognize, however, that bringing forward more measures on the scale of our current voluntary programs, tax incentives, and budget proposals is unlikely to have the desired impact on international perceptions.

A second avenue is to work with Russia and the other economies in transition (EITs) to take steps that mitigate EU concerns about those countries' participation in trading. EU officials are angry that the assigned amounts negotiated in Kyoto reflect Russia's 1990 emission levels, rather than the lower level that prevails as a result of the country's economic collapse. They believe Russia's surplus will be traded without any further emission reductions ("hot air" trading). They are also concerned that Russia will not monitor its emissions accurately, and fearful that Russia will deliberately oversell its allowances.

Steps we are currently pursuing with Russia have the potential to address these issues and lessen EU anxiety about Russia's participation in trading. Following up initial suggestions by Russian officials, we are discussing with the Russian government a possible commitment to dedicate all or part of the proceeds from the first phases of emissions trading to two purposes: (1) building their emissions monitoring system and (2) making project-level investments in energy efficiency and other emission-reducing or sink-enhancing measures. We also intend to work with Russia to establish its national registry. Similar steps could be taken with the Ukraine and Kazakhstan. It may be worth exploring further measures Russia could take to allay fears of overselling: Could Russia commit to limit its sales in the early or middle years of the budget period to a rate that (considering its emissions) appears consistent with compliance at the end of the period?

Steps of this kind would meet EU (and U.S.) interests in ensuring good measurement and making further cost-effective reductions in Russia and the other EITs, without restricting the number of allowances available to be traded. These steps might be sufficient, if put forward at the right time, to allow the EU to retreat from its proposed restrictions without losing face.

Getting the appropriate commitments and actions from Russia and the other EITs, however, will take sustained high-level diplomacy as well as technical cooperation. In the near-term, communications are needed at the highest levels in order to get the issues and opportunities on the "radar" of Russian officials with enough clout to make something happen.

We must also communicate clearly with the EU on fallbacks they may propose. The EU position speaks of "quantitative and qualitative" limits. Assuming the failure of a quantitative limit, there appear to be two views in the EU on the meaning of the latter term. Last year at least one EU official (from the Netherlands) floated the idea that a qualitative limit could be simply a reporting requirement, e.g., a report on how much use a country made of the flexibility mechanisms, expressed as a percentage of the country's original assigned amount. Since this figure is readily calculated from reports that the U.S. supports, it probably should not be objectionable as an end-game outcome. On the other hand, some EU countries may be tempted to argue for some form of harmonized policies and measures under the guise of establishing "qualitative" limits. If this line of argument arises, the U.S. will need to reject it quickly and firmly.

(5) Communications and education

In addition to the activities already described, U.S. agencies will continue a vigorous program of education on emissions trading and related issues. Bilateral efforts include: *[Note: This listing may be supplemented with additional information from other agencies.]*

- *Russia/Ukraine/Kazakhstan:* EPA is providing technical assistance to Russia focusing on legal, institutional, and investment issues specific to emissions trading in Russia and on emissions trading education. In addition, EPA is assisting in a project aimed at improving Russia's national monitoring system for greenhouse gases and allowing the country to meet the minimum monitoring preconditions for participation in emissions trading. EPA intends to expand both of these types of outreach to other Newly Independent States, specifically Ukraine and Kazakhstan. AID has provided travel money and supported workshops in Russia and Ukraine, and both AID and State may contribute funds to these efforts.
- *Argentina/Chile:* EPA, CEA, DOE, and Treasury are working with the Argentine government on the development of an emissions target. We are supporting efforts by both governments to conduct outreach to domestic stakeholders on the benefits of emissions trading.
- *China:* EPA is working with the Chinese environment agency to design a pilot SO₂ trading program in China. In addition to helping China develop a least-cost approach to address its serious domestic air pollution problem, this effort could be an excellent educational tool to inform the Chinese about the benefits of emissions trading in general, and could help efforts to gain Chinese participation in greenhouse gas reduction efforts.

- *Mexico:* EPA is helping Mexico to develop monitoring and compliance capabilities that will be needed for eventually taking on a target and entering the international emissions trading system. DOE has established a high-level U.S.-Mexico group working on climate change issues, including emissions trading. EPA is also working under the tri-national NAFTA environmental commission to help Mexico consider the use of economic instruments, including trading, to address both conventional pollutants and greenhouse gases.
- *Poland:* EPA has provided educational materials on sulfur dioxide trading to the Polish government and, as a result of contacts between Polish and U.S. officials at COP-4, offered further technical assistance focusing on domestic emissions trading for both conventional and greenhouse pollutants.
- *Emissions Trading Education Initiative:* EPA is funding development of educational materials on emissions trading by the Emissions Marketing Association (an pro-trading industry group) and the Environmental Defense Fund. The project will include a web site and published materials will be aimed at improving both domestic and international understanding of trading.
- *International Visitors Program:* EPA's trading experts regularly meet with foreign visitors to discuss the acid rain SO₂ trading program and the application of emissions trading to climate change. Japan, in particular, has sent many delegations from government, business, and academia. EPA has also established an international residency program to allow foreign officials working on climate change and emissions trading to visit our office for an extended period to gain hands-on experience in operating an emissions trading program. Our first visitor, from New Zealand's Economic Ministry, was here in January-February 1999 (with New Zealand funding). With sufficient funding, we could host visitors from countries with economies in transition and developing countries.
- *Climate Technology Initiative:* CDM and emissions trading were discussed in a joint CTI/industry workshop on technology diffusion in Beijing last year. Additional workshops will take place this year in Zimbabwe and Poland.

Except where indicated, these activities are funded in current budgets. If an expansion of such activities were desired, resource needs would be substantial.