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Introduction

Some would find it a challenge if asked to name an important public policy approach on which President George H.W. Bush, President Bill Clinton and President George W. Bush all shared an identical position. Students of environmental policy, however, would have no trouble. As President, each of these leaders put forward in major presidential addresses, and then pressed ahead with, high-profile environmental proposals that were centered on a cap and trade system.

While cap and trade embodies certain principles that many see as reflecting a distinctively American philosophy, the international community has begun to embrace this approach in its effort to reduce greenhouse gas emissions. Perhaps even more striking is the fact that national and provincial environmental policy-makers in the Peoples Republic of China are in the process of fashioning a regional SO_2 emissions trading program modeled on the U.S. cap and trade approach.

Looming on the horizon in this country are a series of potentially daunting new public health and environmental challenges posed by current levels of air pollution. Despite the evident emissions reduction success of the 1990 SO_2 program, acid rain continues to plague sensitive ecosystems from the Rockies to the East, and visibility-marring haze blights our national parks and monuments. Tens of millions of Americans breathe air made unhealthful by ozone smog and particulate

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matter—and, even in the wake of his rejection of the Kyoto Protocol, President Bush pledged to continue to focus on the issue of climate change, including consideration of more broad-based policies within the next ten years.

As it turns out, electric power plants are a chief source of the range of pollutants and gases directly implicated in all of these problems. In February 2002, when he put forward his Clear Skies Initiative (CSI), President Bush ensured that both power plants and the cap and trade model would be at the center of any future debate about how to address this suite of air pollution challenges.

If that is the case, then it is vital for the policy community to evaluate the U.S. experience so far, with the use of the cap and trade tool to curb power plant pollution.

Fortunately, we are now fifteen years on in what, during the 1990s many referred to as the world's largest public policy "experiment" with market-based regulation. A recent publication went so far as to dub the program a "living legend."[1] Indeed, the program's first fifteen years appear to reveal the following results:

1. The SO_2 program passes the better-faster-cheaper test that long has been the Holy Grail of just about everybody in the environmental policy community.

2. The SO_2 program passes the "keep-it-simple-stupid" test.

3. The SO_2 program passes the right-tool-for-the job test; indeed, it has proven to be the perfect complement—as opposed to replacement—to the fundamental structure of the Clean Air Act, as embodied by Title I of the Act.

4. Cap and trade is a vitally important tool in the toolbox of pollution problem-solving. Even so, the success of any air pollution program, including one based on cap and trade, depends both on setting the emissions reduction targets at levels low enough to solve the environmental problem and on ensuring that the cap and trade tool works in harmony with other vital tools. The virtue of cap and trade is simply that it makes it easier to reach the right pollution reduction levels and to harmonize multiple pollution control programs

1. WINSTON HARRINGTON ET AL., RESOURCES FOR THE FUTURE, CHOOSING ENVIRONMENTAL POLICY: COMPARING INSTRUMENTS AND OUTCOMES IN THE UNITED STATES AND EUROPE (2004).

and strategies.

I. Faster, Cheaper and *Greener:* Performance Results

From 1995 to 1999, or the period known as "Phase I," the acid rain program yielded impressive environmental and economic results. 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.

- While achieving *100% program compliance* during Phase I, power plants reduced SO_2 emissions 22% more than the restricted number of "base allocations" initially allotted to them by Congress, equal to 7.3 million tons of *extra emissions reductions*.

- When factoring all types of emissions allowances included in the program, including those for auction and performance incentives, actual emissions were 30% lower than the amount that was legally allowed, equal to 11.6 million tons of unused allowances.

- The *extra reductions* in emissions were distributed across 22 of the 24 states whose power plants participated in Phase I, and many of the highest-emitting sources—such as those in Ohio, Indiana, Georgia, Pennsylvania, West Virginia, and Missouri—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 SO_2 reductions, as reflected indirectly in the price of traded SO_2 emissions allowances, is far below the cost predicted during the initial debates on the program.

- Despite the rapid fall in SO_2 emissions over the past five

years, both electricity generation and the U.S. 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 SO_2 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.

In 2000, the first year of Phase II, these trends continued for the most part. One significant feature of compliance in 2000 was that some utilities drew from the "bank" of extra Phase I reductions to offset emissions above their nominal target levels. Overall, however, SO_2 emission in the highest-emitting regions continued to fall.

II. Faster, Cheaper and *Greener*: Acid Rain Politics of '89-'90

The notion of using emissions trading as part of the implementation of national SO_2 emissions reductions was formally unveiled in June 1989 in a speech by President George H.W. Bush, when he introduced 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.

The 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 SO_2 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 SO_2 program stipulate an annual reduction of *10 million tons*.[2] President

2. Tom Wicker, *Who'll Stop the Rain?*, N.Y. TIMES, June 16, 1989, at A27.

Bush's insight was that the country could afford a greater level of environmental protection, given that the use of emissions trading would yield the lowest compliance costs possible. The shift from an 8 million ton annual reduction target to a 10 million ton target was especially important. The 10 million ton target was much closer to the reduction level first suggested by the National Academy of Sciences as that required to curb acid deposition. 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 SO_2 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 SO_2 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.

III. The Clear Skies Initiative: What Happened to Faster, Cheaper, Greener?

Against this historical background, some of the criticism of President Bush's Clear Skies Initiative may seem more understandable. The CSI proposal seems to be structured in a way that will allow power plants to take full advantage of the cost-savings opportunities afforded by an emissions trading market. In contrast with the first Bush administration's decision to share some of the cost-savings dividend with the environment in the form of an additional 2 million tons of reductions, the current administration's ultimate reduction goals fall noticeably short—and late—of delivering on the promise of attaining the health-based standards for ozone smog and fine particles. Where, the public is asking, is the environmental and public health dividend that should be yielded by the expected cost-savings?

This question is more than rhetorical, as the "environmental dividend" is likely to mean the difference between success in attaining the national ambient air quality standards (NAAQS) for ozone and fine

particles and failure. As in the case of the 10-million ton target for acid rain, the level and timing of reductions required under any national cap and trade program for power plant SO_2 and NO_x emissions will have a *direct bearing* on the capacity of metropolitan areas across the country to attain the health-based standard for ozone and fine particles. To be sure, by itself a national cap and trade program for power plant SO_2 and NO_x reductions will not ensure attainment of the fine particle and ozone NAAQS in every area. At the same time, unless such a program achieves the full measure of cost effective reductions from this sector, the prospects of attaining the NAAQS will be extremely remote in many high-population communities.

Press reports, which uncovered leaked Environmental Protection Agency (EPA) analyses during 2002 and 2003, consistently indicated that EPA's internal analyses pointed to the necessity of achieving SO_2 and NO_x reduction levels and timetables beyond those included in the CSI if the NAAQS are going to be attained as required under current law. It became widely believed that the EPA analyses demonstrated that an SO_2 emissions cap in the 2.0-2.25 million ton range and a NO_x cap in the 1.25 million ton range were essential both in addressing acid rain and in attaining the fine particle and ozone NAAQS. In addition, current law appears to impose a deadline for attaining the fine particle and ozone NAAQS in the 2009-10 time period.

These targets and this timetable contrast unfavorably with those in the President's CSI. In addition, the historical precedent—set by the President's father—of yoking the cost-savings of emissions trading with an environmentally relevant reduction target presents yet another unfavorable contrast as well. The power of cap and trade programs inheres in their ability to link synergistically—through emissions trading markets—cost-savings and superior environmental performance. That synergistic link cannot be achieved unless such programs are based on emissions reduction targets that are truly capable of addressing the needs of public health and environmental protection. It would seem that EPA's analytic focus on a 2.0-2.5 million ton SO_2 cap and a 1.25 million ton NO_x cap points to the target levels needed for a successful multi-pollutant cap and trade program.

IV. Keeping It Simple: A New Regulatory Paradigm

The SO_2 program is first and foremost an emissions reduction program. What set the program apart from other Clean Air Act programs is that the reduction was implemented as an annual SO_2 emissions budget—literally a "cap" on total SO_2 emissions from power plants—at levels substantially lower than those of the 1980s. This approach was

unprecedented, as existing air pollution regulation at the time relied on specific technical or operational requirements on sources, usually resulting in a restriction on the *rate* of emissions discharge, not on *total* discharges. Although such requirements were based on projections of actual emissions reductions, fixed levels of total reductions were never explicitly 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 SO_2 program, however, the Environmental Protection Agency distributes to each power plant a fixed number of emissions "allowances," each of which gives the owner the authorization to emit one ton of SO_2 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." Because the number of emissions allowances the EPA distributes every year is fixed, then, by definition, an allowance remaining in excess of a plant's emissions represents an "extra" reduction that may be transferred to another plant to cover its incremental emissions. No matter how many or how few allowances are transferred total emissions *always* remain at or below the cap. 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.

Phase I of the acid rain program mandated participation by the largest emitters of SO_2—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. By 1999, the budget gradually decreased to roughly 7 million tons as a result of the phase-out of provisions designed to promote certain control options and investments.

Phase II, which began in January 2000, imposed more stringent emissions limits on the units participating in Phase I. In addition, Phase II also established caps on SO_2 emissions for virtually every other power plant in the continental United States[3] as well as all new utility units, thus

3. Phase II incorporates any power plant with an output capacity greater than

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.

In 1989, the rhetoric surrounding SO_2 emissions trading emphasized "market mechanisms," "economic incentives," and "cost-savings." Less apparent, but equally significant, is that in the process of establishing the SO_2 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.

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

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twenty-five megawatts.

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. As a result, 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. Although the characteristics of sources varied, requirements tended to be uniform and thus many sources were subject to expenses that could have been avoided in more flexible systems. Simultaneously, sources that could have adopted more effective or innovative control technologies 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 SO_2 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 SO_2 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 SO_2 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 a 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 benefits.

Today, the EPA proudly embraces the very coup that, at least as far as SO_2 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.

V. Keeping it Simple: One Key to Economic Success

Critical to the character and success (and not just the mechanics) 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 SO_2 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 bank the surplus 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 both the incentive and the means to find the lowest-cost ways of achieving compliance anywhere within the entire electricity system 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. By including emissions trading in the full suite of compliance options open to power plants, the program enhances the ability of the interlocking emissions and electricity markets to find the most efficient responses. The SO_2 emissions trading market has been effective in reducing costs because it has fostered implicit or "latent" emissions trading as well as active trading. Put another way, emissions trading places all compliance options in direct competition with each other. Of course, any program that permits flexibility in compliance choices does this. Because of emissions trading, however, that competition is geometrically expanded in the SO_2 program. Different compliance options compete with each other at many different facilities. Because emissions trading allows a facility operator to choose to apply a compliance option at its own site or, in effect, at any other affected facility that can make surplus emissions allowances or reductions available, the facility operator's range of choices are much

broader, the competition among them much more intense, and the capacity of that competition to lower costs much, much greater.

As a result, the different compliance alternatives have been forced to compete with one another even more vigorously. The expected result has occurred: compliance costs have been driven steadily downward.

By fundamentally transferring the decision of *how* to comply to power plant operators, the SO_2 program created a regulatory environment in which the government in effect delivered the environmental and economic results promised by, in effect, "getting out of the way" of the market. To be sure, the program did not "get out of the way" of power plant emissions. On the contrary, the mandate to cut emissions is backed by the stiffest and closest-to-automatic penalties in almost all of public law. The program "got out of the way", however, of the underlying fuel and electricity market as it responded to the electricity industry's very real emissions reduction mandates.

In practice, this has meant that power plant operators could capitalize on long-term economic trends in the fuel market in order to maximize cost-savings. Analysts in both the government and academia have observed, for example, that beginning in the 1980s, modernizing changes in mining operations and inter-regional rail transport, have made coal from the Powder River Basin an increasingly economical option for power plants throughout parts of the Midwest and East. Earlier proposals to curb acid rain would have imposed operational requirements that likely would have stymied these coal market trends. The flexibility inherent in establishing only an actual emissions target as sources' sole legal requirement meant that these trends have continued to develop as the fuel and electricity markets, not as legislators or regulators, have dictated.

VI. The Right Tool for the Job

Congress chose to focus the design of the SO_2 program on total *cumulative* emissions reductions and on *unrestricted* emissions trading and banking because of the atmospheric characteristics of SO_2 emissions. In the atmosphere SO_2 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 SO_2 and sulfate (a chemical derived from SO_2), as well as other pollutants involved in the formation of acid deposition.

Congress believed that existing scientific understanding supported the conclusion that general wind patterns prevailing over the eastern half of the United States capture the large amount of SO_2 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 SO_2 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 SO_2 emissions constraints. In fact, banking could play a critical role in the formation of the overall SO_2 emissions trading market. Equally important, the opportunity to bank extra allowances could yield more and earlier reductions than Congress otherwise could mandate.

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 SO_2 emissions in the Midwest and parts of the South would allow those regions and their sources to tap economies of scale in making SO_2 reductions. 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 extra 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 SO_2 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, the cap and trade program for SO_2 emissions has provided immediate and significant reductions in those 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 SO_2 from sources whose emissions had local effects on public health. In fact, in the legislation establishing the SO_2 cap and trade program, Congress explicitly barred sources subject to SO_2 emissions limits under the local health-effects program from using SO_2 emissions allowances to meet their local limitations. As a result, plants subject to SO_2 emissions limits imposed for purposes of protecting local air quality cannot exceed these limits no matter how many SO_2 allowances they hold.[4]

4. The legislation establishing the SO_2 program explicitly preserved the existing Clean Air Act authorities of Congress and the EPA to impose additional restrictions on SO_2. In addition to calls for Congress to require further reductions in annual SO_2 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 SO_2 emissions cap and/or additional source-specific reduction requirements.

VII. The Right Tool for Other Jobs?

Although history lessons may be interesting, the most pressing questions often involve looking forward. As Congress looks ahead to the imperatives created by the new health-based standards for groundlevel ozone smog and fine particles, by the persistence of acid rain in many areas of the country, by the continued problem of haze in pristine areas and national parks and by the mounting evidence of unwanted human-induced climate change, it will need to decide whether and how to use the cap and trade tool. The President's Clear Skies Initiative and multi-pollutant power plant legislation long pending in the Senate ensure that cap and trade will be at the center of any legislative consideration of new air pollution reduction mandates.

Cap and trade is a powerful and versatile tool. Congress should make every effort to design new legislation to reduce SO_2, oxides of nitrogen (NO_x) and carbon dioxide (CO_2) emissions from power plants using the cap and trade model. The President and both his predecessors were right to feature cap and trade in their respective environmental policy initiatives.

At the same time, however powerful cap and trade may be, it can only be used constructively if it is embedded in carefully and precisely designed clean air programs and strategies. This issue has already become quite acute in the current debate, as many, including senior administration officials, have suggested that a national cap and trade program for power plant emissions can replace existing authorities under Title I of the Clean Air Act.

If Congress pursues the Clear Skies Initiative or any multi-pollutant power plant cap and trade program it will need to confront this issue seriously. I would like to suggest a construct for thinking about this question.

First, as already noted, the acid rain program was established as a complete complement to, not as a replacement for, existing Clean Air Act and state air pollution authorities. This complete separation of the SO_2 program from Title I is illustrative. As a precursor of acid rain, SO_2 emissions are a threat to the extent that they are projected into the atmosphere in great quantities and transported over long distances by prevailing winds. As vehicles for exposing human lungs to particulate matter, SO_2 emissions are largely of concern because of their impact within the confines of local airsheds—hence Congress' decision in 1990 to address SO_2 emissions simultaneously in two separate programs. Again, the Clean Air Act makes clear that Title I authorities take precedence over the SO_2 acid rain program.

In the context of multi-pollutant power plant legislation, SO_2 and

NO_x emissions again would be regulated as precursors of acid rain. They also would be regulated as precursors of groundlevel ozone and fine particles. It is in this respect that these pollutants should be subject *both* to new cap and trade requirements *and* to existing Title I authorities. This is because even in the context of the attainment of the national ambient air quality standards for ozone and fine particles, power plant SO_2 and NO_x contribute to nonattainment *both* as pollutants transported in quantity from an aggregation of remote sources *and* as pollutants injected into local airsheds by local or nearby upwind sources, including power plants in both instances.

A cap and trade program can *guarantee aggregate* reductions in power plant SO_2 and NO_x emissions, *but the reductions are guaranteed only for that portion of the local emissions inventory comprising the contributions of long-distance transport.* Consequently, reductions in SO_2 and NO_x in the local airshed will occur only in proportion to the amount of airshed SO_2 and NO_x attributable to reductions in long-range transport. To the extent that airshed SO_2 and NO_x continue to be generated by local power plants or nearby upwind power plants, additional reductions at those sources may be needed to attain the NAAQS. By itself a cap and trade program cannot ensure that *all* cost-effective and/or necessary reductions from local, or critical nearby upwind, sources will be achieved. Only programs and authorities currently constituted under Title I can ensure those.

Thus, in some nonattainment areas, residual local emissions from power plants may prove to be critical contributors to nonattainment. In that case, the retention of Title I applicability to those emissions will prove to be vital to attaining the NAAQS. If, however, those authorities are removed or effectively disabled as the political price exacted for multi-pollutant cap and trade legislation, then the entire exercise will have proven to be self-defeating for the people living in those areas forced to face continued exposure to unhealthful air.

VIII. Something Missing: Carbon Dioxide (CO_2)

In his February 14, 2002 speech presenting his Clear Skies Initiative and climate strategy, President Bush said:

> If, however, by 2012 our progress is not sufficient and sound science justifies further action, the United States will respond with additional measures that may include broad-based market programs as well as additional incentives and voluntary measures designed to accelerate technology development and deployment.

Although the President's intent was just the opposite, this statement would seem to reinforce the logic underlying the adoption of multi-

pollutant power plant legislation that included CO_2, as well as the three conventional pollutants. The President seems to have set up a high-stakes wager.

In the coming decade and a half, the power sector will be facing either legislated reductions of SO_2, NO_x and mercury emissions *or* reduction requirements driven under current law by the MACT[5] standard for mercury and by the demands of attaining the NAAQS for ozone and fine particles. This means that virtually every electricity sector company will be making substantial long-term capital investments involving fuel and technology choices. The logic of a multi-pollutant approach, legislated by Congress and implemented by a cap and trade system, is that companies will be able to bring a higher degree of economic efficiency, environmental efficacy and overall rationality to those investment and operation decisions if they are acting, with certainty, under a comprehensive emissions regime.

This logic applies in its fullest sense only if that regime encompasses all four—not just three—of the pollutants or classes of emissions likely to be subject to new reduction requirements at some point during the current investment horizon. To ask companies to make investments with certain knowledge of what their liabilities are for SO_2, NO_x and mercury and with only speculation as to their potential CO_2 obligations, is to make each company place a bet on what the future of climate-related emissions control regulation will be. If they bet wrong, and after having made substantial SO_2, NO_x and mercury compliance investments, are called on again to make separate investments in limiting their CO_2 emissions, their overall costs are likely to be much higher than if multi-pollutant legislation is truly comprehensive and covers CO_2.

The President's own explicit reference to potential climate policy changes in the next ten years is a tip off as to how acute this uncertainty is. After all, even discounting for the most compelling arguments that critics offer against both the Kyoto Protocol and the *bona fides* of those nations moving to ratify it, a great many members of the international community—including the world's leading scientists, national policy-makers and the executives of some of the largest multinational energy and chemical companies—have already concluded that the *current* state of the science justifies limiting greenhouse gas emissions now. In this light, the potentially high-cost bet that power companies will be forced to make either under current law or under three-pollutant cap and trade legislation—which is that they will not be facing CO_2 emissions obligations in the next 15-20 years—seems almost rigged against them. In contrast, incorporating a CO_2 emissions limitation requirement

5. Maximum Achievable Control Technology.

implemented through a fully flexible cap-and-trade model that allowed offsets from other sectors, including agriculture and land use, offers electric companies a far more cost effective path forward—instead of a dangerous, rigged wager. Little wonder, then, that at least one major coal-burning utility acting by itself and a separate coalition of utilities have come forward to support four- rather than three-pollutant legislation.