Testimony Summary:
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Office of Air and Radiation, U.S. Environmental Protection Agency
before the House Energy and Commerce Committee
Subcommittee on Energy and Air Quality
March 29, 2007

EPA has almost 20 years of experience designing, operating, and assessing cap and trade programs, most notably, the Acid Rain Program and more recently, the NOx Budget Trading Program. EPA promulgated two more cap and trade rules in 2005: the Clean Air Interstate Rule and the Clean Air Mercury Rule that will further reduce emissions of SO_2, NO_x, and mercury by up to 70 percent.

Cap and trade is a market-base mechanism that:

- Sets a mandatory cap, or aggregate emissions limit, on a category of sources
- Distributes allowances to those sources equal to the cap
- Requires covered sources to monitor and report all emissions
- Requires covered sources to surrender allowances equal to their emissions
- Allows trading (purchasing or selling) and banking of allowances.

Key principles of cap and trade programs essential to success: Government should focus on the emission reductions goal; keep it simple so it's easily understood; provide certainty; be transparent; and hold itself and industry accountable.

In addition to an emissions-reducing cap and unrestricted trading and banking, key elements of a successful program include:

- Monitoring—accurate measurement and reporting of all emissions from all sources, with complete transparency of data, provides the foundation for ensuring the emission reduction goal and the credibility of the allowance market.
- Allowance distribution—how government distributes allowances (free or by auction) is an important economic and political design decision but does not affect the environmental outcome or the overall costs. It does affect who ultimately pays for the program.
- Implementing legislation—good legislation underpinned the Acid Rain Program's success. There were few legal challenges and none delayed implementation.

The results of the Acid Rain Program and the NOx Budget Program have been impressive and clearly demonstrate that market-based cap and trade programs are an effective means of achieving broad improvements in air quality by reducing regional and national emissions:

- Compliance with the programs has been greater than 99 percent every year.
- Since 1990, national SO2 emissions from power plants are down over 40 percent, acid rain is down over 30 percent, and summertime NOx emissions from power plants and industrial boilers are down over 70 percent.
- The greatest SO_2 emission reductions were achieved in the highest SO_2-emitting states, and trading did not cause "hotspots."
- Human health and environmental benefits were delivered early and broadly.
- Compliance flexibility and allowance trading reduced compliance costs for the Acid Rain Program by more than two-thirds from initial EPA and industry estimates.

Bottom line: a well-designed cap and trade program can be a cost-effective, flexible, and efficient environmental policy instrument for industry and government.

TESTIMONY OF
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U.S. ENVIRONMENTAL PROTECTION AGENCY

BEFORE THE
COMMITTEE ON ENERGY AND COMMERCE
SUBCOMMITTEE ON ENERGY AND AIR QUALITY
UNITED STATES HOUSE OF REPRESENTATIVES

March 29, 2007

I. Introduction

Mr. Chairman and members of the Subcommittee, thank you for the opportunity to testify today on the Environmental Protection Agency's (EPA or Agency) experience designing and implementing cap and trade programs, and the key features that have contributed to their success. My name is Brian McLean and I am the Director of the Office of Atmospheric Programs within EPA's Office of Air and Radiation. EPA is proud of our use of market-based tools, particularly cap and trade programs, to deliver sustained emission reductions, cut compliance costs, and promote technological innovation. I welcome the opportunity to discuss these important programs with the Subcommittee.

The Acid Rain Program, our first experience with cap and trade, which has now measured twelve years of implementation and results, is widely accepted as one of the most effective air pollution programs ever adopted. Much of my testimony focuses on our experience and lessons-learned from this program.

II. What Is Cap and Trade?

Traditional environmental regulation in the U.S. is sometimes referred to as "command and control." This regime may reduce emissions significantly, typically by relying on a technology- or rate-based method with periodic inspections and limited emissions monitoring.

In many situations, command and control has been very effective; however, it provides limited flexibility for sources to experiment with less-costly alternatives and control strategies and little incentive to control beyond the levels required in the rules. Command and control establishes what needs to be done and usually prescribes how and when each source is to do it. Limiting the flexibility of firms in how and when they meet the standard proved expensive.

Several decades ago, EPA began experimenting with emissions trading programs to provide flexibility to regulated sources. The first programs were project-based, and included "bubbles," "offsets," and credit trading within a rate-based regulatory framework. In general, sources could earn credit for actions that reduced emissions more than was required by the applicable permit in order for other sources to use those credits to emit more than their applicable permit. The decision to generate these credits was voluntary; however, credits needed to be certified, normally by the appropriate regulatory agency, before they could be used. These programs were built on the command and control regulatory structure. While they provided some flexibility in how a source could comply, i.e., by getting reductions from another source, credits generated required government approval to determine whether they, in fact, represented "real" emission reductions, and this approval could be time-consuming, costly, and uncertain.

Emissions cap and trading is an alternative to traditional regulation and credit trading, not simply a trading feature added to existing regulation. A cap and trade program sets a mandatory cap, or maximum limit, on the aggregate emissions of all affected sources to achieve broad, regional reductions. The government distributes emission allowances (either freely or by sale) that total no more than the cap. Allowances may be traded (purchased and sold) creating a market for allowances and establishing a price. Individual source control requirements are not specified, but each source must surrender allowances for compliance equal to its actual emissions.

The cap ensures achievement of the emission reduction goal while also providing flexibility to sources and predictability for the allowance trading market. Cap and trade works best on a regional or larger scale to address emissions from multiple sources that exhibit a range of control costs.

Some of the demonstrated benefits of cap and trade programs are: certainty that a specific emissions level is achieved and maintained; regulatory certainty for affected sources; compliance flexibility as sources may choose from many alternatives for reducing emissions (including installing pollution control equipment, switching fuel, or buying allowances if that appears to be less costly than abating); and lower permitting and transaction costs. To date, these programs have required fewer administrative resources by both industry and government, allowing government to focus on setting environmental goals and assuring results, rather than on reviewing and approving individual compliance actions. Cap and trade programs can also be designed to work with local air pollution control efforts. It does not have to be an either-or situation. Finally, by placing an economic value on reducing emissions, cap and trade rewards innovation and early reductions, and can make further environmental improvements economically feasible.

Critical features of a cap and trade program are the cap, accurate and complete measurement of emissions, and clear consequences for noncompliance. Markets also tend to function better when the rules are simple and easily understood by all participants. The cap puts a ceiling on emissions and provides environmental certainty that aggregate emissions do not rise as new sources come online or existing sources are used more. The cap is ensured by requirements for accurate emissions monitoring and reporting using verifiable measurement. Complete and consistent emission measurement and reporting by all sources provide the basis

for ensuring that (1) an individual source's emissions are no higher than the allowances held, and (2) aggregate emissions do not exceed the cap. Decision makers at affected sources understand compliance expectations, because cap and trade programs include clear consequences for noncompliance from day one. Furthermore, allowing sources to save or bank unused allowances for use in future years provides an incentive for sources to decrease emissions below allowable levels earlier than required, resulting in earlier human health and environmental benefits.

III. What Is Title IV?

The EPA has almost twenty years of experience designing, implementing, and assessing the results of cap and trade programs, most notably, the Acid Rain Program and more recently, the NO_x Budget Trading Program.

The Acid Rain Program was established under Title IV of the 1990 Clean Air Act Amendments to decrease acid rain and improve public health by dramatically reducing emissions of sulfur dioxide (SO_2) and oxides of nitrogen (NO_x). For SO_2, Title IV uses the cap and trade approach to achieve reductions, setting a cap on the total amount of SO_2 that may be emitted by electric power plants in the 48 contiguous states. The cap is set at 8.95 million tons, or about one half of the 17.4 million tons of SO_2 emitted in 1980, and the trading component provides sources with the flexibility to select their methods of compliance. For NO_x, Title IV sets NO_x emission limitations for coal-fired power plants using a rate-based regulatory program to achieve a two million ton reduction from levels projected for the year 2000. Because the NO_x component of the program is rate-based, however, emissions may increase as power generation increases.

Regional cap and trade mechanisms, such as Title IV, the NOx SIP Call, and the Clean Air Interstate Rule (CAIR), do not replace the requirement to meet the National Ambient Air Quality Standards (NAAQS) at the local level, but rather help achieve those standards through

significant reductions in the pollution that is often transported across state boundaries. Thus, state and local governments, along with EPA, continue to have the obligation and the authority under the Clean Air Act to assure that the NAAQS are met everywhere. This means that state and local governments may impose additional source-specific emission limits, as warranted.

IV. Results of Title IV

Overall, the results of the Acid Rain Program have been dramatic — and unprecedented. Compliance has been greater than 99 percent every year. Now, with over a decade of implementation experience, we know that the greatest SO_2 emission reductions were achieved in the highest SO_2-emitting states; acid deposition dramatically decreased over large areas of the eastern United States in the areas where reductions were most critically needed; trading did not cause geographic shifting of emissions or increases in localized pollution; and the human health and environmental benefits were delivered early and broadly. Compliance flexibility and allowance trading (and banking) have reduced compliance costs by more than two-thirds from initial EPA and industry estimates.

Studies revealed that the flexibility of the program allowed companies to take advantage of numerous cost-saving opportunities as multiple methods for reducing SO_2 emissions competed with one another.[1] For example, competition among railroads shipping low-sulfur coal led to significant reductions in transport costs, a major component of coal cost; flexibility in the operation of flue gas desulfurization equipment ("scrubbers") coupled with design and equipment advances significantly reduced the cost of scrubbing; and medium-sulfur coal became marketable in the absence of an arbitrary sulfur content for "compliance coal" that existed under the traditional regulatory program. Also, the ability of sources to bank allowances earned from

[1] Ellerman, A. Denny, Joskow, P.L., Schmalensee, R., Bailey, E., and Montero, J-P., "Markets for Clean Air the U.S. Acid Rain Program," Cambridge University Press, 2000.

extra control actions allowed them to reduce future expenditures as requirements grew more stringent. Finally, the allowance market, in addition to providing a compliance option for sources, provided a benchmark price against which companies could better evaluate compliance alternatives. By embracing markets, allowing flexibility, and requiring accountability, the Acid Rain Program has been a great success with only minimal impacts on electricity prices.

In April 2000, Resources for the Future had this to say about the Acid Rain Program: "The flexibility of the trading program has encouraged utilities to capitalize on advantageous trends, such as changing fuel prices and technological innovation that might have been delayed or discouraged by traditional regulatory approaches."[2]

Flexibility under the Acid Rain Program has not adversely affected attainment of national air quality standards. Independent analyses of the program by Resources for the Future,[3] Environmental Defense,[4] and the Environmental Law Institute[5] demonstrate that trading has not created "hotspots," or increases in localized pollution. In fact, the greatest SO_2 emission reductions were achieved in the highest SO_2-emitting states, acid deposition decreased, and, consistent with projections, the environmental benefits were delivered in the areas where they were most critically needed.

Perhaps the most important lesson from implementing the 1990 Clean Air Act Amendments is how powerful a tool cap and trade programs can be for protecting public health and the environment. When the acid rain legislation was under development, the proposal for a cap and trade approach was new, untested, and viewed with skepticism. Many questioned

[2] Carlson, Curtis, Burtraw, Dallas, et. al., "Sulfur Dioxide Control by Electric Utilities: What are the Gains from Trade?" In *Journal of Political Economy*. 2000, vol.108, no.6, pp. 1292-1326.
[3] Ibid.
[4] "From Obstacle to Opportunity: how acid rain emissions trading is delivering cleaner air." *Environmental Defense*, 2000.
[5] Swift, B. "Allowance trading and potential hotspots: good news from the Acid Rain Program." *Environmental Law Institute Environment Reporter* 31: 954-959, 2000.

whether it would deliver the promised environmental protection, whether the trading system would operate as advertised, and whether costs would be reasonable. Today, it is clear that the answer to all these questions is a resounding "yes."

The emission reductions from the acid rain cap and trade program translate to impressive environmental results. As of 2006, emission reductions from power plants were about 8 million tons, or 46 percent below 1980 levels. Because of the incentive to over-control in the early years of the program, cumulative reductions of SO_2 since 1995 have exceeded statutory requirements by over 7 million tons. Due to the drop in SO_2 emissions, the acidity of deposition in the eastern United States has been reduced by about 30 percent. As a result, some sensitive lakes and streams in New England are showing signs of recovery. Furthermore, ambient sulfate concentrations have been reduced by over 27 percent, leading to improved air quality and public health, and to improved visibility, particularly in areas where some of our most scenic vistas are found, such as the Shenandoah National Park.

[View Figure 1: National SO_2 and NO_x Emissions from Power Plants]

[View Figure 2a and 2b: Acidic Deposition (Wet Sulfate)]

These emission reductions and environmental results have been achieved at a much lower cost than anyone expected. When the Clean Air Act was being amended in 1990, EPA projected the full cost of implementation of the SO_2 portion of the Acid Rain Program would be about $6.9 billion per year (in 2006 dollars). In 2005, a study in the *Journal of Environmental Management*[6] estimated annual costs of the Acid Rain Program in 2010 will be $3.5 billion (in 2006 dollars) with the SO_2 program accounting for about $2.3 billion. The estimated value of the program's annual benefits in the year 2010 now totals nearly $142 billion — more than a

[6] Chestnut, L.G., Mills, D.M. A fresh look at the benefits and costs of the U.S. acid rain program. Journal of Environmental Management. Vol. 77, Issue 3, pp. 252-256, November 2005.

40:1 ratio of benefits to costs. These benefits result mostly from the prevention of health-related impacts, such as premature deaths, illnesses, and workdays missed due to illness, but also include ecosystem improvements and improved visibility in parks and other recreational areas.

These substantial benefits are being achieved by the work of a surprisingly small number of government employees. Because of the simplicity of the program and clarity of its requirements, and because it does not require the review and approval of credit creation, offsets, or trades, we were able to take full advantage of advances in information technology and operate the program with fewer than fifty EPA employees.[7] Most of them are responsible for certifying and auditing monitoring equipment and data. The rest handle allowance transfers where over 98 percent of the transactions are done online by the market participants. Since 1994, we have recorded over 44,000 transfers involving over 225 million allowances, and we could easily handle a thousand times that volume of activity. The ability to monitor emissions easily and accurately has been a key factor in minimizing government involvement and has kept transaction costs low.

V. Applying Cap and Trade to the Ozone Nonattainment Problem

In the mid 1990s, as the SO_2 cap and trade program began showing success, the question was posed as to whether the approach could be applied to the regional ozone problem in the eastern United States. The ozone problem differed from the acid rain problem in several respects. First, whereas acid rain was primarily caused by transported pollution (mostly SO_2), ozone was caused by both transported pollution and local pollution, and by both NO_x and VOCs (volatile organic compounds). Second, whereas acid rain was primarily attributable to power plants, ozone was attributable to a wide range of sources with power plants contributing only about 25 percent of the NO_x emissions and virtually none of the VOCs. Third, whereas acid rain was a

[7] Covering Acid Rain Program in EPA headquarters and regions.

problem of total environmental loadings over a period of years, ozone was a summertime problem with peak concentrations of concern measured in hours. We thought that cap and trade could work for this problem, or more appropriately, could make an important contribution to addressing it.

In 1998, EPA issued a regulation calling on states in the eastern United States to revise their State Implementation Plans to reduce summer season NO_x emissions that contributed to ozone nonattainment in other states. This was referred to as the NO_x SIP Call, and its goal was to reduce summertime NO_x emissions from a diverse set of sources including mobile sources, power generators, and large industrial boilers and turbines. It did not mandate source-specific emission limits; rather, it required states to meet emission budgets, and gave states flexibility to develop control strategies to meet those budgets. One control strategy was an EPA-implemented cap and trade program for large power generators and large industrial sources. All nineteen affected states and the District of Columbia chose to adopt trading rules implementing the cap and trade program, called the NO_x Budget Trading Program. One notable difference between the Acid Rain Program and NO_x Budget Trading Program is that the NO_x program allowed states to include other source categories in the trading program, such as large industrial sources (industrial boilers), cement kilns, and/or process heaters. However, states had to include all sources in a category to ensure that emissions were not shifted to non-covered sources. In addition, the sources were required to accurately monitor and report all of their emissions. The NO_x Budget Trading Program comprises power generators, industrial sources, and three cement kilns in New York State.

[View Figure 3: NO_x Budget Program Emissions]

As of 2006, summer season NO_x emissions under the NO_x Budget Trading Program were reduced by more than 1.3 million tons, or 73 percent, below 1990 levels. The program has also reduced emissions on peak emission days even though there is only a seasonal cap. Most importantly, it is lowering average ozone levels in the NO_x Budget Trading Program region. Based on 2003 to 2005 air monitoring data, the program was the major factor in ozone air quality improvement in all 103 areas designated nonattainment in 2004 in the eastern United States.[8] In fact, nearly 70 percent of these areas at the end of 2005 had air quality that is better than the level of the standard.

VI. Capturing the Cost Savings for Greater Environmental Protection

In 2005, EPA extended the benefits achieved through the Acid Rain and NO_x Budget Trading Programs by promulgating the Clean Air Interstate Rule (CAIR). When implemented, CAIR will use the cap and trade mechanism to reduce emissions of SO_2 in the eastern United States by an additional 73 percent from 2003 levels and, for the first time, set an annual cap for NO_x in the eastern United States. The first cap for NO_x is in 2009 and the first cap for SO_2 is in 2010. In 2015, both caps are lowered. Together, the Acid Rain Program and CAIR are estimated to provide annual quantifiable benefits of close to $350 billion (2006 dollars) by 2020,[9] at an annual cost comparable to the original 1990 estimate for the Acid Rain Program alone. EPA believes that this demonstrates how more efficient approaches can lead to greater environmental protection.

The cap and trade mechanism was also applied to another rule EPA finalized in 2005, the Clean Air Mercury Rule. Mercury comes from many sources and has local, regional, and global

[8] *NOx Budget Trading Program 2005 Program Compliance and Environmental Results*, EPA-430-R-06-013, September 2006, http://www.epa.gov/airmarkets/progress/docs/2005-NBP-Compliance-Report.pdf.
[9] *Acid Rain Program 2005 Progress Report*, EPA-430-R-06-015, October 2005, http://www.epa.gov/airmarkets/progress/arp05.html.

components. The Clean Air Mercury Rule, when fully implemented, will reduce mercury emissions from United States coal-fired power plants by about 70 percent. It offers states the flexibility to adopt a cap and trade program as a compliance option. Several states are moving to adopt the cap and trade approach. The rule takes effect in 2010.

VII. Why Have These Cap and Trade Programs Worked?/Lessons Learned

In addition to these programs, EPA has consulted with several states as well as representatives of over 50 countries on the design and implementation of cap and trade systems. From these experiences we have identified several principles and program elements that are critical to the success of cap and trade programs.

Key principles:

- Keep your eye on the prize — above all, government should focus on achieving the emissions reduction goal cost-effectively; not on reviewing individual compliance decisions or trying to manage the market.
- Keep it simple — the program and its rules and obligations should be easily understood by all participants.
- Be transparent — all emissions and allowance data should be easily accessible to build public and market confidence.
- Be accountable — sources and governments should regularly measure and report results, including environmental outcomes, programmatic assessments, and compliance.
- Provide certainty — emission reduction requirements (and the allowance distribution mechanism) should be established for as far into the future as reasonably possible, and consequences for noncompliance should be clear and predictable.

Key program elements:

- Full sector coverage — all significant sources (existing and new) of a particular industry or sector should be included to minimize "leakage," i.e., the shifting of production and emissions to uncovered sources.
- The cap — the aggregate cap on an entire sector's or region's emissions, defined through government issuance of a fixed quantity of allowances, establishes the emission reduction goal and provides predictability for the allowance market.
- Monitoring — accurate measurement and reporting of all emissions from all sources, as well as complete transparency of allowance and emission data, provides the basis for ensuring the emission reduction goal and underpins the credibility of the allowance market.
- Trading — unrestricted trading and banking (with source-specific limits, where necessary to protect local air quality) allows companies to choose (and change) compliance options and minimize compliance costs. Banking also encourages early reductions and provides liquidity, a cushion for price volatility and a safety mechanism for unforeseen market events.
- Allowance distribution — the particular method for distributing allowances is generally not critical to the environmental success or total cost of the program. However, it is critical to the distribution of economic impacts, and therefore, is an important design feature. We have learned much since the 1990 Clean Air Act Amendments, and our thinking on allowance distribution continues to evolve with help from the experiences and analyses of many, both inside and outside of government.

In 1990, when we were developing the first cap and trade program, we gave limited consideration to the economic value of allowances. In fact, the allocations were primarily a result of setting emission limits and then allowing one ton increments of those permitted emission levels to be tradable.

To set these emission limits for the Acid Rain Program, we used the historic level of activity of a facility (measured as heat input in million British thermal units (mmBtu)) and multiplied it by an emission rate (measured in pounds (lbs) of sulfur dioxide per mmBtu) to obtain a mass emissions limit in tons of SO_2. Most plants were given an emissions limit based on a rate of 1.2 lbs/mmBtu, with cleaner plants having their limit based on a rate that was slightly higher than their actual rate. This ensured that the plants with the highest historic emission rates would be encouraged to reduce the most, while plants that had already reduced emissions would need to do less (or nothing). Using the formulas provided in the law, we found that the total allocations exceeded the statutory cap by about 10 percent, so, as directed by the law, we ratcheted them down pro rata to match the program cap.

New units were given no allocation and were required to purchase allowances for compliance either in the marketplace or directly from the government in the annual auction. Non-emitting units were also not given an allocation; but, of course, they had no need to purchase allowances. There were special set-asides of allowances for encouraging early installation of scrubbers, for undertaking energy conservation and renewable energy projects, and for holding the annual auction. Since the government had never created an asset quite like this before, and some thought the program might not even work, we did not compare the aggregate value of the allowances created to the aggregate cost of the program.

For the Acid Rain Program, Congress chose an SO_2 program cap that was about half of what the power plant sector was emitting in 1980. This meant that the allowances we were allocating for free equaled about half of the electric utility sector's emissions. The Clean Air Interstate Rule will reduce SO_2 emissions by an additional 73 percent (from 2003 levels in the CAIR region), which means that allowances will then cover less than 20 percent of 1980 power plant emissions. During the rulemaking process, our analysis demonstrated that we were not significantly increasing consumer electricity prices, hurting our electricity-driven economy, substantially changing the fuel mix, or causing significant closures of electric capacity. The aggregate value of the CAIR SO_2 and NO_x allowances in 2015 is similar to the direct compliance costs of the rule. Therefore, due to the level of control and the nature of the industry involved, the program's allocation of free allowances is roughly in balance with the direct compliance costs to the regulated industry.

The allocation for the NO_x Budget Trading Program was similar to the Acid Rain Program, but states could utilize varying methodologies in apportioning allocations to sources. States were provided a model trading rule they could adopt but had the flexibility to devise their own allocation approaches. States typically made allocations three to five years in advance for the seasonal NO_x program, although, like the Acid Rain Program, they could allocate in perpetuity. Most states included a set-aside account carved out of the state's allowance budget to provide allowances for the addition of new sources or as incentives for renewable energy and energy efficiency projects.

Let me make one final comment about Title IV. The legislation did many things right: there were few legal challenges to the rules EPA had to issue and none delayed implementation of the cap and trade program. I believe litigation was limited under Title IV for two reasons.

First, in most cases the legislative language was clear. In fact, the Phase I allocations were printed in the law, so there was no question about them. What little litigation did occur all revolved around interpretations of those statutory provisions that were overly complex or unclear. Second, the law made it clear that if the rules were delayed, every source would have to meet a source-specific emission limit and there would be no trading. There would be a real cost to delaying the environmental improvement promised by the legislation.

VIII. Conclusion

EPA has almost 20 years of experience designing, operating, and assessing cap and trade programs, most notably, the Acid Rain Program and more recently, the NOx Budget Trading Program. This experience clearly demonstrates that market-based cap and trade programs are an effective means of achieving broad improvements in air quality by reducing emissions of regionally transported air pollutants.

For other air pollution problems, command and control (or direct regulation) may be the best course. For example, where a specific facility can be identified as the source of a public health problem, limiting its emissions may be the simplest and most effective solution. However, specificity of requirements may also inhibit innovation, in which case economic instruments such as cap and trade may be preferred to encourage more efficient solutions. If properly designed, economic incentives can harness market forces to work toward environmental improvement. By internalizing pollution control costs, they can make pollution reduction in the interest of the firm and promote innovation. An emissions cap simply requires that sources consider the emission implications of their business decisions; and, if they plan to increase production (and emissions), they must either reduce their emission rate commensurately or purchase allowances from other sources sufficient to offset their increased emissions. This

internalization of environmental consequences can most likely be achieved at lower cost to sources than iterative (and less predictable) command and control requirements intended to achieve the same effects.

The Acid Rain Program and the NO_x Budget Trading Program have reduced SO_2 and NO_x emissions faster and at far lower costs than anticipated, yielding wide-ranging health and environmental improvements. The results of these programs show that a combination of emission-reducing mandatory caps, a viable allowance trading market, rigorous emission monitoring and reporting protocols, and clear consequences for noncompliance ensure success.[10] We have learned through our experience that, for certain regional or larger scale air pollution problems, a well-designed cap and trade program is cost-effective, flexible, and easy to implement with clear benefits that can be sustained into the future.

[10] For more information on EPA's market-based programs, see www.epa.gov/airmarkets.