
The Difficulty of Fencing in Interstate Emissions: EPA's Clean Air Interstate Rule Fails to Make Good Neighbors

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*Airborne pollutants from electricity generation, such as sulfur dioxide and nitrogen oxides, may travel long distances from their sources and routinely cross state boundaries. It is difficult for individual states to control the harmful health and environmental effects of these emissions, and often they are unable to meet ozone and particulate matter national ambient air quality standards mandated by the Clean Air Act. The U.S. Environmental Protection Agency (EPA) attempted to resolve this interstate pollution problem by promulgating the Clean Air Interstate Rule, which established a cap-and-trade system for sulfur dioxide and nitrogen oxides emissions originating in many eastern states. However, the District of Columbia Court of Appeals, in its recent decision *North Carolina v. EPA*, found the rule inconsistent with the Clean Air Act and surprised all interested parties by vacating the rule.*

In this Note, I first discuss the regulatory history behind CAIR, including previous sulfur dioxide and nitrogen oxides emissions reductions programs established by Congress, EPA, and a group of northeastern states, respectively. I then explain the relevant aspects of CAIR and summarize why the D.C. Circuit invalidated it. Next, I explore the theory of using market-based approaches—such as cap-and-trade systems—as compared to traditional command-and-control approaches to achieve emissions reductions, focusing on the context of sulfur dioxide and nitrogen oxides emissions. Finally, I recommend design features for the future revision of EPA's rule.

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INTRODUCTION

Our modern society demands massive amounts of electricity every day. Notwithstanding recent innovations in generating electricity from relatively clean resources such as wind, solar energy, water motion, and geothermal activity deep underground, we continue to generate most of our electricity from the combustion of fossil fuels such as coal, natural gas, and oil. This combustion releases a host of pollutants into the air. The airborne pollutants may travel long distances from their sources before they dissipate or are absorbed by the environment, if at all.

Because these airborne pollutants travel across state boundaries, it is difficult for individual states to control the harmful health and environmental effects of the emissions from fossil fuel-fired electricity generators. Congress began to address these interstate concerns with the Air Pollution Control Act of 1955, and in 1970 transformed this legislative effort into the modern Clean Air

Act (CAA or the Act).¹ Congress delegated responsibility for major sections of the CAA, including Title I, which regulates specified criteria pollutants, to the U.S. Environmental Protection Agency (EPA).²

In 2005, EPA promulgated the Clean Air Interstate Rule (CAIR) to control the interstate effects of sulfur dioxide (SO₂) and nitrogen oxide (NO_x) emissions from fossil fuel-fired electricity generators.³ These pollutants jeopardize human health and cause significant environmental problems such as the formation of ozone and smog.⁴ Because the wind carries these pollutants far from their sources, their harmful effects often occur in distant areas. In order to achieve the desired emissions reductions in a cost-effective and flexible manner, CAIR established a cap-and-trade system in which the states could elect to participate.⁵ In response to challenges, however, the D.C. Circuit in 2008 found that CAIR did not comport with the requirements of the CAA and thus vacated the rule.⁶

The D.C. Circuit's ruling has left a worrisome regulatory gap: downwind states are still enduring the human health and environmental impacts from the upwind pollution, and industry, faced with regulatory uncertainty, is unable to effectively plan for the future. Nevertheless, the gap provides regulators and legislators with an opportunity for reassessment. In this Note, I reaffirm that a properly structured cap-and-trade, market-based approach is the most desirable way to control this interstate pollution, and I suggest design features for such a cap-and-trade system that align with the D.C. Circuit's interpretation of the CAA.

I first discuss the regulatory history behind CAIR, including previous SO₂ and NO_x emissions reductions programs established by Congress, EPA, and a group of northeastern states, respectively. I then explain the relevant aspects of CAIR and summarize why the D.C. Circuit invalidated it. Next, I explore the theory of using market-based approaches—such as cap-and-trade systems—as compared to traditional command-and-control approaches to achieve emissions

1. James E. McCarthy, *Clean Air Act: A Summary of the Act and its Major Requirements*, in CLEAN AIR ACT: INTERPRETATION AND ANALYSIS 1–3 (James P. Lipton ed., 2006).

2. *See, e.g.*, 42 U.S.C. §§ 7401–7431 (2006).

3. Rule To Reduce Interstate Transport of Fine Particulate Matter and Ozone (Clean Air Interstate Rule), 70 Fed. Reg. 25,162, 25,162 (May 12, 2005).

4. *Id.* Ozone inhalation can cause or aggravate respiratory problems and can weaken immune systems. *See, e.g.*, OFFICE OF AIR & RADIATION, EPA, FACT SHEET: HEALTH AND ENVIRONMENTAL EFFECTS OF GROUND-LEVEL OZONE (1997), available at <http://www.epa.gov/ttn/oarpg/naaqsfm/o3health.html>. Furthermore, ozone can harm plants' food production and storage capabilities, leading to reduced crop yields in the short-term and to impaired ecosystems in the long-term. *Id.* NO_x emissions also have direct environmental effects such as killing large numbers of fish and contributing to the proliferation of destructive algae blooms. *See id.*

5. 70 Fed. Reg. at 25,162.

6. *North Carolina v. EPA*, 550 F.3d 1176 (D.C. Cir. 2008). The court later agreed to rescind the vacatur and instead remand the rule to EPA. The agency is in the process of redeveloping the rule. *See infra* note 118 and accompanying text.

reductions, focusing on the context of SO₂ and NO_x emissions. Finally, I recommend design features for the future revision of EPA's rule.

I. BACKGROUND

A. *The Clean Air Act and Ambient Air Quality Control*

Congress enacted the CAA primarily “to protect and enhance the quality of the Nation’s air resources so as to promote the public health and welfare and the productive capacity of its population.”⁷ Title I of the Act establishes a general approach of cooperation between the federal government, namely the EPA, and state and local governments.⁸ The Act applies this concept of cooperative federalism in one of its most significant regulatory mechanisms: national ambient air quality standards (NAAQS).

The EPA Administrator is responsible for identifying, and periodically updating, a list of “criteria pollutants”—substances which contribute to ambient air pollution that “may be reasonably anticipated to endanger public health or welfare.”⁹ To date, EPA has identified six criteria pollutants: SO₂, particulate matter, carbon monoxide, ozone, NO_x, and lead.¹⁰ For each of these pollutants, EPA must set a primary NAAQS that is sufficient to “protect the public health” within “an adequate margin of safety,” and may set a secondary NAAQS in order “to protect the public welfare.”¹¹ EPA expresses these standards as a minimum permissible amount of the pollutant in a volume of air, averaging measurements over a specified period.¹²

Once EPA has set a NAAQS for a pollutant, the states are responsible for the “implementation, maintenance, and enforcement” of the standard.¹³ The Act requires each state to develop a state implementation plan (SIP).¹⁴ A SIP both extensively analyzes the current air quality within the state, including individual source emissions, and models possible scenarios for NAAQS attainment based on the analysis.¹⁵ The states have broad discretion in

7. 42 U.S.C. § 7401(b)(1) (2006).

8. *Id.* § 7402.

9. *Id.* § 7408(a)(1), (f)(1)(A). The statute further requires that “the presence of [the criteria pollutants] in the ambient air results from numerous or diverse mobile or stationary sources.” *Id.* § 7408(a)(1)(B).

10. *See* EPA National Primary and Secondary Ambient Air Quality Standards, 40 C.F.R. § 50.4–50.15 (2008).

11. 42 U.S.C. § 7409(b).

12. *See* 40 C.F.R. § 50.3. For example, the primary NAAQS for SO₂ is 0.030 parts per millions (ppm) over the course of a year and 0.14 ppm each day. *Id.* § 50.4(a),(b). While the NAAQS are codified in the Code of Federal Regulations, EPA publishes a convenient summary of the standards on its website: National Ambient Air Quality Standards, <http://www.epa.gov/air/criteria.html>.

13. 42 U.S.C. § 7410(a)(1).

14. *Id.* § 7410(a).

15. *See id.* § 7410(a)(2)(B), (F), (K).

developing their SIPs to decide how to meet the NAAQS, what pollution control techniques to use, and how to regulate and enforce controls on both public and private sources of pollution emissions.¹⁶ One example of this discretion is that a state may establish geographical air quality control regions within its borders.¹⁷ Under such a regime, the state is responsible for meeting the NAAQS in each air quality control region separately. This regulatory structure is significant because the statutory response mechanisms to nonattainment apply only to the failing regions within the state.¹⁸ A state has an obvious interest in delineating control regions such that areas of the state that are predicted to be in compliance with the NAAQS are not burdened by the required response mechanisms of nonattainment. After completing its SIP, a state submits it to EPA for approval. If a state does not submit a viable SIP for a NAAQS, EPA eventually drafts and issues a federal implementation plan instead.¹⁹

An important aspect of the CAA's regime for controlling criteria air pollution is its effort to address interstate air pollution. First, because air pollution may, and often does, travel from one state to the next, the Act empowers EPA, with the advice of affected states, to designate interstate air quality control regions.²⁰ The Act also designates an interstate region for ozone in the Atlantic Seaboard.²¹ For each interstate air quality control region, EPA assists the covered states in developing regional "strategies for mitigating the interstate pollution."²² Second, the Act provides that SIPs include notification requirements to other states about existing or proposed sources that would significantly affect air pollution outside the state.²³ Third, the Act includes the "Good Neighbor Provision,"²⁴ which mandates that each SIP ensure the prevention of "any . . . type of emissions activity" that "contribute[s] significantly to nonattainment in, or interfere[s] with maintenance by, any other State with respect to any [NAAQS]."²⁵ The Good Neighbor Provision is significant because it authorizes EPA to mandate specific state action to address interstate air pollution.

16. *See id.* § 7410(a)(2)(A), (C), (D), (L).

17. *Id.* § 7407(a).

18. *See id.* §§ 7410(a)(1), 7407(d), 7501(2); 7502.

19. *Id.* § 7410(c)(1).

20. *See id.* § 7407.

21. *Id.* §§ 7407(c), 7506a(a), 7511c(a).

22. *Id.* § 7506a(b)(2); *see also id.* §§ 7406, 7511c(b)(2)(c)(1).

23. *Id.* § 7426(a).

24. The provision is section 7410(a)(2)(D). For examples of applying the term to the statutory section, see *Michigan v. EPA*, 213 F.3d 663, 671 (D.C. Cir. 2000) and *Approval and Promulgation of State Implementation Plans*, EPA, 73 Fed. Reg. 26,059 (May 8, 2008) (to be codified at 40 C.F.R. pt. 52).

25. 42 U.S.C. § 7410(a)(2)(D).

B. *Previous Regulatory Efforts to Reduce SO₂ and NO_x Emissions for Ozone Control*

1. *Congressional Acid Rain Program*

Congress amended the CAA in 1990, creating Title IV, known as the Acid Rain Program (ARP), in order to control acid rain.²⁶ Congress found that acid rain was a threat to public health and to the environment, and that anthropogenic emissions of SO₂ and NO_x were the primary causes of acid rain.²⁷ To address the harmful effects of acid rain, the ARP drastically reduced permissible emissions of SO₂ and NO_x from power plants.²⁸

The ARP established a market-based cap-and-trade regime for implementing the SO₂ emissions reductions.²⁹ In theory, this approach provides the desired health and environmental benefits at the least cost by allowing plant operators, the market actors, to make their compliance decisions with minimum governmental control.³⁰ Title IV of the Act mandates a maximum tonnage limit of annual SO₂ emissions for the plants (a “cap”) and directs EPA to allocate allowances, equivalent to one ton of emissions per year, among the plants.³¹ The Act then allows the plants to transfer (or “trade”) the allowances.³² Thus, each plant decides whether it is most advantageous to use its allowances to emit SO₂, to buy allowances to emit more SO₂, or to sell allowances and reduce its emissions by investing in control technology or by other means.³³ Since there is a maximum aggregate cap on SO₂ emissions, a new plant must purchase existing allowances if its operations will emit SO₂.³⁴ The ARP’s cap-and-trade system for SO₂ emissions generally is viewed as successful both by the government and environmental groups in terms of reducing the harmful effects

26. Clean Air Act Amendments of 1990, Pub. L. No. 101-549, 104 Stat. 2399 (adding 42 U.S.C. §§ 7651–7651o).

27. 42 U.S.C. § 7651(a).

28. *See id.* § 7651(b).

29. *See generally id.* § 7651b(a), (b), (d), (f), (g).

30. *See, e.g.,* Jody Freeman & Charles D. Kolstad, *Prescriptive Environmental Regulations versus Market-Based Incentives*, in *MOVING TO MARKETS IN ENVIRONMENTAL REGULATION* 3, 5 (Jody Freeman & Charles D. Kolstad eds., 2007).

31. 42 U.S.C. § 7651b(a).

32. *Id.* § 7651b(b). The trading is primarily among the plants to whom the allowances were allocated; however, operators of new plants and other entities may buy, sell, and hold allowances. *See* EPA Acid Rain Program General Provisions 40 C.F.R. § 72.2 (2008); EPA Sulfur Dioxide Allowance System, 40 C.F.R. § 73.2 (2008). For example, some environmental groups purchase allowances in order to retire them and reduce the total tonnage of SO₂ emissions. *See, e.g.,* Acid Rain Retirement Fund, <http://www.usm.maine.edu/~pos/arrf.htm> (last visited Mar. 24, 2009).

33. An allowance holder may also opt to retain the allowance for use in future years instead of covering emissions in the present year. 42 U.S.C. § 7651b(b). This practice is called “banking.” *See* 40 C.F.R. § 73.36 (2008).

34. *See* 40 U.S.C. § 7651b(e).

of acid rain and also by the power-generation industry in terms of reducing the economic costs of regulatory compliance.³⁵

Congress enacted a more traditional regulatory approach for achieving the NO_x emissions reductions under the ARP, whereby EPA sets NO_x emissions limitations on the regulated facilities—coal-fired electric utility boilers.³⁶ These limits are expressed in weight per unit of heat input (pounds per million British thermal unit); thus, the numerical cap is on the boilers' rate of emissions rather than on the actual amount of emissions produced.³⁷ Since, unlike the regime for SO₂, there is no system-wide cap on total NO_x emissions, the creation of new NO_x-emitting facilities may increase the aggregate amount of emissions.³⁸ Also unlike the SO₂ program, there is no trading of allowances; no single boiler may emit above the mandated rate. Under some circumstances, however, an operator may comply by averaging the emission from all its boilers.³⁹ While EPA sets the limitations, operators retain flexibility in choosing which pollution control technologies to use.⁴⁰ EPA views the NO_x program as successful in reducing pollution from NO_x, although the agency attributes some of the subsequent environmental benefits to other factors.⁴¹

2. Ozone Transport Commission NO_x Budget Program

In the early 1990s, pursuant to a CAA directive, EPA and a group of northeastern states established the Ozone Transport Commission (OTC) to address the interstate aspects of ozone pollution.⁴² Since 1971, the states had

35. See EPA, PUB. NO. EPA-430-R-06-015, ACID RAIN PROGRAM: 2005 PROGRESS REPORT 1, 14, 24–25 (2006) [hereinafter ACID RAIN PROGRESS REPORT], available at <http://www.epa.gov/airmarket/progress/docs/2005report.pdf>; see also, e.g., A. Denny Ellerman, *Are Cap-and-Trade Programs More Environmentally Effective than Conventional Regulation?*, in MOVING TO MARKETS IN ENVIRONMENTAL REGULATION, *supra* note 30, at 48, 50–54 (discussing “the environmental performance of the Acid Rain Program”); Nathaniel O. Keohane, *Cost Savings from Allowance Trading in the 1990 Clean Air Act: Estimates from a Choice-Based Model*, in MOVING TO MARKETS IN ENVIRONMENTAL REGULATION *supra* note 30, at 194, 224 (calculating that the “trading program resulted in estimated annual cost savings of \$150 million (17 percent)” for the first four years).

36. 42 U.S.C. § 7651f(a)–(b); 40 C.F.R. §§ 76.5, 76.6. These boilers contribute about 85% of NO_x emissions from the electric power industry. Winston Harrington & Richard D. Morgenstern, *International Experience with Competing Approaches to Environmental Policy: Results from Six Paired Cases*, in MOVING TO MARKETS IN ENVIRONMENTAL REGULATION, *supra* note 30, at 95, 99.

37. 42 U.S.C. § 7651f(b)(1); 40 C.F.R. §§ 76.5, 76.6.

38. Indeed, there was a net increase in NO_x emissions from these boilers in the 1990s. Winston Harrington & Richard D. Morgenstern, *International Experience with Competing Approaches to Environmental Policy: Results from Six Paired Cases*, in MOVING TO MARKETS IN ENVIRONMENTAL REGULATION, *supra* note 30, at 95, 123.

39. 42 U.S.C. § 7651f(e); 40 C.F.R. § 76.11.

40. 42 U.S.C. § 7651f(d) (“Nothing in this section shall preclude an owner or operator from installing and operating an alternative NO_x control technology capable of achieving the applicable emission limitation.”).

41. ACID RAIN PROGRESS REPORT, *supra* note 35, at 20.

42. 42 U.S.C. § 7511c(a); OZONE TRANSPORT COMM’N, EPA, PUB. NO. EPA-430-R-03-900, NO_x BUDGET PROGRAM: 1999–2002 PROGRESS REPORT 1 (2003) [hereinafter OTC PROGRESS REPORT],

been struggling in their individual attempts to reduce ozone pollution to comply with the NAAQS. Scientists later determined that the atmospheric transportation of ozone, generally from west to east, “contribute[d] significantly to persistent ozone non-attainment in the Northeast and Mid-Atlantic United States.”⁴³ The OTC thus endeavored to achieve regional reductions of NO_x, which are significant precursors to ozone and assist in its transportation, especially during the warmer seasons.⁴⁴

To this end, in 1995 the OTC states initiated the NO_x Budget Program, a cap-and-trade program aimed at reducing NO_x emissions.⁴⁵ The OTC modeled this program on the ARP’s cap-and-trade system for SO₂.⁴⁶ The OTC set a cap of total permissible NO_x emissions in the region, allocated allowances—each the equivalent of one ton of NO_x emissions—to the emitters, and administered, with assistance from EPA, a trading program.⁴⁷ Although similar in its regulatory approach, the NO_x Budget Program had several key differences from the ARP’s regime for NO_x. First, the emissions allowances only applied when necessary: during the ozone season rather than throughout the year.⁴⁸ Second, the strict cap forced considerably more emissions reductions than did the ARP.⁴⁹ Third, while the ARP only included electric utility boilers, the NO_x Budget Program also included certain industrial facilities, thus providing greater coverage of emissions sources and therefore more flexibility in the trading scheme.⁵⁰

available at <http://www.epa.gov/airmarkt/progsregs/nox/docs/otcreport.pdf>. The Commission includes Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Virginia. *Id.* at 2. For purposes of simplicity, I will refer to the District of Columbia as a state.

43. OTC PROGRESS REPORT, *supra* note 42, at 2.

44. *Id.* at 1. Because sunlight assists the chemical reaction that creates ozone from NO_x, ozone is a particular problem in the summer; the “ozone season” in the Northeast is from May through September. *Id.*

45. *Id.* at 3–4.

46. *Id.* at 3.

47. *Id.*

48. *Id.* at 1. The ozone season is May 1 to September 30. *See, e.g.*, T.H. TIETENBERG, EMISSIONS TRADING: PRINCIPLES AND PRACTICE 13 (2d ed., 2006).

49. The NO_x emissions limitations under the Acid Rain Program range from 0.45 to 0.86 lb/mmBtu. 40 C.F.R. §§ 76.5, 76.6 (2008). The declining cap, in tons per ozone season, demanded emissions rates of about 0.20 lb/mmBtu by 2002. *See* OTC PROGRESS REPORT, *supra* note 42, at 4 fig. 2, 6; OFFICE OF AIR & RADIATION, EPA, THE OTC NO_x BUDGET PROGRAM (1999-2002): EMISSIONS TRADING AND IMPACTS ON LOCAL EMISSION PATTERNS 11 (2004), available at <http://www.epa.gov/airmarkt/progsregs/nox/docs/localtrends.pdf>.

50. OTC PROGRESS REPORT, *supra* note 42, at 9; *see also* OFFICE OF AIR & RADIATION, EPA, INDUSTRIAL SOURCE PARTICIPATION IN THE OTC NO_x BUDGET PROGRAM 5–8 (2004), available at <http://www.epa.gov/airmarkt/progsregs/nox/docs/industrial.pdf> (describing the nature of the included industrial facilities).

The NO_x Budget Program was successful in reducing NO_x emissions.⁵¹ Even with the increased emissions reductions, however, the OTC states still had difficulty attaining the ozone NAAQS.⁵² Certain circumstances caused this difficulty. First, in 1997 EPA significantly tightened the ozone NAAQS in response to new information about the effects of ozone on human health.⁵³ Second, increased vehicular travel in the OTC states contributed to higher levels of NO_x emissions.⁵⁴ Third, ozone transported from upwind states continued to pollute the region.⁵⁵ To address this interstate ozone pollution, EPA promulgated a new emissions reduction program, the NO_x SIP Call, which affected a region larger than the OTC and replaced the NO_x Budget Program's third and final phase of declining caps.⁵⁶

3. EPA's NO_x SIP Call

In 1998, EPA adopted the NO_x SIP Call program for the eastern United States to reduce ozone pollution by reducing the transport of NO_x emissions to downwind states.⁵⁷ Pursuant to the Good Neighbor Provision of the CAA, EPA required states within this region to revise their SIPs to ensure that their NO_x emissions did not "contribute significantly to nonattainment in, or interfere with maintenance" of the downwind states' ozone NAAQS.⁵⁸ Similar to the

51. OTC PROGRESS REPORT, *supra* note 42, at 6–8. See also TIETENBERG, *supra* note 48, at 63 (achieving reductions of 30% by 2002); A. Denny Ellerman, *Are Cap-and-Trade Programs More Environmentally Effective than Conventional Regulation?*, in MOVING TO MARKETS IN ENVIRONMENTAL REGULATION, *supra* note 30, at 48, 55 (achieving reductions of 30% by 2002).

52. OTC PROGRESS REPORT, *supra* note 42, at 11.

53. National Ambient Air Quality Standards for Ozone, 62 Fed. Reg. 38,856, 38,856 (Jul. 18, 1997). Since 1993, the primary and secondary ozone NAAQS had been set to a concentration of 0.12 ppm averaged over one-hour periods. *Id.* at 38,857. After considering the most recent scientific studies demonstrating the deleterious health effects of prolonged exposure to ozone, EPA increased the averaging time to eight hours. *Id.* at 38,861. EPA also determined from these studies that the concentration limit should be reduced to 0.08 ppm because the old limit did not provide the "adequate margin of safety" required by the Clean Air Act. *Id.* at 38,863–64.

54. See OTC PROGRESS REPORT, *supra* note 42, at 12.

55. *Id.* at 11–12.

56. *Id.* at 5, 13.

57. Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport of Ozone, 63 Fed. Reg. 57,356, 57,359 (Oct. 27, 1998).

58. *Id.* at 57,358; 42 U.S.C. § 7410(a)(2)(D)(i)(I) (2006). EPA targeted the following twenty-three states: Alabama, Connecticut, Delaware, District of Columbia, Georgia, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Virginia, West Virginia, and Wisconsin. Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport of Ozone, 63 Fed. Reg. at 57,358.

OTC NO_x Budget Program, EPA set maximum levels of emissions, or “budgets,” for each state.⁵⁹

As mentioned above, under the CAA regime of cooperative federalism, EPA sets the NAAQS, and the states are responsible for achieving the standards.⁶⁰ EPA may not dictate to the states how they must meet the standards.⁶¹ A working group comprising the states in the region, EPA, environmental groups, and industry representatives had studied the ozone problem and recommended developing a market-based trading framework.⁶² Based on this recommendation, EPA strongly suggested that states comply with the NO_x SIP Call by participating in a cap-and-trade program, although it explicitly affirmed that the states had the legal right to choose their own compliance mechanisms.⁶³ Indeed, EPA developed a model trading program with the understanding that it would approve any SIP under the NO_x SIP Call that substantially incorporated the model program.⁶⁴

In 1997, while EPA was developing the NO_x SIP Call program, eight northeastern states petitioned the EPA under CAA section 126, claiming that NO_x emissions from upwind states were interfering with their ozone NAAQS attainment.⁶⁵ Under section 126, EPA may directly regulate sources that it finds are violating the Good Neighbor Provision, thereby departing from the general precept that the states regulate their own emission sources.⁶⁶ In its final rule responding to these petitions (Section 126 Rule), EPA found that sources in thirteen upwind states were violating the Good Neighbor Provision and thus were subject to direct EPA authority; the agency therefore required these

59. Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport of Ozone, 63 Fed. Reg. at 57,358. The mandated state budgets, in tons of NO_x emissions, are specified at EPA Findings and Requirements for Submission of State Implementation Plan revisions Relating to Emissions of Oxides of Nitrogen, 40 C.F.R. § 51.121 (2008).

60. 42 U.S.C. §§ 7409(a)(1), 7410(a)(1), 7407(a).

61. *Virginia v. EPA*, 108 F.3d 1397, 1407–08 (D.C. Cir. 1997), *modified on other grounds*, 116 F.3d 499 (D.C. Cir. 1997) (holding that EPA may not withhold approval of a SIP if a state does not implement specific measures) (citing interpretations of the Clean Air Act in *Train v. NRDC*, 421 U.S. 60, 79 (1975) and *Union Electric Co. v. EPA*, 427 U.S. 246, 269 (1976)).

62. Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport of Ozone, 62 Fed. Reg. 60,318, 60,319–20, 60,378 app. B (Nov. 7, 1997).

63. Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport of Ozone, 63 Fed. Reg. at 57,358–59.

64. *Id.* at 57,458. The model rule is codified at EPA NO_x Budget Trading Program and CAIR NO_x and SO₂ Trading Programs for State Implementation Plans, 40 C.F.R. §§ 96.1–96.7 (2008); *see also* EPA Federal NO_x Budget Trading Program and CAIR NO_x and SO₂ Trading Programs, 40 C.F.R. §§ 97.1–97.7 (2008).

65. Findings of Significant Contribution and Rulemaking on Section 126 Petitions for Purposes of Reducing Interstate Ozone Transport, 64 Fed. Reg. 28,250, 28,251 (May 25, 1999).

66. *See* 42 U.S.C. § 7426(b)–(c).

sources to participate in the cap-and-trade program that it developed for the NO_x SIP Call.⁶⁷

The only significant difference between the NO_x SIP Call and the Section 126 Rule is whether the states retain the flexibility to choose the control measures for their sources or whether the sources must participate in the cap-and-trade program. Since all the sources subject to the Section 126 Rule were also included in the NO_x SIP Call, I will treat both programs as part of the same effort by EPA to control interstate NO_x emissions.⁶⁸ Moreover, all the states eventually chose to participate in the trading program, so the distinction of whether participation was voluntary became moot.⁶⁹ The NO_x SIP Call currently includes twenty-one of the twenty-three originally targeted states.⁷⁰

The various NO_x trading programs have been successful in reducing NO_x emissions. From 2000 to 2003, during the OTC NO_x Budget Program, NO_x emissions in the region during ozone season dropped by about a third, from 1222 to 820 thousand tons.⁷¹ From 2003 to 2006, under the expanded reach of the NO_x SIP Call, the regional emissions further decreased to below 500 thousand tons.⁷² Two states, however, did slightly increase their emissions under the trading program.⁷³ By 2006, over 99 percent of regulated sources—all but four sources—were in compliance with the NO_x SIP Call requirements.⁷⁴

More importantly, the programs reduced ozone levels in the region. Since the implementation of the NO_x SIP Call, the one-hour ozone concentration in the region decreased by 5 to 7 percent and the eight-hour ozone concentration decreased by 8 percent.⁷⁵ Furthermore, EPA redesignated 83 of the 126

67. Findings of Significant Contribution and Rulemaking on Section 126 Petitions for Purposes of Reducing Interstate Ozone Transport, 65 Fed. Reg. 2674, 2675–77 (Jan. 18, 2000).

68. See, e.g., Section 126 Rule: Withdrawal Provision, 68 Fed. Reg. 16,644, 16,645 (Apr. 4, 2003).

69. OFFICE OF AIR & RADIATION, EPA, PUB. NO. EPA-430-R-07-009, NO_x BUDGET TRADING PROGRAM: 2006 PROGRAM COMPLIANCE AND ENVIRONMENTAL RESULTS 9 (2007) [hereinafter NO_x BUDGET TRADING PROGRESS REPORT], available at <http://www.epa.gov/airmarket/progress/docs/2006-NBP-Report.pdf>.

70. See 40 C.F.R. 51.121(c) (excluding Georgia and Wisconsin, and parts of Alabama, Michigan, and Missouri). EPA recently released Georgia from the NO_x SIP Call. Petition for Reconsideration and Withdrawal of Findings of Significant Contribution and Rulemaking for Georgia for Purposes of Reducing Ozone Interstate Transport, 73 Fed. Reg. 21,528 (Apr. 22, 2008). The D.C. Court of Appeals disallowed inclusion of Wisconsin because, according to EPA findings, the state significantly contributed to ozone pollution over Lake Michigan but not to any “onshore state nonattainment.” *Michigan v. EPA*, 213 F.3d 663, 681 (D.C. Cir. 2000). The court also found the SIP Call did not need to include the entirety of border states such as Missouri. *Id.* at 682–85.

71. NO_x BUDGET TRADING PROGRESS REPORT, *supra* note 69, at 13.

72. *Id.*

73. *Id.* at 15. The two states were Kentucky and Pennsylvania.

74. *Id.* at 21.

75. *Id.* at 31. Some areas of the region, mostly in the Midwest, did experience slight *increases* in ozone concentrations. See *id.* at 33, 36. This variation could have resulted from a combination of

nonattainment areas in the region as attainment areas for the eight-hour ozone NAAQS.⁷⁶ EPA also found that the NO_x SIP Call contributed to a decrease in average biomass loss from ozone exposure.⁷⁷

C. EPA's Clean Air Interstate Rule

1. The Clean Air Interstate Rule As Designed

EPA issued CAIR in 2005.⁷⁸ EPA's purpose in enacting CAIR was to mitigate the continuing nonattainment of the ozone NAAQS by addressing the interstate effects of NO_x emissions; in doing so, EPA intended for CAIR to subsume the NO_x SIP Call program.⁷⁹ To this end, CAIR regulated all but one of the twenty-one states participating in the NO_x SIP Call, as well as six additional states.⁸⁰ Furthermore, in designing CAIR, EPA found that many states were having difficulty attaining the fine particulate matter ("PM[2.5]") NAAQS due to the interstate effects of both NO_x emissions and SO₂ emissions.⁸¹ Thus, pursuant to the Good Neighbor Provision, CAIR required a similar set of states to implement NO_x and SO₂ emissions reductions for PM[2.5] control.⁸²

As with the NO_x SIP Call, EPA suggested that the affected states comply with CAIR's mandated emissions reductions by participating in a market-based

differing weather patterns, shifting populations, and the distributional effects of the trading on emissions-producing activities.

76. NO_x BUDGET TRADING PROGRESS REPORT, *supra* note 69, at 38.

77. *Id.* at 39–40.

78. Rule To Reduce Interstate Transport of Fine Particulate Matter and Ozone (Clean Air Interstate Rule), 70 Fed. Reg. 25,162 (May 12, 2005).

79. *Id.*

80. *See id.* at 25,167. Note that the twenty states from the NO_x SIP Call include the District of Columbia; Rhode Island, however, is not included in CAIR. The additional states subject to CAIR's ozone control regulation are Arkansas, Florida, Iowa, Louisiana, Mississippi, and Wisconsin. *See id.*; *see also supra* notes 57 and 69.

81. *Id.* at 25,162. Particulate matter pollution consists of "microscopic solids and liquid droplets suspended in air." OFFICE OF AIR AND RADIATION, EPA, PARTICLE POLLUTION AND YOUR HEALTH 1 (2003), available at <http://www.epa.gov/airnow/particle/pm-bw.pdf>. Fine particulate matter refers to particles smaller than two micrometers, such as in haze, while coarse particulate matter refers to those smaller than ten micrometers. *Id.* Contact with particulate matter pollution can cause irritation, and inhalation of the pollution poses health risks to lungs and hearts. *Id.*; *see also* Rule To Reduce Interstate Transport of Fine Particulate Matter and Ozone (Clean Air Interstate Rule), 70 Fed. Reg. at 25,168. SO₂ and NO_x emissions can lead to the formation of particulate matter pollution. *Id.* at 25,162.

82. *Id.* at 25,162. There is significant overlap, but not identity, between the region affected by the NO_x requirements for ozone control and the region affected by the NO_x and SO₂ requirements for PM[2.5] control. The latter includes the following states: Alabama, Florida, Georgia, District of Columbia, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maryland, Michigan, Minnesota, Mississippi, Missouri, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, West Virginia, and Wisconsin. *Id.* at 25,167. That is, the PM[2.5] region adds Georgia, Minnesota, and Texas and excludes Arkansas, Connecticut, Delaware, Massachusetts, and New Jersey.

cap-and-trade program.⁸³ EPA included in CAIR a set of model rules for achieving the ozone-related NO_x emissions reductions and the PM[2.5]-related NO_x and SO₂ emissions reductions.⁸⁴ Consistent with the successes of the previous regulatory efforts utilizing trading programs, EPA viewed this model trading program as a flexible and cost-effective way for the states to meet the CAIR requirements.⁸⁵ In addition, EPA correlated the SO₂ model rule with the ARP's SO₂ trading scheme.⁸⁶ In a 2006 modification to the final version of CAIR, EPA established a federal implementation plan (FIP) that would serve as a default until the states submitted, and EPA approved, SIPs with their own choices for control measures.⁸⁷ The EPA chose the model trading program as the implementation mechanism for the emissions reductions in the FIP.⁸⁸

CAIR specified an incremental schedule for the reductions. First, sources would begin monitoring NO_x emissions in 2008 and SO₂ emissions in 2009.⁸⁹ Next, sources would enter the first phase of emissions reductions for NO_x in 2009 and SO₂ emissions in 2010.⁹⁰ Finally, in 2015 sources would commence the second phase of reductions with lower, more stringent caps for both pollutants.⁹¹

2. *Challenges to the Clean Air Interstate Rule*

The D.C. Circuit received a host of disparate petitions challenging CAIR subsequent to EPA's 2006 modification to the rule.⁹² Principally, North Carolina objected that EPA's model trading program did not include restrictions to ensure compliance with the Good Neighbor Provision; that is, there was no assurance within the rule that sources in upwind states would not release SO₂ and NO_x at levels that would "contribute significantly to nonattainment" of downwind states' ozone and PM[2.5] NAAQS.⁹³ In addition, North Carolina filed several other grievances: (1) EPA's interpretation

83. *Id.* at 25,165.

84. *Id.* at 25,162.

85. *Id.*

86. *Id.* at 25,291. EPA was concerned that the stricter SO₂ emissions requirements under CAIR would deflate the value of SO₂ emissions allowances under the Acid Rain Program and thereby corrupt this successful program. *Id.* at 25,290. In its model rule, EPA addressed this concern by requiring the use of ARP allowances but reducing the amount of emissions covered by each allowance. *Id.* at 25,291. Furthermore, EPA mandated that the states' SIPs provide for retiring ARP allowances that would permit emissions in excess of the limits under CAIR. *Id.*

87. Federal Implementation Plans To Reduce Interstate Transport of Fine Particulate Matter and Ozone, 71 Fed. Reg. 25,328, 25,330 (Apr. 28, 2006).

88. *Id.*

89. *Id.* at 25,331.

90. *Id.* at 25,333.

91. *Id.*; Rule To Reduce Interstate Transport of Fine Particulate Matter and Ozone (Clean Air Interstate Rule), 70 Fed. Reg. at 25,176.

92. *North Carolina v. EPA*, 531 F.3d 896, 905 (D.C. Cir. 2008).

93. *See id.* at 906; 42 U.S.C. § 7410(a)(2)(D)(i)(I).

of the Good Neighbor Provision ignored the “interfere with maintenance” clause;⁹⁴ (2) CAIR’s schedule giving upwind states until 2015 to reduce their significant contributions to downwind states’ nonattainment impermissibly conflicted with the downwind states’ statutory obligations to meet their ozone and particulate matter NAAQS by 2010; (3) the rule’s supplemental pool of NO_x allowances would permit excess emissions;⁹⁵ (4) EPA arbitrarily changed its interpretation of the term “will” in the Good Neighbor Provision;⁹⁶ and (5) EPA arbitrarily set the air quality contribution threshold that would determine whether a state would be considered an upwind state for CAIR’s PM[2.5] requirements.⁹⁷

Other petitioners challenging CAIR included several electric utility and energy companies. First, they objected to how EPA established the SO₂ and NO_x budgets for the states under CAIR, claiming that EPA did not adequately explain why it based the SO₂ budgets on the states’ allowances under the ARP.⁹⁸ They also asserted that in setting the NO_x budgets, EPA impermissibly rationalized its preference for coal-fired plants over oil- and gas-fired plants on a notion of fairness that is not found within the Good Neighbor Provision’s mandate.⁹⁹ Furthermore, they argued that EPA, in connecting CAIR’s SO₂ program with the ARP, did not have the statutory authority to reduce the value of or retire ARP’s SO₂ allowances.¹⁰⁰ Another group of petitioners, comprising several electric utilities and a municipality in Texas, protested both EPA’s inclusion of Texas, Florida, and Minnesota in CAIR and EPA’s advancement of the first phase NO_x compliance deadline from 2010 to 2009.¹⁰¹

In 2008, the D.C. Circuit considered these petitions in the consolidated case of *North Carolina v. EPA*.¹⁰² While it is beyond the scope of this Note to detail the court’s response to all the challenges against CAIR, I will explain the relevant findings of the court.

Foremost, with respect to North Carolina’s primary objection that the rule failed to ensure that offending upwind-state emissions would actually decline,

94. According to the Good Neighbor Provision, each SIP must ensure the prevention of “any . . . type of emissions activity . . . which will . . . contribute significantly to nonattainment in, or *interfere with maintenance* by, any other State with respect to any [NAAQS].” 42 U.S.C. § 7410(a)(2)(D) (emphasis added).

95. See generally Rule To Reduce Interstate Transport of Fine Particulate Matter and Ozone (Clean Air Interstate Rule), 70 Fed. Reg. at 25,350–52 (providing for a compliance supplement pool to be codified at 40 C.F.R. § 96.143).

96. “. . . any . . . type of emissions activity . . . which will . . . contribute significantly to nonattainment in, or interfere with maintenance by . . .” See 42 U.S.C. § 7410(a)(2)(D) (emphasis added).

97. 531 F.3d at 908–16; 42 U.S.C. § 7410(a)(2)(D)(i).

98. 531 F.3d at 916.

99. *Id.* at 920.

100. *Id.* at 921.

101. *Id.* at 923, 928.

102. *Id.*

the court determined that to satisfy the Good Neighbor Provision, EPA must measure each upwind state's significant contribution to nonattainment in downwind states and ensure that CAIR, whether via a trading program or another mechanism, eliminated these significant contributions.¹⁰³ As promulgated, however, CAIR merely provided a cost-effective way to reduce emissions without meeting this requirement.¹⁰⁴ Next, the court found that in determining which states to include in CAIR, EPA did not give the "interfere with maintenance" prong of the Good Neighbor Provision independent effect and therefore improperly failed to consider attainment areas that are in danger of lapsing into nonattainment due to emissions from upwind areas.¹⁰⁵ Third, the court determined that EPA was required to ensure that CAIR was consistent with the CAA's compliance deadline of 2010 for the ozone and PM[2.5] NAAQS. Therefore, as North Carolina contended, CAIR's second phase compliance deadline of 2015 would impermissibly allow upwind states to continue to interfere significantly with downwind states' ability to attain their NAAQS for five years.¹⁰⁶

The court also found merit in some of the challenges from the energy industry. In analyzing how EPA determined the states' SO₂ and NO_x budgets under CAIR, the court found that EPA relied on equitable and cost-effective rationales that were not consistent with the Good Neighbor Provision.¹⁰⁷ Finally, the court agreed with the petitioners that EPA had no authority to limit the value of or to retire the ARP's SO₂ emissions allowances; Congress established the ARP directly within the CAA, and had not delegated to EPA any authority to override it.¹⁰⁸

Overall, the court found CAIR to be so "fundamentally flawed" that "[n]o amount of tinkering . . . or revising . . . will transform [it] into an acceptable rule."¹⁰⁹ Because EPA had promulgated CAIR as a single "integral action," the court vacated the entire rule and remanded to the agency to redevelop it.¹¹⁰

103. *Id.* at 907–08.

104. *Id.*

105. *Id.* at 908–11.

106. *Id.* at 911–12.

107. *Id.* at 916–21. For example, in setting the states' SO₂ budgets, EPA chose reduction targets that it considered "equitable" (without explaining further), estimated the costs of the achieving the reductions, and "determine[d] that they should be considered highly cost effective. Rule To Reduce Interstate Transport of Fine Particulate Matter and Ozone (Clean Air Interstate Rule), 70 Fed. Reg. at 25,175–76. The D.C. Circuit found that EPA's method did not properly identify any "significant contribution" as required by the Good Neighbor Provision. 531 F.3d at 918. For the NO_x budgets, EPA used an adjustment index that penalized states for their oil-fired and gas-fired plants as compared to coal-fired plants. EPA justified this index in terms of an "equitable budget distribution" because coal-fired plants have higher emissions rates and thus a greater burden of compliance. 70 Fed. Reg. at 25,230–31. The court likewise found that this policy choice was irrelevant to determining a state's "significant contribution." 531 F.3d at 920–21.

108. 531 F.3d at 921–22.

109. *Id.* at 929–30.

110. *Id.*

3. *Reactions to the D.C. Circuit's Vacatur of CAIR*

The petitioners were not pleased with the vacatur. In the absence of CAIR's emissions reduction programs, North Carolina and the other downwind states faced health and environmental impacts from the upwind emissions, as well as continued difficulties with attaining or maintaining their NAAQS.¹¹¹ North Carolina asked that the court remand to EPA with a deadline of July 10, 2009.¹¹² Likewise, the industry petitioners were concerned about how to plan for their investments in pollution control technology in light of the regulatory gap, as well as that uncertainty about CAIR's future would destabilize the prices in the extant SO₂ and NO_x allowances markets.¹¹³ The various petitioners, however, were not united in whether the vacatur should stand in part or in entirety, or whether the court should instead grant a stay and remand to EPA for revision.¹¹⁴

Quite reasonably, EPA was distressed at the outcome of the suit and asked the D.C. Circuit to rehear the case en banc.¹¹⁵ EPA was concerned that the vacatur of CAIR would delay the planned SO₂ and NO_x emissions reductions, prolonging human health and environmental problems in the interim as well as negatively affecting the economic value of ARP allowances.¹¹⁶ EPA therefore petitioned the court to grant a stay of the vacatur for approximately two years while it revises CAIR.¹¹⁷ In late December 2008, the D.C. Circuit agreed to grant EPA a remand without vacatur, acknowledging that the vacatur "would at least temporarily defeat . . . the enhanced protection of the environmental values covered by [CAIR]."¹¹⁸

Meanwhile, Congress has been considering whether to enact its own version of CAIR.¹¹⁹ A statutory version of CAIR could essentially amend the CAA with an exception to the Good Neighbor Provision, obviating the legal

111. See, e.g., Andrew Childers, *States, Power Companies Ask Appeals Court to Remand 'Flawed' Clean Air Interstate Rule*, 39 ENV'T REP. CUR. DEV. (BNA) 2253 (2008).

112. *Id.*

113. See, e.g., *CAIR Decision Leaves Turmoil in Its Wake for EPA, Environmentalists, Power Plants*, 77 U.S.L.W. 2059 (2008).

114. See, e.g., Andrew Childers, *supra* note 111.

115. Petition for Rehearing or Rehearing En Banc, *North Carolina v. EPA*, 531 F.3d 896 (D.C. Cir. 2008) (No. 05-1244) (Sept. 24, 2008).

116. Reply in Support of Petition for Rehearing or Rehearing En Banc at 1, *North Carolina v. EPA*, 531 F.3d 896 (D.C. Cir. 2008) (No. 05-1244) (Nov. 17, 2008). See also CLEAN AIR MARKETS DIV., EPA, ANALYSIS OF POTENTIAL QUICK-FIX LEGISLATIVE CHANGES TO ADDRESS COURT DECISION 12 (2008), available at <http://www.epa.gov/airmarkt/progsregs/cair/quickfix.ppt> (forecasting approximately twenty-five thousand potential premature deaths from 2009 to 2011 if Phase I of CAIR is not implemented).

117. Reply in Support of Petition for Rehearing or Rehearing En Banc, *supra* note 116, at 5.

118. *North Carolina v. EPA*, 550 F.3d 1176, 1178 (D.C. Cir. 2008) (quoting *Envtl. Defense Fund, Inc. v. EPA*, 898 F.2d 183, 190 (D.C. Cir. 1990)).

119. See, e.g., Andrew Childers, *Senate Roundtable Hears Support for CAIR, But Industry Asks More Time for Compliance*, 39 ENV'T REP. CURRENT DEVS. (BNA) 1863 (2008).

conflicts that the D.C. Circuit found in EPA's regulatory version. Senator George Voinovich (R-Ohio) has introduced a bill that would enact CAIR in its entirety.¹²⁰ Senator Tom Carper (D-Del.), who attempted unsuccessfully to get a bill through in 2008, has remained committed to a legislative solution, advocating for a program more aggressive than CAIR.¹²¹ In the House, Representative Rick Boucher (D-Va.), a member of the Energy and Commerce Committee, has been planning to introduce legislation addressing the issue in 2009.¹²² At the very least, many stakeholders, including representatives of both parties, the states, environmental groups, and industry, favor a short-term legislative fix that codifies the first phase of CAIR. They disagree, however, on whether Congress should codify the second phase of CAIR and, if so, whether it should have more or less stringent restrictions than the invalidated rule.¹²³

Due to the D.C. Circuit's remand of CAIR, EPA and Congress (and to some degree the states) have an opportunity to reevaluate what type of regulatory structure will most effectively control the interstate effects of SO₂ and NO_x emissions. In the next Part, I argue that the newer, and more experimental, market-based cap-and-trade approach is more effective at mitigating these effects than the traditional command-and-control approach to regulation.

II. EMISSIONS TRADING AS THE PREFERRED APPROACH FOR REDUCING SO₂ AND NO_x POLLUTION

A. *Overview of Conventional and Market-Based Regulation*

Government regulation of emissions generally takes the form of either a conventional command-and-control approach or a market-based approach. In a typical command-and-control approach, the government mandates that each pollution source meet specified standards. The standards are generally either performance-based, where the government sets a hard limit on the amount of permissible pollution, or technology-based, where the government requires sources to use a particular class of pollution control equipment. An example of a command-and-control approach is the CAA's regulation of SO₂ emissions from new sources prior to the 1990 amendments: Congress proscribed each

120. CAIR Reinstatement Bill of 2008, S. 3469, 110th Cong.

121. See, e.g., Andrew Childers, *Discussions on Interstate Rule Dominate Ozone Transport Commission Meeting*, 39 ENV'T REP. CURRENT DEVS. (BNA) 2293 (2008); *CAIR Decision Leaves Turmoil in Its Wake for EPA, Environmentalists, Power Plants*, 77 U.S.L.W 2059 (2008).

122. See, e.g., Dean Scott & Steven D. Cook, *House Will Take Lead on Emissions Caps, Support From Obama Likely, Boucher Says*, 39 ENV'T REP. CURRENT DEVS. (BNA) 2116 (2008).

123. See, e.g., CLEAN AIR MARKETS DIV., EPA, *supra* note 116, at 3, 6.

source from emitting above a specified rate.¹²⁴ In a market-based approach, on the other hand, the government deploys economic disincentives to deter pollution, and allows each polluter to evaluate the degree to which it is advantageous to reduce its emissions and by what means.

Professor Stavins identified four types of market-based approaches: taxes, subsidies, market friction reduction policies, and tradable permits.¹²⁵ In a tax regime, a polluter pays a fee per unit of emitted pollutant. Professor Pigou, an early proponent of direct taxation, theorized on how taxation could account for the effects of pollution.¹²⁶ Modern economists tend to advocate for Pigouvian taxes as an extremely efficient way to control pollution.¹²⁷ Regulators, on the other hand, usually oppose taxes for several reasons: (1) the difficulty in gathering the information necessary for designing an effective tax rate;¹²⁸ (2) the difficulty in accurately gauging the level of pollution that industry will actually emit under a given tax rate, and the accompanying uncertainty about the actual health and environmental benefits resulting from the tax;¹²⁹ and (3) the political unattractiveness of direct taxation.¹³⁰

If a tax on emissions is a stick, a government subsidy is a carrot. The government often supplies monetary grants to industries to encourage certain behavior. While subsidies may produce salutary environmental benefits,¹³¹ they may also produce unintended effects¹³² and, because they are politically difficult to remove, may outlive their usefulness.¹³³ Although the government could subsidize the increased use of more effective pollution abatement technologies, it seems perverse to pay polluters for their detrimental activities. Furthermore, subsidies are difficult to design in a cost-effective fashion.

124. See Nathaniel O. Keohane, *Cost Savings from Allowance Trading in the 1990 Clean Air Act: Estimates from a Choice-Based Model*, in MOVING TO MARKETS IN ENVIRONMENTAL REGULATION, *supra* note 30, at 194, 197.

125. See Robert Stavins, *Market-Based Environmental Policies: What Can We Learn from U.S. Experience (and Related Research)?*, in MOVING TO MARKETS IN ENVIRONMENTAL REGULATION, *supra* note 30, at 19, 21. According to Tietenberg, the Pigouvian theory involves setting “[t]he tax rate . . . to the marginal external social damage caused by the last unit of pollution at the efficient allocation.” TIETENBERG, *supra* note 48, at 2.

126. TIETENBERG, *supra* note 48, at 2.

127. *Id.*

128. *Id.*; Stavins, *supra* note 125.

129. See Stavins, *supra* note 125.

130. *Id.*

131. For example, the federal tax credits for developing wind and solar power encourage investment in energy sources that are cleaner than energy derived from fossil fuels.

132. For example, the corn-based ethanol subsidies have been viewed as a factor in increased worldwide food prices.

133. For example, the fossil fuel subsidies that were enacted in the 1970s to combat the oil crises are today no longer necessary to a booming energy industry and in fact are considered a significant factor in anthropogenic climate change. See, e.g., UNITED NATIONS ENV’T PROGRAMME, REFORMING ENERGY SUBSIDIES, OPPORTUNITIES TO CONTRIBUTE TO THE CLIMATE CHANGE AGENDA 15–16 (2008), available at http://www.unep.org/pdf/PressReleases/Reforming_Energy_Subsidies.pdf.

A third market-based approach involves market friction reduction policies, which aim to remove or reduce barriers to efficient market operation.¹³⁴ Such policies can induce environmentally beneficial market choices by encouraging better resource allocation, by establishing liability regimes, or by requiring information disclosure.¹³⁵ Similar to the U.S. Toxics Release Inventory, which mandates industry disclosure on its use of hazardous substances, the government could impose stricter requirements on industry polluters to report their SO₂ and NO_x emissions in order to raise public awareness. However, as many of these polluters are energy generators, the public has little choice but to support these businesses. Enacting this type of policy may have laudatory long-term effects but is not likely to reduce emissions sufficiently to protect the public health and the environment in the near-term.

In 1960, Professor Coase introduced the idea of associating the external costs of production byproducts, such as pollutant emissions, with property rights.¹³⁶ Over the next decade, academics developed Coase's idea into a theory of emissions trading.¹³⁷ Under a so-called "cap-and-trade" regime, regulators set a limit, or cap, on the total number of emissions allowed, and allocate emissions "allowances" to the regulated emission sources. Further, the regulators establish a market in which the owners of the emission sources may trade their allowances with each other. This trading should provide an economically efficient means of meeting the emissions cap; the owners individually evaluate the specific needs of their facilities and the particular costs of emission-reduction strategies, and collectively determine the value of the allowances through the market.

B. Advantages of Market-Based Regulation

The central argument for preferring market-based regulatory approaches, such as tradable allowances, over conventional command-and-control regulatory approaches is that a well-designed market can allocate the costs of emissions reduction more efficiently than can government regulators. Evaluating the effective options for pollution control depends on a variety of characteristics of each pollution source, such as its nature, design, and age. The unique combination of characteristics of each source, multiplied by the immense number of sources, leads to a huge volume of information necessary to determine how to implement pollution controls at each source. The source operators, generally speaking, are better situated to process this information

134. See generally Paul A.U. Ali & Kanako Yano, *ECO-FINANCE: THE LEGAL DESIGN AND REGULATION OF MARKET-BASED ENVIRONMENTAL MARKETS* 7–9, 39–42, 119–121 (2004) (discussing market-based environmental instruments, carbon finance regimes, and environmental investment funds).

135. Stavins, *supra* note 125, at 24.

136. TIETENBERG, *supra* note 48, at 3.

137. *Id.* at 3–5.

than regulators with limited resources, and thus can make more cost-effective decisions in achieving compliance.¹³⁸ For example, the operators can better estimate the costs of various control strategies as applied to their facilities and can also plan for optimal timing of investments in controls.¹³⁹ By assigning responsibility for this localized decision-making to pollution source operators, a market approach can yield the same amount of pollution control as a command-and-control approach at a lower cost. Or, with the same monetary outlay, a market approach can yield greater emissions reductions.

Nevertheless, the potential for greater efficiency via market-based regulation depends on a number of factors. First, as with a command-and-control approach, the regulator must adequately monitor and vigorously enforce compliance.¹⁴⁰ In a world in which some degree of unscrupulousness is an unfortunate reality, a lack of monitoring or enforcement would encourage some market players to attempt to game the system. Second, a market can only be efficient where no actor enjoys disproportional market power. Such an actor can unduly influence the value of the emissions allowances and thereby disrupt the system's capability of providing the reductions at the lowest cost. Third, while transaction costs are a reality of market functionality, significantly high transaction costs will reduce the market actors' willingness to trade; a reduced volume of trade can lead to inefficient allowance valuation.¹⁴¹ This effect is not catastrophic, however, because even with no trading, sources retain the flexibility in choosing and implementing control strategies, which alone will likely lead to more cost-effective pollution control than a mandated technology standard.¹⁴² Fourth, depending on the design of the market, the regulator's administrative costs may be significant, detracting from the efficiency of the system.¹⁴³

A second argument for preferring market-based approaches to command-and-control approaches is that a market may better stimulate innovation in developing better control technologies and strategies. Under a conventional technology-based approach, the regulator chooses a technology standard for the pollution sources. The polluters must implement this standard but do not have an incentive to exceed the standard. Under a market-based approach, in contrast, the sources are more likely to have an economic interest in reducing emissions as much as possible. A forward-looking owner might invest in researching and developing more effective or less expensive technologies in order to reap the resulting benefits. For example, in a cap-and-trade system, if a

138. *Id.* at 26.

139. *Id.* at 5–6.

140. TIETENBERG, *supra* note 48, at 425–26.

141. *Id.* at 40–41.

142. Robert Stavins, *Transaction Costs and Tradable Permits*, 29 J. ENVTL. ECON. & MGMT. 133, 144 (1995).

143. TIETENBERG, *supra* note 48, at 42.

polluter can utilize advanced technology to reduce emissions, he can then sell his excess emissions allowances for profit.

The proposition that markets better stimulate innovation is controversial. First, economists have theorized that, depending on the nature of competition in the market, the design of the market,¹⁴⁴ and the rate of change of the market players' production costs, conventional regulation may actually stimulate innovation more than market participation.¹⁴⁵ Second, researchers, after studying the actual effects of various regulated markets, have found that some markets influenced technological change and some did not.¹⁴⁶

C. Disadvantages of Trading Systems

The foremost argument against market-based regulatory approaches involves the uncertainty in pollution distribution. If market actors have the power to decide which sources will continue to emit at high levels and which sources will reduce emissions, then it is possible, and arguably even likely, that resulting emissions will be concentrated in some areas. A concentration of emissions may engender what is termed a "hot spot" of ambient toxic pollution.¹⁴⁷ While overall emissions may be reduced in accordance with the mandated cap, areas with hot spots experience increased emissions leading to health problems and environmental damage that may not have occurred under a command-and-control approach. Furthermore, the hot spots may occur disproportionately in areas with disadvantaged communities, raising questions of disparate impact and injustice.¹⁴⁸

144. An example of an important market design feature is whether the regulator allocates emissions freely or by auction. In early cap-and-trade systems, regulators gave away allowances to existing polluters for equitable and political feasibility purposes. The Regional Greenhouse Gas Initiative, targeting carbon dioxide emissions in a group of eastern states, is one of the first cap-and-trade programs to require polluters to purchase allowances through an auction. See Regional Greenhouse Gas Initiative, CO₂ Auctions, <http://www.rggi.org/co2-auctions> (last visited Mar. 24, 2009).

145. Juan Pablo Montero, *Permits, Standards, and Technology Innovation*, 44 J. ENVTL. ECON. & MGMT. 23, 31–39 (2002); Joel F. Bruneau, *A Note on Permits, Standards, and Technological Innovation*, 48 J. ENVTL. ECON. & MGMT. 1192, 1198 (2004).

146. EPA's market for trading the right to use lead additives in gasoline in the 1980s encouraged refineries to use new technologies. Suzi Kerr & Richard G. Newell, *Policy-Induced Technology Adoption: Evidence from the U.S. Lead Phasedown*, 51 J. INDUS. ECON. 317 (2003). On the other hand, the Acid Rain Program actually discouraged use of alternative technologies that had not yet matured enough to be cost-effective. Margaret R. Taylor et al., *Regulation as the Mother of Invention: The Case of SO₂ Control*, 27 L. & POLICY 348, 370 (2005). *But cf.* David Popp, *Pollution Control Innovations and the Clean Air Act of 1990*, 22 J. POLICY ANALYSIS & MGMT. 641 (2003) (finding that the Acid Rain Program led to innovation in the efficiency of scrubbers over the previous command-and-control regime).

147. See, e.g., Ellerman, *supra* note 35, at 51.

148. See, e.g., Richard Toshiyuki Drury et al., *Pollution Trading and Environmental Injustice: Los Angeles' Failed Experiment in Air Quality Policy*, 9 DUKE ENVTL. L. & POL'Y FORUM 231, 251–57 (1999).

The seriousness of the pollution distribution problem depends both on the degree to which the polluting effects of the emissions are localized and on the design of the market. Emissions trading of pollutants that have little or no local effects, like greenhouse gases, might not cause toxic hot spots.¹⁴⁹ Mercury, on the other hand, has extremely toxic local effects and thus trading is significantly more likely to generate hot spots.¹⁵⁰ However, the nature of the traded emissions is not dispositive; for example, some trading systems of SO₂ and NO_x have created terrible hot spots while other trading systems have not had this effect.¹⁵¹ A well-designed market may greatly reduce the risk of hot spots. For example, the trading scheme may operate in conjunction with local standards for ambient air quality (known as “regulatory tiering”), may include varying permit restrictions in different micro-regions or “zones” to foreclose unintended distributional effects, or may establish other trading rules that account for the location of the buyers and sellers.¹⁵²

D. Optimal Trading System Design Based on the Nature of the Pollutant

Emissions of some pollutants do not cause significant local effects but do create global effects, regardless of where they are emitted. Carbon dioxide is an example of such a pollutant.¹⁵³ The effects of carbon dioxide emissions on climate change are independent of how the emissions are distributed. To achieve a cost-effective trading system, the regulator may simply establish the total amount of allowable emissions, allocate the allowances among the pollution sources, and then let the sources freely trade based on their own understanding of their control costs.¹⁵⁴

Other pollutants do cause harmful effects in the area where they are emitted, although the environment has some capacity to absorb them over time. SO₂ and NO_x are examples of this type of pollutant.¹⁵⁵ The distribution pattern

149. Harrington & Morgenstern, *supra* note 38, at 127–28. Note, however, that the emission of such pollutants may be accompanied by other pollutants which *do* have local effects.

150. See, e.g., Nikhil Swaminathan, *Mercury "Hot Spots" Found in North America*, SCIAM.COM, Jan. 3, 2007, <http://www.sciam.com/article.cfm?id=mercury-hot-spots-found-i>.

151. The Regional Clean Air Incentives Market cap-and-trade program, regulating SO₂ and NO_x emissions in the Los Angeles area, disproportionately affected Latino communities with hot spots. Richard Toshiyuki Drury et al., *supra* note 148. On the other hand, the Acid Rain Program and the Northeastern NO_x Budget Program, regulating the same pollutants, did not create hot spots. A. Denny Ellerman, *Are Cap-and-Trade Programs More Environmentally Effective than Conventional Regulation?*, in *MOVING TO MARKETS IN ENVIRONMENTAL REGULATION*, *supra* note 30, at 48, 51, 53, 55.

152. TIETENBERG, *supra* note 48, at 88–89, 97. A trading rule determines “how much of an increase in emissions is allowed a [particular] purchaser . . . given an emissions reduction by a [particular] seller.” *Id.* at 97. Properly structured, a trading rule can discourage and prevent transactions that would concentrate emissions into hot spots. *Id.* at 97–100.

153. *Id.* at 27.

154. *Id.* at 29–32.

155. See *id.* at 33.

of these emissions is important because high concentrations of these pollutants can lead to toxic hot spots. In order to have a cost-effective trading system that does not create significant emissions concentrations, the regulator must define geographic airsheds and set the amount of allowable pollutant concentration—not merely the amount of emissions—for each airshed.¹⁵⁶ Basing the tradable allowances on the ultimate geographic pollution concentration, rather than on source-based emissions levels, takes into account that airborne transport of emissions leads to health and environmental problems distant from the emissions' sources.¹⁵⁷ A pollution source must therefore ensure that it has sufficient allowances not only for its immediate airshed but also for those in downwind areas. These concentration allowances would also be freely tradable, but given the geographic variations among the airsheds in terms of extant pollutant sources and susceptibility to upwind emissions, the market would likely establish different prices for different airsheds.¹⁵⁸

A third class of pollutants comprises those which the environment is essentially unable to absorb and therefore have long-lasting harmful effects. Examples are lead, mercury, and nuclear waste.¹⁵⁹ For these pollutants, the regulator should establish an absolute cap, rather than a yearly cap, on emissions per area based on a threshold tolerance level.¹⁶⁰ Under this system, an allowance would be valid for one use only, after which it would be permanently retired.¹⁶¹ Permanently retiring the allowances ensures that once the threshold tolerance level is reached, sources would not be permitted to deposit any more of that pollutant into the area, ever. Pollution sources may freely use, trade, or conserve their allowances for the future; as the supply of allowances decreases over time, they will become more valuable.

In summary, market-based approaches to emissions reductions can achieve the same, if not better, environmental results as conventional approaches with less overall expense. In particular, interstate trading of SO₂ and nitrous oxides emissions allowances can adequately and efficiently reduce the deleterious effect that the airborne transport of these compounds has on distant ozone and particulate matter levels. Although such trading introduces the risk of creating localized toxic hot spots, a carefully designed market can sufficiently mitigate this risk.

156. *Id.*

157. *Id.* at 38.

158. TIETENBERG, *supra* note 48, at 37.

159. *See id.* at 38.

160. *Id.* at 40.

161. *Id.*

III. RECOMMENDATIONS FOR THE NEXT INCARNATION
OF THE CLEAN AIR INTERSTATE RULEA. *Market Scope*

If Congress does not enact a bill to control the interstate effects of SO₂ and NO_x pollution, then EPA must redesign the CAIR in accordance with the D.C. Circuit's holdings in *North Carolina v. EPA*. EPA's rule must, pursuant to the Good Neighbor Provision, provide against upwind emissions that either significantly contribute to downwind states' attainment of their NAAQS or interfere with downwind states' maintenance of their NAAQS attainment.¹⁶² Furthermore, in creating state emissions budgets or other types of allocation allowances, EPA must provide a reasoned explanation that is consistent with the Good Neighbor Provision; the agency cannot solely rely on justifications such as equity and cost-effectiveness that are not specified by the statute.¹⁶³

In drafting CAIR, EPA performed extensive modeling to determine the interstate transport patterns of SO₂ and NO_x emissions.¹⁶⁴ EPA thus has a good understanding of how upwind emissions will likely affect NAAQS attainment in downwind states. One solution for a market-based cap-and-trade approach to controlling upwind emissions is for EPA to limit trading to within each state after it determines the states' budgets. This approach would essentially create twenty-eight separate markets, each with trading restricted to sources within the state. Thus, unlike CAIR, the total emissions in each state would necessarily remain within that state's cap, which EPA would have already determined would not constitute a significant contribution to any other state's inability to attain or maintain its NAAQS.

One potential issue with this approach is whether there would be enough trading within each state to yield the cost-effectiveness achievable via markets.¹⁶⁵ However, several states have already initiated similar markets, indicating the possibility that even with the limited geographic scope, there may be a sufficient number of market players for market feasibility.¹⁶⁶ Another

162. See *supra* Part I.C.2.

163. *North Carolina v. EPA*, 531 F.3d 896, 920 (D.C. Cir. 2008).

164. See Rule To Reduce Interstate Transport of Fine Particulate Matter and Ozone (Clean Air Interstate Rule), 70 Fed. Reg. 25,162, 25,188–89 (May 12, 2005).

165. In smaller markets, there are fewer trading partners and opportunities than in larger markets and thus less overall flexibility for each market player to optimize his or her individual cost strategy. Furthermore, in a smaller market it is easier for one or a group of players to attain market power and manipulate prices. See generally TIETENBERG, *supra* note 48, at 144–64 (discussing market power in the context of emissions trading). Cost-effectiveness is of course a secondary objective and must not affect the health and environmental goals of the NAAQS.

166. See, e.g., New Hampshire's Multiple Pollutant Annual Budget Trading and Banking Program, N.H. CODE ADMIN R. ANN. ENV-A §§ 2901.01–2915.03 (2008), available at <http://des.nh.gov/organization/commissioner/legal/rules/documents/env-a2900.pdf> (controlling SO₂, NO_x, mercury, and carbon dioxide emissions through a state trading program); Texas's Mass Emissions Cap and Trade

drawback is the loss of economy of scale with respect to market transaction costs: each market would require separate administration, and multi-state corporations would have the additional expense of participating in multiple markets. EPA could reduce these costs by establishing uniform standards for the markets and providing centralized administration.

Another solution for a market-based cap-and-trade approach is for EPA to establish emissions concentration limits for each downwind air quality control region in danger of NAAQS nonattainment due to emissions from upwind states. As discussed above in Part II.D, instead of directly specifying the amount of permissible SO₂ and NO_x emissions for each state's sources, EPA could establish target concentration levels for each nonattainment area¹⁶⁷ and then provide allowances adding up to the desired concentrations. Under such a regime, instead of using allowances to emit pollutants, pollution sources would use allowances to contribute to pollutant concentrations in other areas. An upwind source would thus be required to have concentration allowances for each downwind area that it affects, while a downwind source might only need concentration allowances for their local air quality control region. In effect, this scheme would require upwind sources to internalize the costs resulting from the interstate transport of their emissions. If some or all of a source's emissions do not contribute to any nonattainment area, the source would not need any allowances for those emissions. On the other hand, for emissions that contribute to NAAQS nonattainment in multiple areas, the source would need multiple allowances.

Operationally, such a program would require EPA to provide the pollution sources with data on the transport patterns of their emissions. While data collection could potentially be resource-intensive for EPA, the agency already has much of this information and could rely on established weather patterns rather than updating the data constantly. Another issue is that the pollution sources would have greater transaction costs for their compliance. Rather than simply securing a single allowance, they would first have to determine which local allowances they needed and then obtain them, perhaps through multiple trades. Similarly, the complexity would increase the burden on state and federal regulators in monitoring and enforcement.

Both of these solutions potentially involve added costs to government and industry. Nevertheless, the NAAQS are designed primarily to protect human health and the environment. The goal is not to use the most cost-effective

Program, 30 TEX. ADMIN. CODE §§ 101.350–.363 (2008), available at http://www.tceq.state.tx.us/implementation/air/banking/mass_ect_prog.html (controlling NO_x emissions with respect to nonattainment of the ozone NAAQS in the Houston-Galveston-Brazoria region); Missouri's Emissions Limitations and Emissions Trading of Oxides of Nitrogen, MO. CODE REGS. ANN. tit. 10, § 10-6.350 (2008) (applying to all NO_x within the state to protect the St. Louis ozone nonattainment area).

167. Indeed, EPA already has the requisite data on each nonattainment area from the CAIR rulemaking.

solution but rather the most cost-effective solution that provides these protections. As the D.C. Circuit explained, CAIR as promulgated could not guarantee each state's right under the Good Neighbor Provision to pursue its pollution control targets free from interference from other states. The two suggested alternatives would prevent uncontrolled interstate air pollution, consistent with the CAA's mandate that people in all states and communities benefit from the same health and environmental protection.

B. Banking Restrictions

CAIR's remand provides both Congress and EPA an opportunity to reevaluate the best design features in establishing a new program for controlling the interstate effects of SO₂ and NO_x emissions. One possible design feature within a market-based trading system is to allow "banking" of emissions allowances so that holders may conserve their allowances for future use.¹⁶⁸ Banking provides the pollution sources with additional flexibility in meeting the regulatory requirements. In some years, a source might decide to expend fewer allowances, perhaps by investing in new emissions control technology. In other years, the source might need to increase pollution output if, for example, it increases overall production. The source could then expend the allowances banked in years past to meet this increased output demand. Furthermore, banking may result in early reduction of emissions if sources do not emit their maximum permitted amount.¹⁶⁹

A possible problem with banking is the flip side of early reductions: the use of banked allowances in a particular year could result in more emissions than the projected annual budget, potentially contributing to a violation of the Good Neighbor Provision.¹⁷⁰ The OTC NO_x Budget Program addressed this issue with a mechanism called "flow control."¹⁷¹ In general, flow control establishes financial disincentives for using too many banked allowances for emissions. Under the NO_x Budget Program, flow control applied when the bank held allowances equivalent to more than 10 percent of the total annual emissions budget.¹⁷² Sources could withdraw and use a certain number of their banked allowances without penalty (the number depended on the degree to

168. See, e.g., Rule To Reduce Interstate Transport of Fine Particulate Matter and Ozone (Clean Air Interstate Rule), 70 Fed. Reg. at 25,282. Note that North Carolina challenged EPA's use of banking in CAIR, that it would allow states to emit above their caps. *North Carolina v. EPA*, 531 F.3d 896, 912 (D.C. Cir. 2008). EPA claimed that it had determined that the possible use of banked allowances under CAIR would not affect any state's significant contribution. *Id.* The court did not reach this issue. *Id.*

169. See, e.g., Rule To Reduce Interstate Transport of Fine Particulate Matter and Ozone (Clean Air Interstate Rule), 70 Fed. Reg. at 25,282.

170. See, e.g., OTC PROGRESS REPORT, *supra* note 42, at 15.

171. *Id.*

172. *Id.*

which total banked allowances exceeded the 10-percent-threshold).¹⁷³ However, withdrawing additional banked allowances would permit the source to emit only half the face value of the allowances.¹⁷⁴

Both the ARP and the NO_x SIP Call included allowance banking; while the latter included a flow control mechanism, the former did not.¹⁷⁵ In developing the CAIR, EPA analyzed the use of flow control in the OTC NO_x Budget Program.¹⁷⁶ The agency found that flow control had created too much uncertainty about the value of allowances (and therefore the market pricing of the allowances), that it had a disproportional negative effect on smaller emitters who could not manipulate their accounts to avoid the penalty as nimbly as large emitters, and that it did not actually create early emissions reductions.¹⁷⁷ Based on these findings, EPA decided not to include a flow control mechanism in CAIR.¹⁷⁸

In discarding the flow control mechanism because of implementation issues under the OTC NO_x Budget Program, EPA allowed unrestricted banking under CAIR and ignored the underlying issue of the possibility of excess emissions. Instead of balking at the complexity of flow control, Congress or EPA should include a similar mechanism in any new version of CAIR. EPA's primary objection to flow control under the OTC NO_x Budget Program was that it allowed for market pricing uncertainty.¹⁷⁹ While that program's flow control system was perhaps unduly complex, it is possible to gain environmental benefits by controlling the use of banked allowances without creating undue market pricing uncertainty. For example, the regulator could restrict the use of banked allowances to a certain small percentage of the annual emissions budget. Every market player would know the possible range of allowances on the market every year, and the small variation would not have a great effect on prices. Since the number of banked allowances usable in any year would be limited, sources could then bid on the ability to withdraw allowances for a particular year. This would give sources certainty on the use and value of banked allowances and, additionally, provide the government another revenue stream in the form of banking fees.

173. *Id.* at 15–16.

174. *Id.* That is, while the allowances normally permitted one ton of NO_x emissions, the flow control penalty meant that each allowance only permitted one-half ton of NO_x emissions.

175. Rule To Reduce Interstate Transport of Fine Particulate Matter and Ozone (Clean Air Interstate Rule), 70 Fed. Reg. at 25,282.

176. *Id.* at 25,283.

177. *Id.*

178. *Id.*

179. *See id.*

CONCLUSION

The effects of interstate transport of SO₂ and NO_x emissions on downwind areas are serious and complex. Emissions from sources in upwind states are blown into downwind states, interfering with the latter states' capabilities to meet or maintain their NAAQS. EPA attempted to address these spillover effects by levying additional regulatory requirements on the upwind states through the CAIR. EPA elected to shape these requirements as a cap-and-trade system, following a fifteen-year history of relative success in using trading systems to control the effects of SO₂ and NO_x emissions.

The District of Columbia Court of Appeals examined the legality of CAIR after receiving many complaints from affected parties. The court found so many flaws in EPA's rule, including an inconsistency with the CAA's Good Neighbor Provision, that it initially vacated the rule. After pressure from the EPA and other interested groups—members of Congress, states, environmental groups, and industry associations—the court rescinded the vacatur temporarily, giving EPA time to redesign the program.

The redesign allows EPA to rethink whether a market-based trading system is the optimal solution for this type of interstate pollution. I demonstrated that a market-based trading system can accomplish emissions reductions in a cost-effective and flexible manner. However, unrestricted trading will not ensure the demands of the CAA's Good Neighbor Provision, such that no source's emissions might "contribute significantly to nonattainment in, or interfere with maintenance" of the NAAQS in an air quality control region in another state.¹⁸⁰ In crafting a replacement for CAIR, EPA must respect this valuable statutory mandate. I suggested two ways in which EPA could improve CAIR and bring it in line with the Good Neighbor Provision. The first is to limit the scope of permissible trading, either with strict geographic constraints or by using destination concentration allowances rather than source emissions allowances. The second is to institute banking provisions that provide affected parties with flexibility and encourage early reductions, but also prevent excessive allowance withdrawals via a flow control mechanism. By following these recommendations, EPA could effectively address the interstate pollution stemming from SO₂ and NO_x emissions in a way consistent with the Good Neighbor Provision.

180. 42 U.S.C. § 7410(a)(2)(D)(i)(I).

