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THE SELLING OF POLLUTION: UNLEASHING MARKET FORCES ON THE ACID RAIN PROBLEM

INTRODUCTION

Acid rain is "killing" hundreds of lakes in the northeastern United States, Canada and Europe.[1] The main contributors to acid rain are coal-fired utility power plants.[2] These power plants emit sulfates which create acid rain and are responsible for tremendous amounts of haze in the air.[3] In fact, on certain days the haze is so bad that vacationers who venture to Colorado to visit the Grand Canyon cannot see the bottom of it, and travelers who go to Virginia to visit the Shenandoah Valley cannot see across to the other side.[4]

Our parks and lakes are not the only things affected by acid rain. The impact on humans is just as severe.[5] In contrast to adults, infants and children are especially susceptible to damage from acid rain because they breathe the air more rapidly and their repair processes are less efficient.[6] The fact that illness and premature deaths resulting from breathing polluted air cost the American public $40 to $50 billion annually also underscores the seriousness of the effects of pollution on human health.[7]

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1. Thomas H. Moore, *Acid Rain: New Approach to Old Problem*, 9 EDITORIAL RES. REP., Mar. 8, 1991, at 131. Acid rain, or acid deposition, occurs when sulfur dioxide and nitrogen oxides emitted from coal-burning electric power plants, industrial furnaces, motor vehicles and other sources combine with moisture in the atmosphere and return to earth as acid compounds. *Id.* Acid rain "kills" a lake, stream, or river, thereby increasing the acidity in the soil or water by altering some environments to the point that they can no longer support life. *Id.*

2. *Id.*

3. MARYLYNN PLACET, U.S. NAT'L ACID PRECIPITATION ASSESSMENT PROGRAM, SUMMARY REPORT: EMISSIONS INVOLVED IN ACIDIC DEPOSITION PROCESSES, ACIDIC DEPOSITION: STATE OF SCIENCE AND TECHNOLOGY 25 (1991). In 1985, in the United States and Canada, over 9000 plants emitted in excess of 91 Mg (100 tons) of emissions that cause acid rain. *Id.*

4. Ned Helme & Chris Neme, *Acid Rain: The Problem*, 17 EPA J. Jan.-Feb. 1991, at 19 (detailing acid rain problem, prior legislation and 1990 Amendments to the Clean Air Act).

5. GEORGE J. MITCHELL, WORLD ON FIRE: SAVING AN ENDANGERED EARTH 103-04 (1991) (testimony before Senate Committee on Environment and Public Works Subcommittee on Environmental Protection, Feb. 3, 1987).

6. *Id.*

7. *Annual Health Costs of Air Pollution Reach $50 Billion, Lung Association Says*, [Current Developments] Env't Rep. (BNA) 1648 (Jan. 26, 1990) (de-

The severity of the problem is compounded by the annual cost of environmental abatement and control. A 1989 survey showed that the 1987 costs were approximately $81.1 billion.[8] This translates into a 1990 rate, adjusted for the rate of inflation, of $90 billion.[9] Therefore, on average, each family of four is spending approximately $1,500 per year in the fight to breathe cleaner air and drink cleaner water.[10]

When drafting the 1990 Amendments to the Clean Air Act ("1990 Amendments"),[11] Congress had to carefully balance the competing interests of eradicating acid rain and its damaging effects, the macroeconomic costs, and the microeconomic ramifications on certain indutries. Dr. Daniel Dudek, a senior economist at the Environmental Defense Fund, believes that the 1990 Amendments[12] may contain the solution because "[f]or the first time, we are unleashing market forces on environmental problems."[13] This market approach could reduce the overall cost of the nation's effort to clean up acid rain by as much as $2 billion to $3 billion annually.[14]

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tailing the increasing health-care costs attributable to air pollution) [hereinafter *Annual Health Costs*].

8. Dr. Michael K. Evans, *Clean Air Is Costly*, INDUS. WK., May 17, 1990, at 88 (explaining the economic cost of complying with pollution regulations and the effect of compliance on businesses and economy).

9. *Id.*

10. *Id.* The article concludes that the cost of cleaning the air is increasing dramatically while there is little visible effect on reducing air pollution. *Id.*

11. 42 U.S.C.A. §§ 7401-7642 (West Supp. 1991).

12. Clean Air Act Amendments of 1990, 42 U.S.C.A. § 7401. The Clean Air Act of 1963, Pub. L. No. 88-206, 77 Stat. 392 (1963), is the original legislative enactment to address air pollution. It has been amended several times: Pub. L. No. 89-272, 79 Stat. 992 (1965); Pub. L. No. 89-675, 80 Stat. 954 (1966); Pub. L. No. 90-148, 80 Stat. 485 (1967); Pub. L. No. 91-137, 83 Stat. 283 (1969); Pub. L. No. 91-604, 84 Stat. 1676 (1970); Pub. L. No. 92-157, 85 Stat. 464 (1971); Pub. L. No. 93-15, 87 Stat. 11 (1973); Pub. L. No. 93-319, 88 Stat. 248, 261, 265 (1974); Pub. L. No. 95-95, 91 Stat. 685 (1977); Pub. L. No. 95-190, 91 Stat. 1399 (1977); Pub. L. No. 101-549, 104 Stat. 2399 (1990) (codified as 42 U.S.C. §§ 7401-7642 (1990)).

13. Betsy Carpenter, *A Marketplace for Pollution Rights*, U.S. NEWS & WORLD REP., Nov. 12, 1990, at 79 (discussing 1990 Amendments to the Clean Air Act and the use of economics and markets to lower compliance costs).

14. *Id.* (according to Robert Hahn of the American Enterprise Institute). Although the market approach could reduce the cost to clean up acid rain by two to three billion dollars a year, EPA Administrator William Reilly estimates that the requirements of the proposed rules could cost utilities $4 billion annually. *EPA Seeks to Cut Emissions of Sulfur Dioxide By 40%*, CHI. TRIB., Oct. 30, 1991, § 1, at 3. This will in turn lead to sharp increases in electricity rates in areas with the worst emission problems. *Id.* Reilly believes that electricity rates could increase by 1.5 percent nationwide, with greater increases in the problem areas. *Id.*

However, a representative for the utility industry, Edison Electric Institute, disputes these figures, stating that, "[s]everal key industrial states could experience [rate] increases of 10 to 15 percent." *Id.* The Edison representative stated further that, "[r]esidential customers at about 10 utilities will see increases of

If the 1990 Amendments are successful, they will also help make the air we breathe cleaner and safer because, under the 1990 Amendments, utilities are required to reduce their sulfur dioxide (SO_2) emissions by 10 million tons per year by the year 2000.[15] One congressional estimate states that cancer and severe respiratory disease could be cut by as much as ten percent as a result of this legislation.[16] The 1990 Amendments invoke a free-market[17] approach to achieve these required reductions. This approach is interesting because it unites economics with law.[18]

This Note will explore the use of a free market approach in environmental legislation and delineate the benefits and detriments of the 1990 Amendments. Part I of this Note will present a brief historical survey of how Congress has dealt with the problem of air pollution. Part II will analyze the 1990 Amendments, paying specific attention to the allowance trading program and use of a free market philosophy. Part III will focus on why a market needs to be established and the best way to create a market for trading emissions credits. Finally, Part IV will discuss the potential problems and conflicts with the 1990 Amendments and then offer solutions to those problems. This Note will conclude with the proposition that while the use of market forces to help clean up our environment is

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20% annually and another 20 utilities will experience rate increases of more than 10%." *Id.*

15. 42 U.S.C.A. § 7651b(a)(1).

16. Vicky Cahan, *A Clean-Air Bill Is Easy, Clean Air Is Hard*, BUS. WK., Nov. 5, 1990, at 50 (arguing that the passage of the 1990 Amendments was simple compared to making amendments actually reduce pollution while reducing compliance costs).

17. A market is, in the simplest of terms, the interaction of supply and demand, the buying and selling of goods and services by individuals in an attempt to satisfy their own economic wants. PHILIP W. BELL & DR. MICHAEL P. TODARO, ECONOMIC THEORY 174 (1979). A free market is a market without any outside interference to disturb the interaction between the buyer and seller. *Id.*

18. RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW 3 (3d ed. 1986) (discusses application of economics to increasing range of legal fields). The seminal article on the economic analysis of law is by Ronald H. Coase, who developed the Coase Theorem. Ronald H. Coase, *The Problem of Social Cost*, 3 J. LAW & ECON. 1 (1960). According to the theorem, if transactions are costless, the initial assignment of a property right will not determine the ultimate use of the property. *Id.*

Posner explains this theorem with the following example: Suppose that a farmer has a right not to have his crops destroyed by sparks from passing railroad locomotives. POSNER, *supra* at 7. The crop's value to the farmer is $100, based upon the difference between revenue of $330 and labor and capital costs of $230, but the cost to the railroad of installing a mechanism to prevent sparks is $110. *Id.* It also costs nothing for the railroad and farmer to complete a transaction between themselves. *Id.* The real cost of the crops to the farmer is not $230; it is between $330 and $340, for it includes the price that the farmer could get by agreeing with the railroad not to use his property in a fire-sensitive way. *Id.* Therefore, since the true cost of exercising his right to grow crops exceeds his revenues, he will sell that right, and the use of his land will be the same as if the railroad had had the right to emit sparks freely. *Id.*

a positive step forward, it is an approach that has a number of pitfalls that could inhibit its effectiveness. However, if the pitfalls are successfully negotiated, the use of economic forces to drive legislation could be effective in many areas.

I. HISTORICAL BACKGROUND

A. Evolution of Air Pollution Laws

The English Common Law first recognized the problem of air pollution[19] as early as 1273.[20] During the reign of Edward I, England enacted the first smoke abatement ordinance.[21] Before such statutory laws were enacted, common law nuisance[22] was the only

19. Air pollution consists of particles and gases in the air that for various reasons are considered undesirable. DAVID P. CURRIE, POLLUTION: CASES AND MATERIALS 9 (1975). In fact, nature, including trees, causes air pollution. *See* [19 Current Develpoments] Env't Rep. (BNA) 1086 (1988) (detailing how research supports President Reagan's assertion that trees cause pollution by contributing to ozone formation).

There are five main classes of pollutants that fill our air:

1. *Sulfur dioxide* (SO_2) is an acrid, corrosive, poisonous gas produced when fuel containing sulfur is burned. CURRIE, *supra* at 10. Electric utilities and industrial plants produce most of the SO_2 in the air by their burning of coal and oil. *Id.*

2. *Nitrogen oxides* (NOx) are produced when fuel is burned at very high temperatures. *Id.* at 11. Combined with sunlight, NOx mix with gaseous hydrocarbons to form, among others, such pollutants as ozone, a toxic form of oxygen and nitrogen dioxide. *Id.*

3. *Carbon monoxide* (CO) is a colorless, odorless, poisonous gas that is produced by the incomplete burning of the carbon in fuels. *Id.* at 9. If the carbon fuel is allowed to burn completely, carbon dioxide, which is naturally present in the air, is produced in the place of CO. *Id.* The largest source of CO is automobile exhaust. *Id.*

4. *Hydrocarbons* (HCs) are the byproduct of unburned and wasted fuel. *Id.* at 10-11. Although not generally toxic when found in the atmosphere, HCs are a major pollutant because of their role in forming smog. *Id.* Automobiles are also a major source of HCs. *Id.*

5. *Particulate matter* ranges from visible forms such as soot and smoke to particles of solid or liquid waste undetectable to the human eye. *Id.* at 10. The source of these pollutants range from stationary fuel combustion and industrial processes to forest fires and other miscellaneous sources. *Id.*

20. FREDERICK R. ANDERSON ET AL., ENVIRONMENTAL PROTECTION: LAW AND POLICY 156 (2d ed. 1990). Common law nuisance was the earliest form of relief from air pollution. *Id.*

21. *Id.* The ordinance prohibited the burning of coal in the city of London. *Id.* A conviction for violation of this ordinance could lead to the execution of the violator. *Id.*

22. A nuisance is defined as an "activity which arises from unreasonable, unwarranted or unlawful use by a person of his own property, working obstruction or injury to right of another . . ." and producing "such material annoyance, inconvenience and discomfort that the law will presume resulting damage." BLACK'S LAW DICTIONARY 1065 (6th ed. 1990). In fact, nuisance is divided into public and private nuisance. "A public nuisance is the doing of or the failure to do something that injuriously affects the safety, health or morals of the public, or works some substantial annoyance, inconvenience or injury to the public." WILLIAM L. PROSSER, PROSSER ON TORTS 583 (4th ed. 1971) (quoting Common-

form of relief from pollution.[23]

The advent of the Industrial Revolution brought an accompanying increase in the level of air pollution. Because of contemporary economic realities and judicial hostility, nuisance actions were less effective.[24] In response to the increasing air pollution, the United States enacted its first pollution regulations in Chicago and Cincinnati in 1881, as the Industrial Revolution began to leave its side effects drifting in the air.[25] By 1912, twenty-three American cities with populations of over 200,000 had passed similar laws intended to control the ever-increasing air pollution problem.[26]

However, these city ordinances did little to stop the damaging effects of pollution.[27] Few people realized how dangerous air pollution was becoming until a number of incidents aroused public attention.[28] In 1948, in Denora, Pennsylvania, almost half of the town's 14,000 residents fell ill and 20 died because of the lingering air pollution.[29] In London, in 1952, a "killer smog" was blamed for an increase of 1,600 more deaths than normally would have occurred during that period.[30] These disasters led to a greater awareness of the air pollution problem and the need to find a solution.

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wealth v. S. Covington & C. St. R., 205 S.W. 581, 583 (1918)); 6 A.L.R. 118; *cf. City of Selma v. Jones*, 79 So. 476, 477 (1918). "It includes. . . interference with public comfort, as in the case of bad odors, smoke, dust and vibration. To be considered public, the nuisance must affect an interest common to the general public, rather than peculiar to one individual, or several." PROSSER, *supra* at 584-85.

A private nuisance, on the other hand, "is an interference with the use and enjoyment of land." *Id.* at 591. A private nuisance may consist of an interference with the physical condition of the land itself. An example of a private nuisance is the pollution of a stream. *Id.* at 592.

23. ANDERSON, *supra* note 20, at 157. There are other common law remedies for relief from pollution. *Id.* at 58. A private action for negligence could arise out of the improper disposal of waste if it was disposed of negligently and that negligence was the cause of some damage. *Id.* An action for trespass could be asserted if the pollution caused an interference with a person's possessory interest in his land. *Id.* at 59. Finally, an action for strict liability may be brought on the theory that damage was caused by a condition or activity that was abnormally dangerous because of its non-natural character. *Id.* at 62.

24. *See id.* at 157.

25. *Id.* at 156-57. These ordinances were not as harsh as their English counterparts. To enforce these ordinances, England levied fines on violators anywhere from ten dollars to one hundred dollars. For a discussion of early pollution ordinances, see generally Jan G. Laitos, *Legal Institutions and Pollution: Some Intersections Between Law and History*, 15 NAT. RESOURCES J. 423 (1975).

26. CURRIE, *supra* note 19, at 9.

27. *Id.* (the ordinances were only local in nature and levied small fines for infractions).

28. *Id.* (the Denora catastrophe made national headlines).

29. *Id.* at 12.

30. *Id.*

B. The Federal Government Gets into the Act

In 1955, the federal government addressed air pollution regulation for the first time and established the Air Pollution Control Act of 1955 ("1955 Act").[31] The 1955 Act was limited to a research program directed at discovering the causes and effects of air pollution.[32] It lacked any type of enforcement provision that would deter the emission of air pollutants.[33]

Eight years later, Congress passed the Clean Air Act of 1963[34] ("1963 Act"), which expanded the federal government's role.[35] This legislation gave investigative powers to the Department of Health, Education, and Welfare ("HEW").[36] Although the Secretary of

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31. Air Pollution Control Act, Pub. L. No. 84-159, 69 Stat. 322 (1963).

32. ANDERSON, *supra* note 20, at 158. The effects of air pollution are numerous and alarming. In addition to the health risks, air pollution damages buildings, statues, monuments, and other structures. *See* T. E. Graedel & R. McGill, *Degradation of Materials in the Atmosphere*, 20 ENVTL. SCI. & TECH. 1093 (1986). In fact, air pollution has caused Egyptian monuments in London and New York to corrode more in the last decade than in the previous three millennia. *Id.*

Air pollution is also being blamed for global warming, or as it is sometimes referred to, the greenhouse effect. The greenhouse effect is caused by the buildup of gases beyond the natural background levels normally found in the atmosphere. *Hearing Before the House Comm. on Foreign Affairs*, 100th Cong., 2d Sess. 96-98 (1988) (statement of Dr. Irving Mintzer, World Resources Institute). This buildup can cause a global warming that would also result in substantial changes in winds, rainfall and ocean currents. *Id.* This warning might lead to hotter and drier conditions in many midcontinent and midlatitude regions which could lead to drought conditions. *Id.* Scientists estimate that the global temprature could rise 1.5 to 4.5 degrees Celsius by 2030. Jennifer Woodward, *Turning Down the Heat: What United States Laws Can Do To Help Ease Global Warming*, 39 AM. U. L. REV. 203, 204 (1989). In contrast. the Earth's temperature has not fluctuated more than two degrees Celsius in the past 10,000 years. *Id.*

By far the most dangerous and threatening effect of air pollution is to the health of human beings. *Annual Health Costs*, *supra* note 7, at 1648. Despite the difficulties of establishing medical evidence to prove the harm caused by air pollution, scientists have been able to show how dangerous air pollution is to human health. *Id.*

One of the first extensive studies on this subject showed the correlation between SO_2 levels and acute illness in patients with chronic bronchopulmonary disease. Bertram W. Carnow et al., *Chicago Air Pollution Study*, 18 ARCH. ENV. HEALTH 768 (1969). The study concluded that high daily levels of SO_2 exposure among elderly persons exacerbated symptoms of acute respiratory illness. *Id.*

A more recent study of the damaging effects of air pollution on the health of human beings shows that illness and premature deaths resulting from breathing polluted air costs $40-50 billion annually. *Annual Health Costs*, *supra* note 7, at 1648.

33. Air Pollution Control Act, Pub. L. No. 84-159, 69 Stat. 322 (1963).

34. Clean Air Act, Pub. L. N. 88-206, 77 Stat. 392 (1963).

35. *See id.*

36. *See* Clean Air Act, Pub. L. No. 88-206, 77 Stat. 392 (1963). The Department of Health, Education, and Welfare ("HEW") is now called the Department of Health and Human Services.

HEW now had the power to investigate pollution problems, the Secretary could only recommend abatement programs, which a state or local government could choose to ignore.[37] If a factory or utility was emitting air pollutants that were shown to endanger "the health or welfare of persons," the Secretary was empowered to begin a lengthy enforcement process that might feasibly conclude with an action by the Attorney General enjoining the polluting sources.[38] However, as part of the enforcement process, the 1963 Act provided for a series of conferences and procedures that drew out the process for such a long time that only one federal enforcement action was ever filed.[39]

It was not until 1967[40] that the federal government established a comprehensive federal-state skeletal structure for air pollution control.[41] The 1967 Air Quality Act was the first legislation in the United States that required implementation plans and provided for enforcement provisions.[42] While HEW designated national geographic air quality control regions, Congress required the states to adopt numerical ambient air quality standards for each major pollutant.[43]

To effectuate this process, HEW maintained control over the states because the standards created by the states were based upon HEW criteria and subject to HEW approval.[44] In addition, the plan that described how a state was going to meet HEW's standards (referred to as a state's implementation plan or "SIP") was subject to HEW approval.[45] The implementation plan had to detail the specific numerical emissions limitations that factories or utilities would

37. ANDERSON, *supra* note 20, at 158.

38. *Id.* Allowing the Attorney General to enjoin a polluting source was the first direct federal legal action taken to abate pollution. *Id.*

39. *Id.* at 159.

40. Congress enacted the Motor Vehicle Air Pollution Control Act in 1965. Motor Vehicle Air Pollution Control Act, Pub. L. No. 89-272, 79 Stat. 992, (1965). The Act was the first legislation to enact federal air pollution emissions standards into law. ANDERSON, *supra* note 20, at 158.

41. *See* Air Quality Act, Pub. L. No. 90-148, 81 Stat. 485 (1967).

42. ANDERSON, *supra* note 20, at 158. Specifically, federal enforcement could be achieved a number of ways under the 1967 Act. HEW could enforce through: (1) a conference initiated by the procedures created in the 1963 Act; (2) a new provision authorizing the Attorney General to act if air quality in a state fell below set standards and the state failed to take reasonable action either to implement or enforce the standards; or (3) a new provision enabling the Attorney General to act immediately if an 'imminent and substantial' danger to health existed." *Id.*

43. *Id.* at 158-59. *See infra* note 57 (for a discussion of numerical ambient air quality standards ("NAAQS") and EPA's list of pollutants).

44. *See infra* note 57 (for a discussion of NAAQS and EPA's list of pollutants).

45. ANDERSON, *supra* note 20, at 158. If the state's proposed standards did not satisfactorily reflect the findings of the federal criteria documents, HEW could establish its own standards. *Id.*

have to achieve to meet the state's ambient standards.[46]

Unfortunately, the 1967 Act was no more successful at controlling air pollution than the 1963 Act. In fact, it failed miserably in practice.[47] This failure was due both to the enormous task that the federal and state agencies faced in preparing implementation plans and enforcement standards and to the lack of the technology required to deal with the problem.[48]

C. The 1970 Amendments[49] to the Clean Air Act: The Command and Control Era

In response to these early environmental legislative failures, and a drastic decrease in air quality, Congress acted with uncharacteristic decisiveness in amending the Clean Air Act in 1970 ("1970 Amendments"). The 1970 Amendments were passed by an overwhelming 73-0 vote in the Senate and a 374-1 vote in the House of Representatives.[50] This legislation was heralded as the nation's most important and controversial environmental regulations.[51] However, for the reasons set out below, the effectiveness of the 1970 Amendments never came close to their proclaimed importance.

Congress used a "command and control"[52] structure to enforce the pollution regulations it promulgated in the 1970 Amendments.[53] Under a command and control system, the Environmental Protection Agency ("EPA") could command that certain levels of pollution reduction be reached and had the power to control the method

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46. *Id.*

47. *Id.* One reason that the 1967 Act failed was that federal enforcement still depended on the series of conferences and procedures that marked the demise of the 1963 Act. *Id.* However, the Attorney General was able to start an enforcement proceeding if an "imminent and substantial" endangerment to health existed. *Id.*

48. *See generally* DAVID P. CURRIE, AIR POLLUTION (1981). (discussing the inherent flaw in the 1967 Act)

49. Pub. L. No. 91-604, 84 Stat. 1676 (1970).

50. ANDERSON, *supra* note 20, at 160.

51. William F. Pendersen, Jr., *Why the Clean Air Act Works Badly*, 129 U. PA. L. REV. 1059, 1059 (1981) (arguing that the 1970 and 1977 Amendments to the Clean Air Act were too cumbersome and poorly suited to address air pollution control).

52. Adam Babich, *Understanding the New Era in Environmental Law*, 41 S.C. L. REV. 733, 736 (1990). Babich feels the problem with the command and control regulation is that it "presupposes the government's ability to: (1) identify environmental problems and set rational priorities; (2) develop regulations that provide technologically workable and politically viable solutions; and, (3) enforce those regulations effectively." *Id.*

53. Yvonne F. Lindgren, Note, *The Emissions Trading Policy: Smoke on the Horizon for Taking Clause Claimants*, 18 HASTINGS CONST. L.Q. 667 (1991) (discussing whether the EPA's emission trading policy conflicts with the Takings Clause of the United States Constitution).

by which the levels were to be reached.[54] The command and control system is based upon the idea that compliance with environmental regulations must be compelled.[55] Accordingly, it provides no incentive for achieving reduced emission levels, but it does impose heavy fines on polluters who exceed their licensed emission levels.[56]

The 1970 Amendments required that the EPA establish National Ambient Air Quality Standards ("NAAQS")[57] to regulate the maximum allowable level of specific airborne pollutants tolerated in the air at any time.[58] In addition, the 1970 Amendments provided

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54. Dr. Philip R. O'Connor, Energy and the Environment: Market-Based Compliance Versus Regulatory Anachronisms (Mar. 23, 1991) (unpublished manuscript, on file with the Palmer Bellevue Corporation).

55. Dana A. Rasmussen, *Enforcement in the U.S. Environmental Protection Agency: Balancing the Carrots and the Sticks*, 22 ENVTL. L. 333 (1991) (arguing that incentives are needed to change polluter's behavior).

56. Lindgren, *supra* note 53, at 667. Because of the sometimes draconian economic consequences of compliance with the command and control regulations, there was often significant delay in compliance with the rules. Palmer Bellevue Corporation, Proposal to Evaluate and Develop an Emission Credit Trading Program for the Metropolitan Chicago Area 2 (1990) (unpublished article on file with the Palmer Bellevue Corporation). In some cases, businesses facing significant emission reduction requirements relocated to other areas or closed entirely, resulting in job losses and economic loss to the area. *Id.* at 3. Further, command and control does not incorporate incentives for achieving additional reductions (below required levels) by those sources able to make such reductions on a cost effective basis. *Id.*

57. Clean Air Act Amendments of 1970, Pub. L. No. 91-604, 84 Stat. 1676 (1970)(codified as amended at 42 U.S.C. § 7409(a)(1) (1988)). National Ambient Air Quality Standards ("NAAQS") is the maximum allowable concentration in ambient (outside) air for each pollutant for which air quality criteria has been issued. Daniel J. Dudek & John Palmisano, *Emissions Trading: Why is this Thoroughbred Hobbled?*, 13 COLUM. J. ENVTL. L. 217, 219 (1988). Pollutants that are currently on the Environmental Protection Agency's ("EPA") list include asbestos, benzene, beryllium, coke oven emissions, inorganic arsenic, mercury, raionuclides, and vinyl chloride. 42 U.S.C. § 7412(b)(1) (1988). The EPA determined that attainment and maintenance of these standards is required to protect public health and welfare from any known or anticipated adverse effects that may be caused by the presence of the above-mentioned pollutants in the air. Dudek & Palmisano, *supra* at 220. The NAAQS are periodically revised and may increase or decrease over time, depending on new health data. *Id.*

The 1970 Amendments created primary and secondary ambient air standards. 42 U.S.C. §§ 7409(b)(1),(2) (1988). Primary ambient air quality standards are those required to protect public health. § 7409(b)(1). Secondary ambient air quality standards are those to protect the public welfare. § 7409(b)(2). The difference between the two standards was that primary standards were required to be achieved by 1975, while secondary standards were required to be met within a reasonable time. § 7410(a)(2)(A)(i)(ii).

58. Martin Bern, *Government Regulation and the Development of Environmental Ethics Under the Clean Air Act*, 17 ECOLOGY L.Q. 539, 543 (1990) (discussing role ethical considerations take in environmental regulation); *see also* Mark Sagoff, *We Have Met the Enemy and He is Us or Conflict and Contradiction in Environmental Law*, 12 ENVTL. L. 283 (1982) (discussing whether environmental policies should be based upon maximizing the satisfaction of consumer demand or ethical considerations).

that each state be divided into air quality control regions.[59] The state was then required to identify which regions met the NAAQS and which did not.[60] After this identification, the EPA required that the state develop SIPs that described a method for achieving the NAAQS.[61] The EPA reviewed all SIPs and could substitute its own plan for the state's if the EPA determined the state plan was unacceptable and would not cure the defect.[62]

To effectuate the SIPs, states were required to regulate industrial and utility emissions of pollutants within their own boundaries.[63] This self-regulation led to a disastrous but unintentional effect: it encouraged utilities and industries to build their smokestacks so tall that the emitted pollutants would drift beyond state lines.[64] In fact, by 1981, there were 179 smokestacks built higher than 500 feet and 20 smokestacks built 1,000 feet high so that their emissions went beyond state lines.[65] This in part led Robert B. Flacke, Commissioner of New York State's Department of Environmental Conservation, to state, "[T]he [1970 Amendments to the] Clean Air Act [were] one of the chief reasons for the increase in acid rain."[66]

The 1970 Amendments to the Act were also problematic because the regulatory scheme made the protection of human and environmental health absolute.[67] In other words, the EPA could not take the economic feasibility or the costs of pollution reduction into account when determining the NAAQS.[68]

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59. 42 U.S.C. § 7407(c) (1988).

60. *Id.*

61. Clean Air Act of 1970, Pub L. No. 91-604, § 4(a), 84 Stat. 1676, 1680 (codified as amended at 42 U.S.C. § 7410(a)(2)(B)). All State Implementation Plans ("SIPs") included "emission limitations, schedules and timetables for compliance with such limitations, and such other measures as may be necessary to ensure attainment and maintenance of such primary and secondary standards, including, but not limited to, land-use and transportation controls." *Id.*

62. *Id.*

63. Moore, *supra* note 1, at 136 (noting prior attempts to clean air legislation and reasons why 1990 Amendments may succeed where others failed).

64. *Id.*

65. Anne Labastille, *Acid Rain: How great a Menace?*, NAT'L GEOGRAPHIC, Nov. 1981, at 652 (outlining severity of acid rain problem and reasons why problem is getting worse).

66. *Id.*

67. Bern, *supra* note 58, at 544.

68. *Id.*; *see also* Union Electrical Company v. Environmental Protection Agency, 427 U.S. 246 (1976) ("the three year deadline for achieving primary air quality standards . . . leaves no room for claims of technological or economic feasibility"). American Petroleum Inst. v. Costle, 665 F.2d 1176 (D.C. Cir. 1981) (economic feasibility not a relevant consideration in the promulgation of national ambient air quality standards for ozone under the CAA), *cert. denied*, 455 U.S. 1034 (1982); Lead Indus., Inc. v. EPA, 647 F.2d 1130 (D.C. Cir.) (statutory

Finally, another one of the 1970 Amendments' problems precipitated out of the mandate for the achievement of environmental objectives regardless of the reality or possibility of achieving such objectives.[69] For example, the reductions in automobile emissions that were required to be achieved by 1975 were simply not possible with the available technology.[70]

Accordingly, despite the genuine attempt to deal with the ever-increasing problem of air pollution, the 1970 Amendments failed to remedy, and in some cases even exacerbated, the pollution problem.[71] This failure led to another attempt by the federal government to solve the pollution problem: the enactment of the 1977 Amendments to the Clean Air Act.[72]

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language of CAA does not allow EPA to consider economic feasibility in setting air quality standards for lead), *cert. denied*, 449 U.S. 1042 (1980).

The following quote by Senator Edmund Muskie illustrates the degree to which environmental and health concerns took precedence over economic or any other concerns: "The standards must be set to provide an ample margin of safety to protect the public health. This could mean, effectively, that a plant could be required to close because of the absence of control techniques. It could include emissions standards which allow for no measurable emissions." 116 CONG. REC. 42,385 (1970).

An example of the harshness of the statutory requirements is dramatized by their implication in Los Angeles, which in warmer months would have had to reduce vehicle travel by eighty-two percent to meet the primary ambient standard for photochemical oxidants by the statutory deadline of 1975. David P. Currie, *Relaxation of Implementation Plans Under the 1977 Clean Air Act Amendments*, 78 MICH. L. REV. 155 (1979-80). Currie questions whether the desirability of eliminating Los Angeles smog is worth the costs of shutting down the City of Los Angeles. *Id.* at 156.

69. David Schoenbrod, *Goals Statutes or Rules Statutes: The Case of the Clean Air Act*, 30 UCLA L. REV. 740, 749 (1983) (discussing whether 1970 Amendments were unreasonable due to imposition of rules that did not consider feasibility of implementation of rules).

70. John E. Bonine, *The Evolution of "Technology-Forcing" in the Clean Air Act*, Env't Rep. (BNA) Monograph 21 (July 25, 1975). 42 U.S.C. § 7521 (1988) required the reductions by 1975.

71. Labastille, *supra* note 65, at 652.

72. 42 U.S.C. §§ 7401-7642 (1988).

D. The 1977 Amendments to the Clean Air Act: Emissions Offset Policy,[73] a Step in the Right Direction

Congress enacted the 1977 Amendments to the Clean Air Act[74] ("1977 Amendments") to reduce administrative and enforcement costs, to improve compliance, and to reduce the time needed to comply with congressionally mandated air quality standards.[75] Congress decided that the best way to achieve its goals was to forgo the command and control type of legislation in favor of a market-sensitive approach.[76] As part of this new direction, Congress adopted an emission offset policy.[77]

The 1977 Amendments codified this policy.[78] The 1977 Amendments provided that states could still issue permits to manufacturers in areas non-attainment (areas that failed to meet the NAAQS) if total allowable emissions from the new source, as well as existing

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73. The EPA introduced the "offset policy" in 1976 when it became clear that the nation was not going to meet the required attainment standards set by the 1970 Amendments' deadline. Jack L. Landau, Note, *Who Owns the Air? The Emission Offset Concept and its Implications*, 9 ENVTL. L. REP. 575 (1979). In fact, by 1975, of the "247 air quality control regions in the nation, 60 are projected not to meet standards by statutory deadlines for TSP and 42 for sulfur dioxides. For oxidants, 74 air quality control regions have reported levels in excess of the national ambient air quality standards." H.R. REP. NO. 1175, 94th Cong., 2d Sess. 177-78 (1976). Under the 1970 Amendments, failure to attain the standards meant that permits to construct new or modified sources could no longer be issued. Comment, *Emission-Offset Banking: Accommodating Industrial Growth with Air-Quality Standards*, 128 U. PA. L. REV. 932, 940 (1980).

The question was raised whether new stationary sources, needed to support economic development, could be legally permitted in non-attainment areas. Bruce M. Kramer, *The 1977 Clean Air Act Amendments: A Tactical Retreat From the Technology-Forcing Strategy?*, 15 URB. L. ANN. 103, 108 (1978). A solution was given by a 1976 EPA interpretive ruling of the 1970 Amendments that allowed economic development in non-attainment areas under certain conditions. 41 Fed. Reg. 55,524 (1976). This ruling allowed new or modified sources in non-attainment areas if: (1) the new or modified source could limit its emissions to the "lowest achievable emission rate" which was determined by the "most stringent emission limitation in any SIP and the lowest emission rate which is achieved in practice for such type of source;" *Id.* at 55,528. (2) the owner of the new or modified source is in compliance with all applicable SIP requirements for any other sources owned; *Id.* at 55,529. (3) the owner of the new or modified source could demonstrate sufficient emission reductions at existing sources to more than "offset" the amount of emission that would be produced by the new or modified plant; *Id.* and, (4) the "offsets" proposed by the owner of the source would provide sufficient reductions in air pollution to make reasonable progress in the attainment of the applicable NAAQS and provide a "net Benefit" to the air quality of the affected areas. *Id.*

74. 42 U.S.C. §§ 7401-7642 (1988).

75. Emissions Trading Policy Statement, 51 Fed. Reg. 43,814, 43,830 (1986).

76. Lindgren, *supra* note 53, at 667.

77. 41 Fed. Reg. 55,528 (1976). See *supra* note 73 discussing the significance of the ruling.

78. 42 U.S.C. § 7503(1)(A) (1977); *see also supra* note 73 (for a detailed discussion of the 1976 interpretive ruling and the offset trading policy).

sources in the region, were projected to be "sufficiently less than total emissions from existing sources . . . prior to the application for such permit to construct or modify."[79] This created a market for the emission reduction credits ("ERCs") because businesses or utilities that wanted to modify an existing facility, or build a new facility, in a non-attainment area had to obtain sufficient ERCs from an existing operation to offset their future emissions.[80]

In the 1977 Amendments, Congress introduced market forces into pollution regulation, and the emission offset policy led to emissions trading.[81] Firms bought ERCs from other firms to meet their goal of growth in a non-attainment area.[82] However, trading among and between firms was not the only use of ERCs.

ERCs were used for expansion or other modifications that would normally have required a New Source Review ("NSR") without using ERCs.[83] A facility that was going to build a new smokestack or other point of emission could avoid an NSR by counting the total emissions at the plant.[84] Through the device of "netting," emissions were measured among all emitting points in a plant instead of only at the modified point at the plant.[85] Because there would be no net increase in emissions, there would be no need for an NSR.[86]

ERCs were also used as "bubbles" to treat pollution reduction

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79. *Id.*

80. Lindgren, *supra* note 53, at 671. This advertisement was evidence that a market for these emission offsets was created:

> For Sale: Substantial Hydrocarbon Emission Offset in the Chicago area. For details, contact Box EZ-300, Wall Street Journal.

MOTHER JONES, Nov. 1979, at 12. A woodfinishing plant that was closing, placed this advertisement in the Wall Street Journal. *Id.* The plant's closing would reduce air pollution in Chicago by about 1600 tons of emissions per year, which could have been worth as much as $3000 to a buyer who wanted to expand or build in Chicago. *Emission-Offset Banking: Accommodating Industrial Growth with Air-Quality Standards, supra* note 73, at 937.

81. Dudek & Palmisano, *supra* note 57, at 220. In fact, several active ERCs markets were developing making ERCs a commodity of sorts. *Id.* at 225. In addition, between 1976 and 1988, there were more than 100 ERCs transactions completed between various firms. *Id.*

82. *Id.*

83. *Id.* This was referred to as "netting." *Id.* Netting is an emission trading method involving the use of ERCs gained at an existing facility to compensate for the emission increases associated with a proposed modification at the same facility. *Id.* at 226.

84. *See id.* By using the aggregate of the plant, the manager of the plant could get a new source of emissions built. *See id.* The manager could accomplish this by making sure that the aggregate emissions with the new source included was at or below the emissions level before the source was built. *See id.* at 225.

85. *Id.* at 226.

86. *Id.*

in the aggregate at a facility, rather than by the individual source.[87] Bubbles allow a firm to increase emissions at one or more of its sources in exchange for larger decreases at other emission sources so that the total emissions from a facility do not exceed the sum of the individual emission limits of all sources.[88] The advantage of the bubble method is that it permits facilities to rearrange emission controls to take advantage of the least-costly method of compliance.[89]

Emission trading was an improvement in the long struggle to find a method of improving air quality while still encouraging economic growth.[90] However, there is no data to establish that, on its own, emissions trading itself results in improved air quality.[91] Therefore, legislation was required that would incorporate the benefits of the market approach of emissions trading program with strict, aggressive pollution controls. The 1990 Amendments to the Clean Air Act[92] ("1990 Amendments") represent the incorporation of market forces into pollution regulation.

II. THE 1990 AMENDMENTS TO THE CLEAN AIR ACT

The 1990 Amendments became effective on November 15, 1990.[93] Subchapter IV of the 1990 Amendments,[94] entitled Acid Deposition Control, contains the allowance trading provisions which makes this legislation so unique and interesting. While there may be some problems with the implementation of this legislation, it will reduce sulfur dioxide ("SO_2") emissions. However, whether the use of market forces will reduce the costs of complying with this legislation is less certain. An analysis of this legislation and its allowance program and implementation requirements is required to determine whether the 1990 Amendments will succeed where other pollution regulations have failed.

Specifically, insofar as the 1990 Amendments make use of free market forces, the need to create a market to trade these allowances should be examined and the procedures for creating this market should be explored. The use of market forces may present

87. *Id.* at 227.

88. Robert W. Hahn & Gordon L. Hester, *Where Did All the Markets Go? An Analysis of EPA's Emissions Trading Program*, 6 YALE J. ON REG. 109, 123 (1989). A source will only have sufficient incentives to employ a bubble if the firm employs an inefficient mix of emissions control and the marginal costs of emissions control would justify the use of a bubble. *Id.*

89. Dudek & Palmisano, *supra* note 57, at 227.

90. *Id.* at 230.

91. *Id.*

92. 42 U.S.C.A. § 7651 (West Supp. 1991).

93. *Id.*

94. *Id.*

unique problems for this legislation. Finally, while there may be possible problems with this legislation, they are not insurmountable, and the allowance program should meet its goals of cutting emissions by 8.5 million tons from 1980 levels while reducing compliance costs.[95]

A. Subchapter IV-Acid Rain Program

The purpose of Subchapter IV is to reduce SO_2 emissions by 8.5 million tons below 1980 levels, at the lowest cost to society.[96] To achieve these SO_2 reductions, the law sets up an "allowance" program to encourage market-based solutions for controlling air pollution.[97] The allowance program gradually tightens the restrictions placed on fossil fuel-fired power plants in a two-phase program.[98] Phase I begins January 1, 1995, for the 111 plants that emit the greatest amount of SO_2.[99] Phase II, which will affect most power plants, begins January 1, 2000, by setting a total emissions cap of 8.9 million tons of SO_2 allowed nationwide.[100]

B. Congress's Goal to Cut Acid Rain and Compliance Costs

The primary purpose of Subchapter IV is to reduce SO_2 emissions by 8.5 million tons below 1980 levels.[101] This goal is to be achieved through "alternative methods of compliance."[102] The "alternative methods of compliance" language of this legislation is in direct contrast to the technology-forcing or command and control type of legislation that was used in earlier clean air acts and amend-

95. S. REP. No. 101-228, 101st Cong., 2d Sess. 6, *reprinted in* 1990 U.S.C.C.A.N. 3685.

96. 1990 U.S.C.C.A.N. 3685.

97. Sulfur Dioxide Allowance System, 40 C.F.R. § 73 (1991).

98. *Id.*

99. 42 U.S.C.A. § 7651c.

100. 42 U.S.C.A. § 7651d.

101. 42 U.S.C.A. § 7651(b). The 1990 Amendments state that:

> The purpose of this subchapter is to reduce the adverse effects of acid deposition through reduction in annual emissions of sulfur dioxide of ten million tons from 1980 emission levels, and, in combination with other provisions of this chapter, of nitrogen oxides emissions of approximately two million tons from 1980 emission levels, in the forty-eight contiguous States and the District of Columbia. *It is the intent of this subchapter to effectuate such reductions by requiring compliance by affected sources with prescribed emission limitations by specified deadlines, which limitations may be met through alternative methods of compliance provided by an emission allocation and transfer system.* It is also the purpose of this subchapter to encourage energy conservation, use of renewable and clean alternative technologies, and pollution prevention as a long-range strategy, consistent with the provisions of this subchapter, for reducing air pollution and other adverse impacts of energy production and use.

Id. (emphasis added)

102. *Id.*

ments. It allows utility companies to find the most cost-effective method of complying with the limits set by the 1990 Amendments.[103] Granting the utility companies this latitude should reduce the cost of compliance while achieving the emission-reduction goals of the 1990 Amendments.[104]

C. The Allowance Program

The sulfur dioxide allowance trading program is fundamental to the operation of Title IV.[105] At the heart of the trading program is the establishment of allowances.[106] However, the law's definition of an "allowance" is rather nebulous and raises many questions. An allowance is an authorization to emit one ton of SO_2.[107] However, an allowance, by definition is not a property right.[108]

An allowance is an unusual jurisprudential entity. It possesses some of the characteristics of private property,[109] such as transferability, but is by definition not property and is more in the nature of a revocable license.[110] The 1990 Amendments do not indicate, by definition, what an allowance is except that an allowance is an au-

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103. Telephone Interview with Kris A. McKinney, Administrator of Emission Allowances for the Wisconsin Power & Light Company (Sept. 24, 1991). McKinney is also a member of the Allowance Trading Subcommittee of EPA's Acid Rain Advisory Committee.

104. *Id.* For an explanation of why utility companies are interested in choosing this method of compliance flexibility with the 1990 Amendments, see text accompanying notes 135-47.

105. Daniel J. Dudek, Emissions Trading: Environmental Perestroika or Flimflam?, paper submitted to the ELECTRICITY J., at 2 (Oct. 1989).

106. *See* 42 U.S.C.A. § 7651b.

107. 42 U.S.C.A. § 7651a(3). The 1990 Amendments state that an allowance is an authorization, allocated to an affected unit by the Administrator under this subchapter, to emit, during or after a specified calendar year, one ton of sulfur dioxide. *Id.*

108. 42 U.S.C.A. at § 7651b(f). The 1990 Amendments deal with the property right issue by stating that:

> An allowance allocated under this subchapter is a limited authorization to emit sulfur dioxide in accordance with the provisions of this subchapter. *Such allowance does not constitute a property right.* Nothing in this subchapter or in any other provision of law shall be construed to limit the authority of the United States to terminate or limit such authorization.

Id. (emphasis added).

109. *See supra* note 23 for a definition of private property.

110. J. P. Waite, Introductory Narrative Regarding the Acid Rain Title of the Clean Air Amendments of 1990 3 (1990) (unpublished manuscript, on file with author). Although the statute states clearly that an allowance is not a property right, it does not state what an allowance is by definition. *Id.* at 4. Opposing views as to whether an allowance is a property right have developed. *Id.*

A Senate Environment and Public Works Committee Report of December 20, 1989, expressed concern with avoiding litigation under the "Takings Clause" of the United States Constitution. S. REP. NO. 101-228, 101st Cong., 1st Sess. 321 (1989). The Committee reiterated that the purpose in characterizing the legal or property status of allowances is to clarify that regulatory actions taken subse-

thorization to emit one ton of sulfur dioxide.[111] Without an allowance, a utility may not emit any sulfur dioxide without exposing itself to severe penalties.[112]

Once an allowance is allocated, it may be bought, sold, traded,

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quent to the "Takings Clause" of the United States Constitution. *Id.* The Committee went on to say, that:

> Allowances are, in large part, simply iterations of each unit's permit under this title. Since the permits will be, in effect, legally binding statements of each unit's emissions limitation obligations under the pollution control program established herein, the subsection makes clear that should Congress or the Administrator limit, revoke or otherwise modify the allowances or the underlying regulatory program established by new title IV of the Act or the regulations promulgated pursuant thereto, the U.S. government will not be obliged to compensate allowance-holders for loss of the allowances or any loss in their value. Allowances are but the means of implementing an emissions limitations program, which can be altered in response to changes in the environment or for other sound reasons of public policy.

Id.

However, a House Energy and Commerce Committee Report of May 17, 1990, views an allowance more like "quasi-property" and therefore stated that allowances are "utility assets." H. REP. NO. 101-490, 101st Cong., 2d Sess. 366 (1990).

But the strongest pro-property statement came from Representative Mike Oxley of Ohio, who emphasized the need for durability in the allowance trading program. 136 CONG. REC. E360, E3672 (daily ed. Nov. 2, 1990). He stated that while the statute states that an allowance is not a property right, it should be clear that "only Congress and the President, acting together through legislation, have the authority to limit or revoke allowances." *Id.* In addition, Congressman Oxley stated that Congress will be extremely reluctant to limit or revoke an allowance. *Id.*

The reason for Congress' reluctance is because they recognize that the decision to invest in overcontrol in most instances will be driven by the existence of the allowance-based market created by Congress. *Id.* Therefore, Oxley believed that Congress recognizes that there would be little reason for utilities to undergo the costs, efforts and expense of overcontrol if allowances could be revoked by the Administrator. *Id.*

Congressman Oxley went on to state that there is no limitation on the freedom of parties to enter into fully protectable contracts respecting allowances. *Id.* Therefore, allowances are protectable under commercial law, giving them a durable economic value. *Id.* In conclusion, he stated that while allowance-holders cannot rely on Congress to compensate them for the loss of an allowance, they could rely on allowance's continued existence when designing their compliance efforts. *Id.*

111. 42 U.S.C.A. § 7651b.

112. 42 U.S.C.A. § 7651. The amendments carry a heavy penalty for emitting any excess emissions. Any unit that emits SO_2 or NOx for any calendar year:

> in excess of the unit's emissions limitation requirement . . . shall be liable for the payment of an excess emissions penalty . . . That penalty shall be calculated on the basis of the number of tons emitted in excess of the unit's emissions limitation requirement . . . multiplied by $2000.

42 U.S.C.A. § 7651j(a).

> The owner or operator of any affected source that emits sulfur dioxide during any calendar year in excess of the unit's emissions limitation requirement or of the allowances held for the unit for the calendar year, shall be liable to offset the excess emissions by an equal tonnage amount in the following calendar year.

or banked for future use.[113] However, the EPA will not allocate allowances to affected sources[114] if doing so would result in total annual emissions of SO_2 from the utility in excess of 8.9 million tons.[115] As a result, these allowances will be extremely valuable commodities that utilities will trade to achieve compliance with the emission-reduction goals of the 1990 Amendments.

D. Phase I Emission-Reduction Requirements

Phase I requires that, after January 1, 1995, the 111 utility power plants emitting at a rate above 2.5 pounds of SO_2 per million British thermal units[116] (pounds/mmBtu) reduce their "baseline"[117] emissions, which is equal to 2.5 pounds/mmBtu multiplied by their average 1985-87 fuel consumption.[118] However, if a utility is not able to reduce its emissions to the required level, it will be able to avoid the fine if it can obtain enough allowances.[119]

A utility that does not have enough allowances may obtain the additional allowances needed to cover its emissions by one of the following methods: (1) transferring allowances from other units within its utility system that have excess allowances;[120] (2)

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42 U.S.C.A. at § 7651j(b).

In other words, there is a two-prong penalty. First, a utility will be fined $2000 per ton emitted in excess of a utility's allowances. Second, the owner of the utility has to offset its next year allowances by the amount emitted in excess of its allowance limit. The fee of $2000 will be adjusted for inflation and is designed to be higher than the cost of compliance. 1990 U.S.C.C.A.N. 3697.

113. EPA Draft Proposed Allowances Rule Summary, Fed. Reg. (Nov. 1991) (summary at 2, on file with author) [hereinafter EPA Draft].

114. An affected source is a source that includes one or more affected units which is subject to the emissions reduction requirements or limitations under Title IV. 42 U.S.C.A. § 7651a(1). A unit is defined as a fossil-fired combustion device. § 7651a(15).

115. 42 U.S.C.A. § 7651b.

116. A British thermal unit ("Btu") represents the quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit. WEBSTER'S DICTIONARY 229 (2nd ed. 1983).

117. 42 U.S.C.A. § 7651a(1). A utility's "baseline" is its annual quantity of fossil fuel consumed by an affected unit, measured in millions of British Thermal Units ("mmBtu's"), calculated as its average annual fuel consumption in 1985-87 multiplied by a 2.5 lb/mmBtu emissions rate, and then divided by 2000. *Id.* Table A in § 7651c lists the exact number of allowances issued in Phase I to each affected unit.

118. 42 U.S.C.A. § 7651c(a)(2)(A),(B).

119. 42 U.S.C.A. § 7651c(a). A utility is also responsible for its own monitoring of emissions. § 7651k. Owners and operators of utilities subject to Title IV are required to install and operate Continuous Emission Monitoring Systems ("CEMS") for each emitting source. *Id.* The EPA is required to draft regulations within eighteen months of the enactment of the 1990 Amendments that specify the requirements for CEMS or any other monitoring system with the same precision, reliability, accessibility, and timeliness as that provided by CEMS. *Id.*

120. EPA Draft, *supra* note 113, at 3.

purchasing allowances on the open market from another utility that has exceeded its control requirements and has extra allowances;[121] (3) purchasing allowances from an industrial plant or unaffected utility unit that elects to opt into the allowance system; or[122] (4) purchasing allowances though the EPA Auction and Sales Programs.[123]

On the other hand, a utility may choose to reduce its emissions far below the EPA's requirements (referred to as overcontrol)[124] by installing a scrubber on its smokestack,[125] switching to a lower sulfur fuel, or employing other energy conservation measures.[126] If the utility is able to reduce its allowances below the amount it needs for its own emissions, it may trade the allowances with other units in its system, sell them to other utilities for a profit, or bank the allowances to cover emissions in future years.[127]

In theory, high-emitting utilities, because they should have lower marginal costs[128] of control than low-emitting utilities, will employ the overcontrol strategy and sell their allowances at a price

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121. *Id.*

122. *Id.* Opting in occurs when an owner or operator of a unit that is not an affected unit but does emit SO_2 elects to become an affected unit and receive allowances. 42 U.S.C.A. § 7651i(a).

123. EPA Draft, *supra* note 113, at 5. The EPA administrator is required to set up a special allowance reserve containing allowances to be sold to utilities. 42 U.S.C.A. § 7651o(b). The reserve will be set up withholding 2.8% of the allocation of allowances for each of the years 1995-99 and 2.8% of the basic Phase II allowances allocation beginning in the year 2000. *Id.* § 7651o(b)(1),(2).

124. Robert W. Hahn & Robert N. Stavins, *Incentive-Based Environmental Regulation: A New Era from an Old Idea?*, 18 ECOLOGY L.Q. 1, 7 (1991). (economic incentive approaches provide firms with incentives to find cleaner and less expensive production technologies leading to overcontrol).

125. A scrubber is a sophisticated, very expensive devise that takes the SO_2 out of electrical power plants. Moore, *supra* note 1, at 138. Scrubbers take the SO_2 out of the emissions after the coal is burned but before it goes up the smokestack. *Id.*

A scrubber mixes limestone with gases produced by a boiler that attaches to the SO_2 creating a sludge that can be easily collected. *Id.* Even though this process can clean the emission by as much as 92%, scrubbers are not widely used because of their high cost. *Id.* Retrofitting a scrubber (putting a scrubber in an existing power plant) costs between $150,000-$160,000 per megawatt (1 million watts) expended. *Id.* Because a typical power plant in the United States puts out 500 megawatts per year, retrofitting a plant with a scrubber could cost between $75 million and $80 million. *Id.*

It is also expensive to put a scrubber in a new plant. When the Bruce Mansfield power plant was built in 1980, one-third of the $1.4 billion cost was attributed to scrubbers and dams to hold the sulfuric sludge. Labastille, *supra* note 65, at 679. The extra costs raised the utility bills in the Shippingport service area by 7%. *Id.*

126. EPA Draft, *supra* note 113, at 9.

127. 42 U.S.C.A. § 7651b(b). Any transfer of allowances are not effective until a written certification of the transfer, signed by a responsible official of each party to the transfer, is received and recorded by the Administrator. *Id.*

128. Marginal cost is the additional cost incurred by producing one additional unit of output. BELL & TODARO, *supra* note 17, at 115.

that is higher than the cost of generating them.[129] The buyers will be low-emitting, high-cost compliance plants willing to purchase allowances at prices lower than the cost of generating them to achieve compliance.[130]

This allowance system contains an important feature of Phase I of the 1990 Amendments, the scrubber incentive program.[131] This program encourages the development of "clean coal" technologies.[132] The program encourages the use of the clean coal technologies not through subsidies, but through the allocation of extra, or bonus, allowances and compliance time extensions.[133] This will enable those utilities that choose to take the risk of developing and installing new technologies for the cleaner use of higher sulfur coals to delay their compliance with Phase I requirements. In turn, those utilities that may not have installed new technologies will be encouraged to consider the benefits of installation.[134] Because the government does not directly subsidize the development of these new technologies, the utilities are forced to use the most economical means of development.

E. Phase II Emission-Reduction Requirements

Phase II, which begins January 1, 2000, tightens the annual emissions limits imposed on the large higher-emitting plants covered in Phase I and also sets restrictions on smaller and cleaner plants fired by coal, oil and gas.[135] Generally, utilities that have a capacity of seventy-five megawatts or more and that had an actual 1985 SO_2 emissions rate of at least 1.2 pounds of SO_2 per mmBtu,

129. U.S. Senator Robert C. Byrd, *The Clean Air Act Amendments of 1990: An Innovative, But Uncertain Approach to Acid Rain Control*, 93 W. VA. L. REV. 477, 480 (1991) (explaining that 1990 Amendments create uncertainty among utility operators which could inhibit effectiveness of legislation).

130. *Id.* It is theorized that if every plant made the right economic choice and the low cost plants produced maximum allowances and sold their allowances to plants with high costs, the price of allowances would be in the $400 to $700 range. J. H. Bernard, Discussion on Value of Allowances 2 (unpublished manuscript, on file with author). However, many low cost producers will not produce excess allowances and those that do may hoard their allowances for themselves. A. Joseph Dowd, The Brave New World of Emissions Trading, Speech Presented at the National Association of Regulated Utility Commissioner's (NARUC) 102d Annual Convention 4 (Nov. 13, 1990) (transcript available at the American Electric Power Service Corporation of Columbus, Ohio). This will put upward pressure on the price of allowances, which could end up costing anywhere from $600 to $1400 for an allowance. Bernard, *supra*, at 2.

131. 42 U.S.C.A. § 7651c(f) (1988).

132. *Id.* Clean coal technologies are the use of scrubbers, low-sulfur burning coal or other technology that cuts emissions of SO_2. Waite, *supra* note 110 at 15.

133. 42 U.S.C. § 7651d.

134. Telephone Interview with Kris A. McKinney, *supra* note 103.

135. 42 U.S.C.A. § 7651d.

will be restricted from emitting more than the Phase II limits.[136]

III. CREATING A MARKET FOR ALLOWANCES

The use of an allowance market could result in a total cost savings of as much as $2 to $3 billion annually to the utilities that are required to reduce their emissions.[137] However, whether these savings are realized depends on how the allowance market is created.

A. Why a Market for Allowances Is Needed

Title IV of the 1990 Amendments has two goals: to reduce SO_2 emissions by 8.5 million tons below 1980 levels and to do so at the lowest cost of compliance.[138] This second goal is to be achieved by giving utilities a great deal of flexibility in the methods they use to comply with the law. The use of market forces is intended to achieve the second goal, not the first. This is because, whether or not a market is created, utilities must reduce their emissions by the deadlines set forth in the 1990 Amendments.[139] However, the key to the 1990 Amendments is the use of allowance trading to accomplish the first goal of emission reduction at a lower cost to utilities.

If the first goal is achieved without the benefit of a market for allowances, utilities will be unable to take advantage of market forces to lower their cost of compliance.[140] Whether utilities will be able to use the market forces to reduce their compliance costs depends on how the allowance market is designed and implemented.[141] If a market is not created, the allowance trading program will not have succeeded, even if Title IV's first goal is met.

The main reason that a robust allowance market is desirable is that it allows the achievement of full economic efficiency which in turn results in significant reductions in compliance costs.[142] If a

136. 42 U.S.C.A. § 7651d(a). Phase II calculates the emissions limit by multiplying the 1.2 pounds of SO_2 per million Btu's by the average annual quantity of mmBtu's consumed between the years 1985 and 1987, divided by 2000. *Id.* § 7651d(a)(2).

137. Carpenter, *supra* note 13, at 79.

138. 42 U.S.C.A. § 7651(b). See *supra* note 101 for a further explanation of Title IV's goals.

139. 42 U.S.C.A. §§ 7651c, 7651d.

140. Telephone Interview with Kris A. McKinney, *supra* note 103. McKinney felt that if a market-based approach is to work, a reliable futures market must develop as early as possible. *Id.* A centralized market place will provide the opportunity for explicit allowance transfers, and allow for hedging, all of which will increase certainty in utility planning. *Id.*

141. *Id.*

142. Dudek & Palmisano, *supra* note 57, at 238. Dudek states that as a result of a robust allowance market, utilities will be able to maximize their flexibility of compliance to the point of lowering the overall costs of the entire reduction and maintenance program. *Id.*

market is not created, utilities will be inhibited in their fiscal planning because they will not know the price of an allowance.[143] Thus the best method of compliance will be impossible to predict, and the goal of least-cost compliance will be undermined.[144]

Another reason that a strong allowance market is desirable is to permit new sources to obtain allowances through the market.[145] After 1995, sources not already in existence will be unable to procure allowances from the EPA.[146] Therefore, the only way that a growing area could build a new plant that emits SO_2 would be to obtain enough allowances through the allowance market.[147]

A less obvious argument in favor of a strong market is that a market-based environmental program will be closely watched and analyzed.[148] If a robust market is created, economic benefits will be plentiful.[149] This may encourage other types of legislation to use a market-based program.

B. How to Create a Market for Allowances

The EPA has developed alternatives for creating a market for allowances: (1) create a market itself through auctions on reserves or by acting as a broker for trades; (2) let the market create itself through private brokers or utility companies seeking trades; or (3) establish an association with an institution such as the Chicago Board of Trade to create the market.[150]

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143. Telephone Interview with Kris A. McKinney, *supra* note 103.

144. *Id.*

145. Dowd, *supra* note 130, at 6.

146. 42 U.S.C.A. § 7651d.

147. Dowd, *supra* note 130, at 6.

148. Telephone Interview with Dr. Philip R. O'Connor, Chairman of the Acid Rain Advisory Committee (Sept. 25, 1991).

149. *Id.*

150. 42 U.S.C.A. § 7651o sets up a method for the EPA to hold sales and auctions for utilities to obtain excess allowances. The EPA set will sell allowances at a price of $1500 per allowance, adjusted by the Consumer Price Index. § 7651o(c)(2).

A market is also being created through private brokers bringing together utilities who are already searching for allowances. Telephone Interview with Elizabeth T. Smith, Environmental Specialist for the National Acid Precipitation Assessment Program in Washington D.C. (Oct. 3, 1991).

Finally, the Chicago Board of Trade ("CBOT") announced that they approved contract specifications for allowances to be traded on the futures market. Andrew Stern, *Chicago Board of Trade Approves Pollution Futures*, REUTER BUS. REP., July 17, 1991, at 2.

The CBOT's objectives for their program is: (1) the establishment and administration of allowance transfer programs via an annual auction and a direct sale; (2) the establishment and operation of active cash markets that ensure the ability of market participants to acquire and dispose of allowances; (3) the establishment and operation of active futures markets that provide accurate pricing signals so that informed decisions can be made regarding emission control; and, (4) the establishment of information

The best possible means of creating of an allowance market would be to let all three occur. The EPA must create an allowance market that will provide utilities with the greatest possible certainty about the future consequences of its decisions. An allowance market would allow quick and easy transfers among utilities. Finally, an association with an institution such as the Chicago Board of Trade would allow utilities to continuously track the price of allowances on the market. The combination of these three alternative markets would result in certainty, ease of transfer and the ability to plan and forecast for future expenditures.

IV. WILL THE AMENDMENTS WORK?

Even if a market for allowances is established, the 1990 Amendments must overcome other potential obstacles to be a successful pollution-control legislation. The permanent cap on allowances in Phase II[151] raises questions whether this cap will inhibit economic growth and whether utilities will actually trade these allowances.[152] Another issue that could arise under this legislation is the conflict between federal and state jurisdiction.[153] These obstacles threaten the viability of this legislation, and will have to be dealt with for the 1990 Amendments to work.

A. Will the Amendments Inhibit Economic Growth?

States with little utility activity, or so-called clean states,[154] whose SO_2 emission rates are well below the rates of higher-emitting utilities will not be able to overcontrol to provide for future power plant construction.[155] Because of their inability to overcontrol, these clean states may become dependent upon obtaining allowances from higher-emitting utilities in the Midwest in order to ensure future growth within their own states. However, if the midwestern, or other higher-emitting, states refuse to trade their allowances, then the economic growth in clean states could be in jeopardy.

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systems that can provide data necessary to evaluate the allowance program at the least cost.

Id.

151. In Phase II, the emission levels are reduced to 8.9 million tons. 42 U.S.C.A. § 7651d. Emissions will not be allowed above 8.9 million tons after the beginning of Phase II. *Id.*

152. Dowd, *supra* note 130, at 10.

153. *Id.* at 14.

154. A clean state is a state whose SO_2 emissions are well below the mandatory reduction requirements. Dowd, *supra* note 130, at 2. Clean states are generally from the southwest region of the United States. *Id.*

155. *Id.* at 2. It will be more difficult for these clean states to get excess allowances on their own because their SO_2 emissions are already so low that it will be very difficult to further decrease emmissions to get the allowances. *Id.*

The EPA has set up a reserve pool of allowances that it will put up for auction.[156] This will allow utilities that do not have a surplus of allowances the ability to expand and meet the demands of economic growth in their state.[157] However, because there will be a permanent cap on emissions by the year 2000, some utilities may not be able to get all the allowances that they desire even with the EPA's reserve pool. Yet, this constraint on growth is necessary and unavoidable if the 1990 Amendments are going to meet their strict emission reduction goals. Congress has made a choice. Society in the future may have to suffer a technological slump so that people can breath fresher air.

B. Will Utilities Really Trade Allowances?

Apart from, or, in a sense, attached to, the problem of creating a market for the trading of the allowances is the question whether utilities will actually trade their allowances. Because the number of emission allowances will be permanently fixed at 8.9 million tons per year,[158] some utilities have already stated that they will hoard any allowances that they might have.[159] If all the utility companies retain their allowances and a market for them never materializes, the free-market portion of the 1990 Amendments is jeopardized.

However, hoarding will only occur if utility companies believe that the market will fail to provide them with the opportunity to obtain allowances in the future.[160] If a utility company believes that it will be unable to obtain any future allowances through the market, it may refuse to sell any that it has at present.[161] The scarcity of allowances on the market will drive up its cost, frustrating the least-cost goal of the 1990 Amendments.[162]

The reserve pool of allowances that the EPA will put up for auction should relieve any fears of unavailability of allowances on the market. It will address the hoarding problem on two fronts. First, it will offer an easy access to allowances for those attempting to purchase them. Second, it will ease the fears of those contemplating hoarding due to possible unavailability.

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156. 42 U.S.C.A. § 7651o.

157. Dowd, *supra* note 130, at 8.

158. 42 U.S.C.A. § 7651b.

159. Dowd, *supra* note 130, at 8. The Public Utilities Commission of Ohio adopted a policy resolution that discourages utilities from hoarding allowances. *Id.* Hoarding occurs when an allowance-holder refuses to sell its allowances, even though it is in its economic interest to do so. Brennan Van Dyke, *Emmissions Trading to Reduce Acid Deposition*, 100 YALE L.J. 2707, 2716 (1991).

160. Van Dyke, *supra* note 159.

161. *Id.*

162. *Id.* at 2712.

C. *Interface Between Federal and State Jurisdiction*

Another problem that may confront this legislation is the interface between federal and state jurisdiction. In fact, it has been argued that the 1990 Amendments have "created a comprehensive, pervasive national emissions trading program, that in order to work properly, has to be free of parochial state regulation."[163]

Multi-state holding companies that own utility companies in several states will likely encounter this jurisdictional problem.[164] The 1990 Amendments explicitly provide that the legislation does not affect any state law regulating utilities or limiting state regulation.[165]

Therefore, these multi-state holding companies[166] could possibly be subject to divergent rules, depending on what state they are dealing with at a given time.[167] As a result, these holding companies would be unable to place allowances gained from overcontrol into a system-wide pool or to deploy them on a system-wide basis.[168] This limitation, in turn, would prevent the holding companies from achieving the least-cost compliance goal of the 1990 Amendments.[169]

Therefore, to create uniformity and to achieve the least-cost compliance goal, these inter-state allowance trades should be subject to the exclusive jurisdiction of the Federal Energy Regulatory Commission (FERC) under the Federal Power Act.[170] This would

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163. Dowd, *supra* note 130, at 14.

164. *Id.*

165. 42 U.S.C.A. § 7651b(f). The act states that "[n]othing in this section shall be construed as requiring a change of any kind in any State law regulating electric utility rates and charges or affecting any State law regarding such State regulation or as limiting State regulation (including any prudency review) under such a State law." *Id.*

166. There are nine multi-state holding companies at the present time. Dowd, *supra* note 130, at 15. These holding companies will possess almost 25 percent of all allowances by the year 2000. *Id.*

167. Telephone Interview with Dr. Philip R. O'Connor, *supra* note 148.

168. Dowd, *supra* note 130, at 14-15. Since, multi-state holding companies' generation and transmission is planned on a centralized basis, it makes sense that their acid rain compliance should also be centrally-planned on a multi-state basis. *Id.* at 15. Therefore, to achieve the least-cost compliance, the excess allowances resulting from centrally planned overcontrol should also be placed in system-wide pools and deployed on a system-wide basis. *Id.* Otherwise, the multi-state holding companies would have to tailor their plans on a state-by-state basis. *Id.*

169. *See supra* note 101 for a discussion of the 1990 Amendments, purpose and goals.

170. The Federal Power Act of 1935 vests the Federal Energy Regulatory Commission ("FERC") with the exclusive authority to regulate the rates governing interstate sales of electricity for resale. 16 U.S.C. § 824(b) (1976). *See, e.g.*, New England Power Co. v. New Hampshire, 455 U.S. 331. (1982) (affirming FERC's exclusive jurisdiction over interstate sales of electricity).

The Act provides:

be consistent with FERC's exclusive jurisdiction, under the Federal Power Act over the transfer of electric energy among interstate companies.[171] Although state regulators would likely argue against exclusive FERC jurisdiction, it does make sense to have one authority and one set of rules.

The 1990 Amendments deal with this issue, but not in a definitive manner.[172] In fact, the language contained in the 1990 Amendments preserves the jurisdictional *status quo* between the state and federal regulatory systems.[173] By preserving the jurisdictional *status quo*, the legislation incorporates existing law of implied preemption and the case law on both sides of that issue.[174] This approach

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It is declared that the business of transmitting and selling electric energy for ultimate distribution to the public is affected with a public interest, and that Federal regulation of matters relating to generation . . . of that part of such business which consists of the transmission of electric energy in interstate commerce is necessary in the public interest.

16 U.S.C. § 824(b) (1976).

171. *See infra* note 174 for discussion of prudence versus cost-sharing distinction.

172. *See supra* note 170 for 1990 Amendment's statutory language regarding federal and state jurisdiction.

173. Preserving state jurisdictional power, the 1990 Amendments state that, "[n]othing in this section shall be construed as requiring a change of any kind in any State law regulating electric utility rates and charges or affecting any State law regarding such State regulation or as limiting State regulation . . . under such a State law." 42 U.S.C.A. § 7651b(f).

On the other hand, the next sentence preserves federal jurisdiction by stating that, "[n]othing in this section shall be construed as modifying the Federal Power Act [16 U.S.C.A. 791a et seq.] or as affecting the authority of the Federal Energy Regulatory Commission under that Act." *Id.*

174. Dowd, *supra* note 130, at 14. The case law on both sides of this issue center on interpreting the Federal Power Act and exactly what it has exclusive jurisdiction over and what the states have jurisdiction over. In Nantahala Power & Light Co. v. Thornburg, 476 U.S. 953 (1986), the Supreme Court held that the FERC has exclusive jurisdiction over rates to be charged electric utility's interstate wholesale customers under the Federal Power Act, 16 U.S.C. § 824(b) (1982). *Nantahala Power*, 476 U.S. at 953, 967. Once the charges the utility proposes are found to be "just and reasonable," a state cannot prohibit a utility from passing on its retail rates to its customers. *Id.* at 967. *See also* Mississippi Power & Light Co. v. Mississippi, 487 U.S. 354 (1988) (holding that rates determined by FERC to be just and reasonable, preempted an inquiry by the Mississippi Public Service Commission into the prudence of management); Narragansett Elec. Co. v. Burke, 381 A.2d 1358 (R.I. 1977) (jurisdiction to determine reasonableness of wholesale rates charged by interstate wholesale supplier of electricity rests exclusively with federal government). In addition, the *Nantahala* Court held that its jurisdiction is not limited to "rates" *per se* but also to decisions that directly affect a utility's rates by determining the amount and allocation of power. *Nantahala Power*, 476 U.S. at 953, 967.

However, in dictum, the Court said that a state utility commission does have jurisdiction if the commission finds that the utility acted imprudently in incurring the FERC-approved expenses when less expensive alternatives were available. *Id.* at 972; *see* Pike County Light & Power Co. v. Pennsylvania Public Utility Comm'n, 465 A.2d 735 (Pa. Commw. Ct. 1983) (states cannot deny recovery of FERC-approved rates for wholesale power purchase, but can examine prudence of purchase.) The *Pike* Court stated that a particular quantity of

does nothing more than defer a solution to this decision until it can be litigated in the courts.

A middle ground could be established. The Ohio Commissioner of Public Utilities, Ashley Brown, has suggested that nine regional multi-state regulatory agencies be created.[175] These agencies could try "to resolve pricing and other emissions trading issues on a uniform basis so that the centralized compliance planning of the multi-state system would not be impeded."[176]

While this suggestion would resolve both the federal preemption problem and the centralized compliance planning problem, it is not without its disadvantages. For example, it adds another tier of time-consuming regulation.[177] It could also lead to conflicts among states that could be difficult to resolve.[178] In addition, the question of how to resolve a dispute would have to be addressed. Because of these problems, the simplest solution would be to give FERC exclusive jurisdiction over inter-state allowance trades.

CONCLUSION

What makes this allowance trading program extraordinary is that it lowers SO_2 emissions by using a least-cost approach that does not rely on the government to prescribe technologies. In addition, it does not rely on the government to achieve the prescribed limits through intense regulation of each and every emitting source. Instead, the program requires substantial reductions in SO_2 emissions to be accomplished through a flexible plan that allows each utility to choose the most cost-effective method for its individual situation.

However, it must be remembered that flexibility is a double-edged sword. The flexibility that is built into the 1990 Amendments could lead to problems that may result in higher compliance costs. If a market for the allowances does not materialize, the goal

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power procured by a utility could be deemed unreasonable if lower cost power is available elsewhere, even though the higher-cost power purchased is obtained at a FERC-approved, and therefore reasonable, price. *Id.* at 737-38.

This prudence versus cost allocation distinction could be applied to interstate allowance trading to determine whether the states or the federal government should have exclusive jurisdiction. Dowd, *supra* note 130, at 15. The federal government would claim that allowance trading does not involve questions of prudence but questions of allocation of costs and benefits among an interstate system. *Id.* State utility commissioners, on the other hand, would claim that allowance trading is a question of prudence, reviewable by the state commissions. *Id.* Only a court could make a final determination, but the federal government has a stronger case and more case law on its side.

175. Dowd, *supra* note 130, at 15-16.

176. *Id.* at 16.

177. *Id.*

178. *Id.* Dowd cites such problems as conflicting state economic interests and equality of state voting rights. *Id.*

of reducing compliance costs will be impossible to achieve.[179] This failure could lead to drastically higher costs to both the utility companies and, eventually, the consumers. A failure of this legislation could also discourage the use of market forces to be used in any type of legislation.

On the other hand, if this legislation is successful Congress may enact a great deal more of legislation that is driven by market forces. Its success could lead to lower costs of compliance with all legislation employing market forces.

If the 1990 Amendments are successful, acid rain may no longer present a problem for our environment. Once again, we may be able to take our children to see the Grand Canyon without worrying whether we will be able to see to the bottom of it or whether we will be able to breathe.

Thomas R. Dee

179. In spring of 1992, while this paper was being published, the Tennessee Valley Authority ("TVA") and Duquesne Light Co. in Pittsburgh purchased allowances to emit sulfur dioxide for the first time under the Clean Air Act. *Duquesne, TVA First To Buy Allowances To Emit Sulfur Dioxide Under The Clean Air Act*, (Bureau of Nat'l Affairs, Daily Report for Executives) (May 13, 1992). These two companies purchased the right to emit about 30,000 tons of sulfur dioxide from the Wisconsin Power and Light Company. *Id.* Thus, it appears that a market for the allowances will materialize.