TRANSPORTATION CONTROL PLANS UNDER THE 1990 CLEAN AIR ACT AS A MEANS FOR REDUCING CARBON DIOXIDE EMISSIONS

INTRODUCTION

The dangers of global warming make it imperative that Americans reduce their dependence on automobiles.[1] A lifestyle dependent on instant personal mobility via the internal combustion engine is no longer viable because carbon dioxide emitted by automobiles is a significant cause of the global warming problem.[2] This note explores the potential for using transportation control plans under the Clean Air Act[3] to reduce carbon dioxide emissions from automobiles in the United States.

Although the global warming problem is international and measures taken under the Clean Air Act will be restricted in scope to the United States, an evaluation of potential carbon dioxide emissions reductions under transportation control plans is important. An international treaty containing meaningful limitations is many years away[4] and greenhouse gas emissions must be reduced now.[5] Until an international treaty is enacted, the United States should utilize the potential for emissions reductions contained in its national laws. Furthermore, the United States is responsible for more carbon dioxide emissions on a per capita basis than any other country in the world.[6] It is incumbent upon the United States to lead the way in reducing greenhouse gas emissions.

Global warming is the result of the greenhouse effect.[7] The greenhouse effect results from the atmospheric build-up of gaseous by-products of industrialization: carbon dioxide, ozone, methane, chlorofluorocarbons (CFCs), nitrous oxide, and other gases.[8]

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1. *See, e.g.*, CHRISTOPHER FLAVIN, WORLDWATCH PAPER 91: SLOWING GLOBAL WARMING: A WORLDWIDE STRATEGY (1989).

2. *See infra* notes 70-83 and accompanying text.

3. 42 U.S.C.A. §§ 7401-7671 (West 1983 & Supp. 1991).

4. Abram Chayes, *Managing the Transition to a Global Regime or What to Do til the Treaty Comes*, *in* GREENHOUSE WARMING: NEGOTIATING A GLOBAL REGIME 61, 61 (1991).

5. *See* FLAVIN, *supra* note 1, at 6.

6. *Id.* at 25-26. The United States produced over five tons per person in 1987. *Id.*

7. JAMES J. MACKENZIE, BREATHING EASIER: TAKING ACTION ON CLIMATE CHANGE, AIR POLLUTION, AND ENERGY INSECURITY 2 (1988). All of these gases, with the exception of chlorofluorocarbons (CFCs), result from the burning of fossil fuels. *Id.*

8. *Id.*

Normally, ultraviolet and visible radiation from the sun passes through the upper atmosphere and is reflected back into space in the form of infrared energy (i.e., heat).[9] Greenhouse gases in the upper atmosphere interfere with this process by absorbing the infrared energy before it reaches outerspace.[10] Heat is trapped in the atmosphere,[11] raising global temperatures.[12] Many scientists are convinced that unless emissions of greenhouse gases are reduced, the resulting increase in global temperatures will destroy the balance of life on earth.[13]

This note examines potential regulation of emissions of carbon dioxide from automobiles under the Clean Air Act.[14] The Act was enacted in 1970 to regulate air quality.[15] The Act creates a scheme of joint state and local regulation for improving air quality.[16] Although the Act has not yet been used to regulate greenhouse gas emissions, measures to reduce such emissions potentially fall within its scope.

Under the Clean Air Act a state is responsible for setting emissions levels for the various sources of regulated pollutants within the state. The most significant exception to this rule is the federal preemption of state authority to regulate automobile emissions.[17] However, states are still able to regulate automobile emissions indirectly through transportation control plans.[18] Transportation control plans regulate the use of automobiles.[19] They involve the adoption by the state of measures designed to ensure that the

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9. STEPHEN SEIDEL & DALE KEYES, CAN WE DELAY A GREENHOUSE WARMING? 1-2 (1983).
10. *Id.*
11. *Id.*
12. *Id.*
13. *Id.*
14. 42 U.S.C.A. §§ 7401-7671 (West 1983 & Supp. 1991).
15. Clean Air Amendments of 1970, Pub. L. No. 91-604, 84 Stat. 1676. The Clean Air Amendments of 1970 were a radical reworking of the Clean Air Act of 1963. *See* Clean Air Act of 1963, Pub. L. No. 88-206, 77 Stat. 392. The 1963 Clean Air Act was amended several times between 1963 and 1970 in a less dramatic fashion. *See* Clean Air Act Amendment of 1965, Pub. L. No. 89-272, 79 Stat. 992; Clean Air Act Amendments of 1966, Pub. L. No. 89-675, 80 Stat. 954; and Air Quality Act of 1967, Pub. L. No. 90-148, 81 Stat. 485. After 1970, the Clean Air Act was amended in 1974, 1977, and again in 1990. *See* Energy Supply and Environmental Coordination Act of 1974, Pub. L. No. 93-319, 88 Stat. 246, 256; Clean Air Act Amendments of 1977, Pub. L. No. 95-95, 91 Stat. 685; and Clean Air Act Amendments of 1990, Pub. L. No. 101-549, 104 Stat. 2399. *See also* FRANK P. GRAD, TREATISE ON ENVIRONMENTAL LAW § 2.03[1] (1991) (discussing the Clean Air Act prior to 1970).
16. 42 U.S.C. §§ 7401-7428 (1988).
17. *Id.* § 7543(a).
18. *Id.* § 7410(a)(2)(B).
19. *Id.* § 7408(f)(1)(A).

pollution control equipment is working properly, programs designed to encourage the use of carpools and mass transit, and other policies designed to decrease automobile use.[20] These measures are the only means by which states may regulate automobile pollutants.

Automobiles are a significant source of carbon dioxide emissions.[21] Thus, transportation control plans would be an essential component of any effort to reduce greenhouse gas emissions under the Clean Air Act. This note evaluates transportation control plans in order to determine whether they can be used to reduce automobile emissions effectively.

I. The Greenhouse Effect and Carbon Dioxide

A. The Causes and Effects of Global Warming

The greenhouse effect is caused by the build-up of carbon dioxide and water vapor in the atmosphere. It is a natural phenomenon,[22] and without it the temperature of the earth would decrease approximately sixty degrees fahrenheit, and life would not be possible.[23] The greenhouse effect is the process whereby some gases, such as carbon dioxide, absorb heat in "the same way that glass traps heat in a greenhouse."[24] Solar energy in the form of sunlight passes through these heat trapping gases and is reflected off the earth's surface in the form of heat (i.e., infrared radiation). The heat is then absorbed by the greenhouse gases resulting in a net warming of the planet.[25]

The present climate of the earth is the result of a delicate balance of "energy inputs, chemical processes, and physical phenomena."[26] In 1896, scientists theorized for the first time that human activity could upset this balance.[27] Today, scientists generally ac-

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20. *Id.*

21. *See* Flavin, *supra* note 1, at 42. *See also infra* notes 70-83 and accompanying text.

22. MacKenzie, *supra* note 7, at 4.

23. *Id. See also* Flavin, *supra* note 1, at 10. The author notes that the difference in temperature between Venus (where a human's blood would boil) and Mars (where a human would instantly freeze to death) "is largely due to the varying compositions of each planet's atmosphere." *Id.*

24. Flavin, *supra* note 1, at 10.

25. *See id.*

26. *Id.*

27. Flavin, *supra* note 1, at 10. Swedish chemist Svante Arrhenius theorized increased

cept the theory that carbon dioxide emissions from fossil fuel combustion can result in climate change by increasing the quantities of greenhouse gases in the atmosphere.[28]

It is estimated that a twofold increase of greenhouse gases will cause global temperatures to increase by 2.5 to 5.5 degrees celsius.[29] Although this temperature increase seems relatively small, it is dangerous because it will occur at a rate ten to fifty times greater than that which has occurred during the previous century.[30] The potential effects of this rapid warming are difficult to predict because they will vary from region to region.[31] For example, atmospheric models predict that high and middle latitudes, such as Canada and the United States, will experience greater temperature increases than tropical regions close to the equator.[32]

One prediction which has been made is a drastic rise in summertime high temperatures.[33] The chance of a summer heat wave in Dallas, Texas could rise from the current thirty percent to sixty-eight percent by 2050.[34] In Washington, D.C., by the year 2030, the number of days when the temperature reaches ninety degrees fahr-

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coal use during the European industrial revolution could increase global temperatures by increasing atmospheric carbon dioxide concentrations. *Id.*

28. *See* FLAVIN, *supra* note 1, at 12 ("[The] basic conclusions [of the global warming theory] now appear solid."); *U.N. Envtl. Program/World Meteorological Organization/Int'l ICSU Conference, Villach Conference Statement, in* THE CHALLENGE OF GLOBAL WARMING, 63, 63-64 (Dean E. Abrahamson ed., 1989) (noting that a UNEP/WMO/ICSU Conference in 1985 of 29 scientists for developed and developing nations accepted the theory of advanced global warming); SEIDEL & KEYES, *supra* note 9, at 2-24 (noting that climatic effects models "provide strong evidence of the likelihood of unprecedented rates of temperature increases"); Rudy Abramson, *Despite Research, 'Greenhouse Effect' is Tough to Prove*, L.A. TIMES, May 4, 1990, at 31 (citing a survey which found that three-fourths of all scientists involved in climate-change research accept the theory of increased global temperatures resulting from the build-up of greenhouse gases); Terry Atlas, *Experts Warn about Global Warming Costs*, CHI. TRIB., May 26, 1990, at 2 (discussing a report issued by the U.N.'s Intergovernmental Panel on Climate Change which strongly affirmed global warming theories); Ellen Wallace, *Global Warming Conference Sets No Goals on Gases*, CHRISTIAN SCI. MONITOR, Nov. 9, 1990, at 7 (noting that more than 500 scientists were able to agree to a statement that Global warming is occurring). *But see* David Thomas, *The Cracks in the Greenhouse Theory*, FIN. TIMES, Nov. 3, 1990, at 7 (noting that "[t]he dire predictions of higher temperatures are based on much weaker evidence than most lay people . . . realise"); David Thomas, *Call for Calm over Global Warming*, FIN. TIMES, Nov. 9, 1990, at 8 (noting that it could be 10 or 20 years before scientists can prove that global warming is occurring).

29. FLAVIN, *supra* note 1, at 17.

30. *Id.*

31. *Id.* at 18. *See also* MACKENZIE, *supra* note 7, at 8.

32. FLAVIN, *supra* note 1, at 18.

33. *Id.*

34. *Id.*

enheit could increase from thirty-seven (the figure recorded in 1987) to eighty-seven.[35] In Los Angeles, the number of days exceeding ninety degrees could increase from five (the figure recorded in 1987) to twenty-seven.[36] In addition to making life uncomfortable for urban dwellers, energy consumption will increase due to a greater dependence on air conditioners.[37]

A number of writers have discussed the potential effects of global warming,[38] but one particularly good discussion is contained in *WorldWatch Paper 91*.[39] This book, which is discussed in more detail below, presents an overview of the problems we can expect to face as a result of global warming.

One effect of global warming discussed in *Worldwatch Paper 91* is its potential to impact agriculture adversely on a worldwide scale. The major growing areas of both China and North America could become hotter and drier as a result of global warming.[40] This dryness could be caused by a combination of several phenomena: less rainfall, smaller winter snowpacks resulting in less spring runoff, and increased evaporation as a result of higher temperatures.[41] One study has suggested that the portion of the United States Great Plains suitable for crops could be reduced by as much as thirty-three percent.[42] This decline in crop area could be offset in the long run by the expansion of agriculture in Canada and Siberia which, due to increasing temperatures, may be more suitable for agriculture. However, Canadian and Siberian soil is poor, and it would be centuries before those areas would be able to equal the production of current agricultural land.[43]

There are two potentially direct effects of decreases in agricultural production. The first is a decreased food supply, resulting in

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35. Lewis D. Solomon & Bradley S. Freedberg, *The Greenhouse Effect: A Legal and Policy Analysis*, 20 ENVTL. L. 83, 92 (1990) (citing Aeppel, *Group Uses Computer Models to Forecast Global Climate*, CHRISTIAN SCI. MONITOR, Apr. 13, 1987, at A5).

36. *Id.*

37. Philip Shabecoff, *Calculating the Consequences of a Warmer Planet Earth (A Worst-Case Forecast)*, N.Y. TIMES, June 26, 1988, § 4, at 1.

38. *See, e.g.*, FRANCESCA LYMAN, THE GREENHOUSE TRAP (1990); UNEP/WMO/ICSU, *supra* note 28; STEPHEN H. SCHNEIDER, GLOBAL WARMING (1989).

39. FLAVIN, *supra* note 1, at 19-25.

40. *Id.* at 19.

41. *Id.*

42. *Id.*

43. FLAVIN, *supra* note 1, at 19.

higher food prices.[44] The second is severe famine. One Stanford University study concluded that "even if food production keeps pace with demand, a more erratic and drought-prone climate could cause two serious depletions of grain stocks each decade, resulting in the loss of 50-400 million lives."[45]

Another problem related to the decline of agricultural production is shortages of drinking water in arid and semiarid regions.[46] Reduced winter snowfalls combined with earlier spring runoff would reduce the amount of water contained in aquifers and reservoirs.[47]

Global warming would almost certainly result in severe damage to ecosystems.[48] Some species would be unable to migrate northward rapidly enough to cope with rapid climate change.[49] As a result, the "web of interdependencies" that characterizes an ecosystem could be torn apart, and "it is possible that whole ecosystems could unravel."[50]

A rise in sea level is another predicted effect of global warming.[51] As the ocean temperature increases, thermal expansion will cause the volume of the water to increase. Warmer temperatures also are likely to cause polar ice caps to melt, thereby increasing the quantity of water in the oceans.[52] These factors may cause the sea to rise between one and two meters.[53] Seaside towns and cities would be flooded and many of the wetlands which currently nourish the world's fish stocks would be destroyed.[54] Some cities would be able to adapt to sea level rise through the construction of dikes or the abandonment of low lying lands;[55] both of these options, however, are expensive. It is estimated that the cost of protecting the eastern coast of the United States could exceed $300 billion by

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44. *Id.*
45. *Id.*
46. *Id.*
47. FLAVIN, *supra* note 1, at 20.
48. *Id.* Ecosystems are complex systems where interdependent species of plants and animals live together. EUGENE P. ODUM, FUNDAMENTALS OF ECOLOGY 8 (3d ed. 1971).
49. FLAVIN, *supra* note 1, at 20.
50. *Id.*
51. *Id.*
52. *Id.*
53. *Id.*
54. *Id.*
55. *Id.*

2100.[56] In areas which cannot afford such large expenditures, the effects of sea level rise would be devastating. For example, large numbers of people in third world countries farm river deltas and floodplains.[57] Without the construction of dikes and sea walls to prevent the intrusion of salt water into these areas, sea level rise could cause harvests to decline significantly.[58]

In sum, global warming is a serious danger. However, it is important to stress that no level of automobile emissions reduction will prevent global warming completely. According to many predictions, the carbon dioxide and other greenhouse gases emitted before 1985 will result in an eventual increase in global temperature of 1.8 to 4.5 degrees fahrenheit.[59] In fact, many scientists believe that the effects of global warming are already being felt.[60]

The rate at which global warming is currently accelerating differentiates it from natural global temperature fluctuations.[61] Climate change resulting from pollution has the potential to occur at a rate many times faster than our climate has ever changed before.[62] In the past, rapid climate change has been accompanied by "massive biological changes," including mass extinctions.[63] While no one can predict accurately the exact consequences of this acceleration of global warming,[64] the magnitude of the dangers involved makes it imperative that the problem be addressed by policy makers.

Proposed strategies for dealing with global warming have con-

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56. *Id.*

57. *Id.*

58. *Id.*

59. MACKENZIE, *supra* note 7, at 6.

60. *Id. See also* FLAVIN, *supra* note 1, at 16; *Greenhouse Effect and Global Climate Change: Hearings Before the Senate Comm. on Energy and Natural Resources*, 100th Cong., 2d Sess. 39 (1988) (statement of Dr. James E. Hansen, NASA Goddard Institute for Space Studies, who concludes that global warming has already manifested itself sufficiently that scientists can ascribe a cause and effect relationship between the greenhouse effect and observed warming). *But see* LYMAN, *supra* note 38, at 1 (quoting David Parker of the British Meteorological Office who states that "no unambiguous connection" can yet be made between observed warming and increases in atmospheric concentrations of greenhouse gases).

61. LYMAN, *supra* note 38, at 15. In the last 10,000 years the average temperature of the earth has increased less than 4 degrees fahrenheit. In the past 100 years, the average temperature of the earth has risen 1 degree fahrenheit. *Id.*

62. *Id.* at 18.

63. *Id.*

64. *See, e.g.*, David Thomas, *Call for Calm over Global Warming*, FIN. TIMES, Nov. 9, 1990, at 8.

centrated on attempts to slow the rate of warming.[65] These proposals are based on the theory that if climate change is inevitable, and rapid change is more harmful than slower change,[66] then the harm which global warming may cause can be mitigated by delaying increases in global temperatures.

Even strategies which seek only to delay the effects of global warming will involve drastic measures. Environmental Protection Agency scientists have noted that in order to stabilize atmospheric carbon dioxide concentrations it would be necessary to reduce emissions fifty to eighty percent.[67] In 1988, at a conference in Toronto, scientists proposed reducing carbon dioxide emissions twenty percent by 2005 in order to delay global warming.[68] Even such a small reduction would require wholesale changes in energy use patterns worldwide.[69]

B. The Connection between the Automobile and Carbon Dioxide Emissions

Carbon dioxide is responsible for about half of the predicted global warming.[70] Atmospheric carbon dioxide concentrations have increased approximately thirty percent over the past century,[71] and every year an additional 5.5 to 6 billion tons of carbon dioxide is released into the atmosphere.[72]

An effective strategy for delaying global warming will require a gradual shift away from the use of fossil fuels.[73] Currently fossil fuels provide seventy-eight percent of the world's energy.[74] The combustion of coal, oil, and natural gas are major sources of carbon dioxide emissions.[75] In the United States, electric utilities are re-

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65. *See* SEIDEL & KEYES, *supra* note 9, at 4-27.

66. LYMAN, *supra* note 38, at 18. M.I. Budyko, a Soviet scientist, notes that "[t]here exists a simple ecological principal, the more rapid the action of an unfavorable factor . . . the greater the damage caused to organisms." *Id.*

67. FLAVIN, *supra* note 1, at 28.

68. *Id.*

69. *Id.*

70. Peter Ciborowski, *Sources, Sinks, Trends, and Opportunities*, *in* THE CHALLENGE OF GLOBAL WARMING 213, 213 (Dean E. Abrahamson ed., 1989).

71. *Id.* at 214.

72. *Id.* The current atmospheric concentration of carbon dioxide is 350 parts per million (ppm), and it is rising by 1.5 ppm or 0.4% per year. *Id.*

73. FLAVIN, *supra* note 1, at 32.

74. *Id.*

75. *Id.* at 13.

sponsible for approximately thirty-five percent of carbon dioxide emissions, transportation is responsible for thirty-one percent, industry for twenty-four percent, and buildings for twelve percent.[76] Globally, deforestation contributes roughly twenty percent of the carbon dioxide released into the atmosphere.[77] Emissions from each of these sources of carbon dioxide must be reduced if global warming is to be delayed significantly.

Carbon dioxide emissions from automobiles are a particular problem in the United States. Transportation sources are responsible for one-third of the nation's carbon dioxide emissions,[78] compared with a mere ten percent globally.[79] Thus, in the United States, measures to reduce automobile emissions of carbon dioxide are especially important.

Carbon dioxide emissions from automobiles can be reduced. In fact, plans exist which if implemented today would reduce carbon emissions from transportation sources to half of what they are today. These strategies involve: (1) improved gas mileage for automobiles (seventy miles per gallon prototypes exist), (2) improved mass transit, (3) increased use of bicycles, and (4) an effective carbon tax.[80]

Many of these measures could be implemented by states under the Clean Air Act.[81] For example, mass transit improvements and the construction of bicycle lanes are strategies which can be included in state plans to improve air quality. Other measures, such as carpool lanes and gasoline rationing, could also be implemented by states under the Act.[82] The Clean Air Act is a potentially powerful tool which could be used by states to control carbon dioxide emissions.

Although global warming is an international problem, action taken by the United States to reduce emissions of greenhouse

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76. MacKenzie, *supra* note 7, at 10.

77. George M. Woodwell, *Biotic Causes and Effects of the Disruption of the Global Carbon Cycle, in* The Challenge of Global Warming 71 (Dean E. Abrahamson ed., 1989). Deforestation results in the conversion of carbon stored in the biota being released into the air in the form of carbon dioxide through the natural process of decay. *Id.*

78. Flavin, *supra* note 1, at 42.

79. *Id.* at 42, 35. There are approximately 400 million automobiles on the planet, and these automobiles are responsible for emitting 550 million tons of carbon dioxide per year. *Id.* at 35.

80. *Id.* at 35.

81. *See infra* sections II.C and III.

82. 42 U.S.C. § 7408(f)(1)(A) (1988).

gases would be a significant step toward the implementation of an effective global strategy for reducing greenhouse gas emissions. Because Americans produce a disproportionate share of the world's greenhouse gas emissions, they bear a responsibility for taking the lead in emissions reductions.[83] The United States is also in a unique position to take the first step because, unlike many other nations, it already has statutory mechanisms, such as the Clean Air Act, for reducing greenhouse gas emissions.

II. Clean Air Act Provisions Related to Carbon Dioxide Emissions Reduction

The Clean Air Act seeks to improve air quality by reducing emissions of air pollutants.[84] Under the Act, states are required to develop plans for reducing emissions of pollutants into the air. These plans, called state implementation plans (SIPs), must provide for sufficient emissions reductions to bring the air quality of the state into compliance with federal standards.[85] Thus, the Act allows states to custom design a program for air quality standards, but all states must achieve the same minimum level of air quality.

A. The Role of the Federal Government

Air quality is measured through standards which are set by the federal government. The statute outlines a specific process through which these standards are to be formulated. First, the Act requires the Administrator of the Environmental Protection Agency (EPA) to publish, and from "time to time thereafter revise," a list of each air pollutant which meets two statutorily specified prerequisites.[86]

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83. Flavin, *supra* note 1, at 25 (stating that the United States is the "most carbon intensive large country" in the world).

84. 42 U.S.C. § 7401(b)(1) (1988). This section states that it is the purpose of the Clean Air Act "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." *Id.*

85. *Id.* § 7410(a)(1).

86. *Id.* § 7408(a)(1)(C). A third criteria is contained in § 7408(a)(1)(C), and it requires that each listed air pollutant be one for which "air quality criteria had not been issued before December 31, 1970 but for which he [the Administrator of the EPA] plans to issue air quality criteria under this section." *Id.* § 7408(a)(1)(c). However, in *National Resources Defense Council v. Train*, the Second Circuit held that an air pollutant which satisfied the other two requirements could be added to the list even though the Administrator did not plan to add that pollutant to the list before December 31, 1970. National Resources Defense Council v. Train, 545 F.2d 320, 325 (2d Cir. 1976).

The first of these is that emissions of the pollutant must, in the Administrator's judgment, "reasonably be anticipated to endanger public health or welfare."[87] Although the term "health" is not defined in the Act, the legislative history is clear that "especially sensitive persons such as asthmatics and emphysematics are included within the group which must be protected" by the health standard.[88] The term "welfare" is defined very broadly by the Act to include "effects on soils, water, crops, vegetation, manmade materials, animals, wildlife, weather, visibility, and *climate*, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well being."[89] This language includes virtually any adverse affect of a pollutant. Thus, a pollutant need not have a direct effect on human health in order to be regulated under the Clean Air Act. Any pollutant which has any deleterious effect falls within the scope of this criteria.

The second prerequisite for listing a pollutant relates to the source of the pollutant. The Act requires that the presence of the pollutant in the air must result from "numerous or diverse mobile or stationary sources."[90] So long as the pollutant is emitted by a significant number of sources, it can be regulated nationally.

Once the Administrator has listed an air pollutant, s/he must issue air quality criteria for that pollutant within twelve months.[91] The criteria must reflect the "latest scientific knowledge useful in indicating the kind and extent of all identifiable effects on public health or welfare which may be expected from the presence of such pollutant in the ambient air, in varying quantities."[92] All "known or anticipated" adverse effects of the pollutant must be included.[93]

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87. 42 U.S.C. § 7408(a)(1)(A) (1988).

88. Lead Indus. Ass'n v. EPA, 647 F.2d 1130, 1152 (D.C. Cir. 1980). The *Lead Industries* case upheld a standard set by the Administrator for lead in the ambient air which was aimed at keeping 99.5% of the target population below the maximum safe individual blood level of 30 micrograms of lead per deciliter of blood. *Id.* at 1144. The target population, children, was the group which the Administrator found to be the part of the population most sensitive to lead poisoning. *Id.* at 1142.

89. 42 U.S.C. § 7602(h) (1988) (emphasis added).

90. *Id.* § 7408(a)(1)(B).

91. *Id.* § 7408(a)(2). Criteria are not emissions standards; rather, they are "basic inquiries into cause and effect." 1 WILLIAM H. RODGERS, JR., ENVIRONMENTAL LAW (AIR AND WATER) § 3.7 (1986). Criteria documents are published for each pollutant listed under 42 U.S.C. § 7408. *See* 36 Fed. Reg. 1502, 1515 (1971) and 41 Fed. Reg. 14921 (1976).

92. 42 U.S.C. § 7408(a)(2) (1988).

93. *Id.* § 7408(a)(2)(C).

Simultaneous with the issuance of the air pollutant criteria, the Administrator must publish proposed primary and secondary National Ambient Air Quality Standards (NAAQSs).[94] Primary NAAQSs are set at a level sufficient to protect the public health.[95] These standards generally require lesser reduction than secondary NAAQSs[96] because they are intended to remedy only the most serious and direct effects of the pollutant. However, although primary NAAQSs generally require less emission reduction than secondary NAAQSs, states are only given three years to comply with primary NAAQSs.[97]

The Act is less demanding with respect to attainment of secondary NAAQSs. Secondary NAAQSs are more productive than primary NAAQSs. The secondary standards must be set at a level sufficient to protect the public welfare from any known or anticipated adverse effects associated with the presence of a recognized air pollutant in the atmosphere.[98] Because public welfare is a broader term than public health,[99] secondary NAAQSs require greater emissions reductions than primary NAAQSs.[100] Because greater reductions are more difficult to achieve, the Clean Air Act merely requires that secondary NAAQSs be achieved within a "reasonable time."[101]

An important limitation on the discretion of the Administrator is that s/he may not consider economic and technical factors when setting NAAQSs. In *Lead Industries Association v. EPA*,[102]

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94. *Id.* §§ 7409(a)(1), 7409(2). These proposed standards must be finalized after a 90-day period for the submission of written comments. *Id.* §§ 7409(a)(1)(B), 7409(2). The promulgated standards are listed at 40 C.F.R. §§ 50.4-.12 (1990).

95. 42 U.S.C. § 7409(b)(1) (1988). These standards are based upon the air quality criteria, and they must allow for an adequate margin of safety. *Id.* The margin of safety is intended to "protect against effects which have not yet been uncovered by research and effects whose medical significance is a matter of disagreement." Lead Indus. Ass'n v. EPA, 647 F.2d 1130, 1154 (D.C. Cir. 1980).

96. *See* 40 C.F.R. §§ 50.4-.12 (1990).

97. 42 U.S.C. § 7410(a)(2)(A) (1988). *See infra* notes 107-126 and accompanying text (discussing state implementation plans).

98. 42 U.S.C. § 7409(b)(2) (1988) (discussing state implementation plans). Since the requisite level of air quality is based upon the judgment of the Administrator, the statute does not require that the effects of a pollutant on welfare be proven as a scientific certainty. *See id.* § 7408(a)(1)(A).

99. Public welfare, for instance, could include natural resources; public health, on the other hand, could not be so inclusive.

100. *See* 40 C.F.R. §§ 50.4-.12 (1990).

101. 42 U.S.C. § 7410(a)(2)(A) (1988).

102. Lead Indus. Ass'n v. EPA, 647 F.2d 1130 (D.C. Cir. 1980). This case involved a challenge to the standards for lead set by the EPA.

Judge Skelley Wright stated that "the statute and its legislative history make it clear that economic considerations play no part in the promulgation of ambient air quality standards."[103] Thus, NAAQSs cannot be set with any consideration of the economic difficulties associated with state compliance.

Since 1970, when the Act took effect, NAAQSs have only been adopted for six pollutants. NAAQSs have been issued for sulfur oxides, photochemical oxidants (later renamed ozone), particulates, carbon monoxide, nitrogen oxide, and lead.[104] In spite of the broad scope of the EPA's authority to list pollutants, few pollutants have actually been regulated under the NAAQS provision of the Clean Air Act. Carbon dioxide is not a regulated pollutant, so there is no NAAQS for carbon dioxide emissions.

The process of setting a NAAQS for carbon dioxide is beyond the scope of this note—it is a lengthy and difficult process. The EPA proposes a standard only after lengthy review of scientific literature; and proposals are subjected to extensive internal review and public comment before becoming finalized.[105] This process is time consuming,[106] special interest groups are heavily involved, and significant compromises can result. Although this note discusses the potential for reduction of carbon dioxide emissions under the Clean Air Act, the reader should be aware of the practical dimension to regulation which is not discussed herein.

B. The Role of the States

Once a NAAQS has been adopted by the federal government, the responsibility for implementing the standard lies with the states.[107] Each state must submit to the Administrator, within nine months after the NAAQS is promulgated, an implementation plan specifying how the primary and secondary NAAQSs for each criteria pollutant will be achieved.[108] This plan is called a state imple-

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103. *Id.* at 1148. In a more recent case dealing with standards for particulate emissions the same court reaffirmed this holding by stating that "[u]nder §109 . . . the Administrator *may not* consider cost and technological feasibility." NRDC, Inc. v. EPA, 902 F.2d 962, 973 (D.C. Cir. 1990).

104. 40 C.F.R. §§ 50.4-.12 (1990).

105. R. SHEP MELNICK, REGULATION AND THE COURTS: THE CASE OF THE CLEAN AIR ACT 255-61 (1983).

106. *Id.*

107. 42 U.S.C. § 7407(a) (1988).

108. *Id.* § 7410.

mentation plan (SIP),[109] and if it is satisfactory, the Administrator must approve it within four months.[110]

The state may use a variety of methods, the most common of which is emissions limitations, to achieve the required reductions.[111] Emissions limitations are used to reduce the emissions of a particular pollutant from stationary sources.[112] Emissions limits for individual sources are set at a level which will ensure that, in the aggregate, emissions do not exceed the allowable amount of the pollutant in the ambient air under the NAAQS. States have accomplished significant emissions reductions using stationary source emissions limitations.[113]

Since automobiles are not stationary sources, automobile emissions cannot be regulated by emissions limitations. This leaves a regulatory gap for the states because automobiles make a significant contribution to air pollution. In fact, by weight of pollutant, automobiles are the greatest source of air pollution in the country.[114] Automobiles emit four of the six pollutants for which NAAQSs have been issued: carbon monoxide, nitrogen oxide, ozone, and hydrocarbons.[115] In addition, automobiles emit particulate pollution and carbon dioxide.[116] Thus, in order to comply with air quality standards, states have been compelled to use alternative methods to reduce automobile pollution.

State power to limit emissions from mobile sources is restricted. Automobile tailpipe emissions are regulated under a sepa-

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109. "A[n] SIP is a mechanism for ameliorating the difficulties of direct enforcement of ambient standards by imposing on individual dischargers limitations adequate in the aggregate to assure the prescribed ambient quality." DAVID P. CURRIE, AIR POLLUTION FEDERAL LAW AND ANALYSIS § 4.08 (1981 & Supp. 1989). The various SIPs are set out in 40 C.F.R. §§ 52.50-.2920 (1990).

110. 42 U.S.C. § 7410(a)(2) (1988). There are specific notice and public hearing requirements outlined in the Act. *See id.* at § 7607. *See also* 40 C.F.R. § 51.102. If a state's implementation plan is inadequate to achieve air quality standards, the Act allows the EPA to promulgate an SIP for that state. 42 U.S.C. § 7410(c)(1) (1988).

111. 42 U.S.C. § 7410(a)(2)(B) (1988). Emissions limitation is defined as "a requirement established by the state . . . which limits the quantity, rate, or concentration of emissions of air pollutants on a continuous basis . . . ." *Id.* § 7602(k).

112. A stationary source is a fixed structure that emits pollutants.

113. *See* 40 C.F.R. §§ 52.50-.2920 (1990).

114. GRAD, *supra* note 15, § 2.06[1][a]. Automobiles account for 42% of pollutants, although it should be noted that automobile pollutants may not be the most harmful pollutants. *Id.*

115. Thomas B. Bracken, *Transportation Controls under the Clean Air Act: A Legal Analysis*, 15 B.C. INDUST. & COMM. L. REV. 749, 750-51 (1974).

116. GRAD, *supra* note 15, § 2.06[1][a].

rate section of the Clean Air Act.[117] Under this section, mobile source emission standards for particular pollutants are set by Congress and the EPA.[118] The federally set mobile source standards differ in important respects from NAAQSs. Mobile source standards take the form of incremental reductions in emissions.[119] These increments are designed to force the development of technology.[120] However, unlike the process for setting NAAQSs, regulators setting mobile source standards may consider such factors as cost, technological feasibility,[121] and the availability of a sufficient number of automobiles to satisfy consumer demand.[122] Thus, mobile source standards are not as stringent as NAAQSs.[123]

States are prohibited from promulgating any additional regulations regarding tailpipe emissions of new cars by an explicit preemption section contained within the Clean Air Act.[124] The preemption provision was intended to protect automobile manufacturers from the burdens of multiple, diverse emissions standards.[125] In effect, however, the preemption section prevents states from using an effective method for reducing automobile pollutants.[126]

C. Transportation Control Plans

While states are preempted from enforcing direct emission limitations on new cars, they are able to limit automobile emissions in an indirect fashion through the use of transportation control plans. Transportation control plans include a variety of measures affecting the use of automobiles.[127] The state may test motor

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117. 42 U.S.C. §§ 7521-7574 (1988).

118. *See id.* § 7521(b).

119. *Id.*

120. *Id.* § 7521. *See* GRAD, *supra* note 15, § 2.06[2][b], for a discussion of the technology forcing aspects of the mobile source pollution provisions.

121. 42 U.S.C. § 7521 (1988).

122. *See* International Harvester v. Ruckelshaus, 478 F.2d 615, 638-40 (D.C. Cir. 1973).

123. *See* GRAD, *supra* note 15, § 2.06[3].

124. 42 U.S.C. § 7543(a) (1988). California is granted a waiver from this preemption. *Id.* § 7543(b). If it is necessary in order to comply with Clean Air Act standards, other states may adopt California standards. *Id.* § 7507.

125. *See* CURRIE, *supra* note 109, § 2.40.

126. *See infra* notes 163-72 and accompanying text.

127. CURRIE, *supra* note 109, § 4.42. Various transportation control measures must be evaluated by the Administrator of the EPA, and she or he must publish the results. 42 U.S.C.A. § 7408(f) (West Supp. 1991). These measures include, but are not limited to:

(i) programs for improved public transit;

vehicles to ensure compliance with federal emissions standards.[128] States may regulate fuel content, improve traffic flow, and take other measures to reduce emissions per mile traveled.[129] States also may take measures to reduce the number of miles people drive. Such measures could include tolls, taxes on gasoline or parking, parking space limitations, carpooling incentives, gasoline rationing, or mass transit subsidies.[130]

The transportation control plan provisions of the Clean Air Act have been amended extensively.[131] The net effect of the earlier amendments,[132] which are discussed in detail in section III of this note, was to curtail the use of transportation control plans.[133] This

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(ii) restriction of certain roads or lanes to, or construction of such roads or lanes for use by, passenger buses or high occupancy vehicles;

(iii) employer-based transportation management plans, including incentives;

(iv) trip-reduction ordinances;

(v) traffic flow improvement programs that achieve emissions reductions;

(vi) fringe and transportation corridor parking facilities serving multiple occupancy vehicle programs or transit service;

(vii) programs to limit or restrict vehicle use in downtown areas or other areas of emission concentration particularly during periods of peak use;

(viii) programs for the provisions of all forms of high-occupancy, shared-ride services;

(ix) programs to limit portions of road surfaces or certain sections of the metropolitan area to the use of non-motorized vehicles or pedestrian use, both as to time and place;

(x) programs for secure bicycle storage facilities and other facilities, including bicycle lanes, for the convenience and protection of bicyclists, in both public and private areas;

(xi) programs to control extended idling of vehicles;

(xii) programs to reduce motor vehicle emissions, consistent with subchapter II [Mobile Sources] of this chapter, which are caused by extreme cold start conditions;

(xiii) employer-sponsored programs to permit flexible work schedules;

(xiv) programs and ordinances to facilitate non-automobile travel, provision and utilization of mass transit, and to generally reduce the need for single-occupant vehicle travel, as part of transportation planning and development efforts of a locality, including programs and ordinances applicable to new shopping centers, special events, and other centers of vehicle activity;

(xv) programs for new construction and major reconstruction of paths, tracks or areas solely for the use by pedestrian or other non-motorized means of transportation when economically feasible and in the public interest. For purposes of this clause, the Administrator shall also consult with the Secretary of the Interior; and

(xvi) program to encourage the voluntary removal from use and the marketplace of pre-1980 model year light duty vehicles and pre-1980 model light duty trucks.

42 U.S.C.A. §7408(f)(1)(A) (1990) (footnote omitted).

128. 42 U.S.C. § 7410(a)(2)(G) (1988). This section requires states to provide "to the extent necessary and practicable, for periodic inspection and testing of motor vehicles." *Id.*

129. CURRIE, *supra*, note 109, § 4.42.

130. *Id.*

131. *See infra* notes 181-92 and accompanying text.

132. *See infra* notes 155-247 and accompanying text.

133. Clean Air Act Amendments of 1974, Pub. L. No. 93-319, 88 Stat. 256; Clean Air Act Amendments of 1977, Pub. L. No. 95-95, 91 Stat. 685.

trend was reversed in 1990 when Congress again amended the Clean Air Act. These amendments give transportation control plans a prominent role in the regulation of air pollution and encourage the use of a broader variety of transportation control measures.[134]

The most significant amendment in this area links federal highway grants to air quality.[135] States are required to include in their SIPs a calculation of vehicle emissions reductions which, in combination with stationary source emissions limitations, will result in compliance with federal NAAQSs.[136] State transportation projects, such as highway building and mass transit improvements, will be ineligible for federal grants unless the state meets the necessary vehicle emissions reduction.[137] This represents the first time that federal funding has been directly linked to whether a state has set substantive air quality objectives for transportation controls.[138]

In addition to making federal grants dependent on vehicle emissions reduction, the 1990 amendments also require states to implement certain transportation control measures.[139] The amendments pertaining to "nonattainment areas"—regions of the country that have not yet attained compliance with NAAQSs for specific pollutants—specifically require that these areas implement transportation controls.[140] The 1990 amendments include a system for ranking nonattainment areas. As the concentration of air pollutants within an area increases, the designation of that area becomes more serious. The level of transportation control in which a specific area is required to engage is directly dependent upon the seriousness of that area's designation.

Ozone nonattainment areas,[141] for example, are given one of

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134. Clean Air Act Amendments of 1990, Pub. L. 101-549, 104 Stat. 2399.

135. Robert E. Yuhnke, *The Amendments to Reform Transportation Planning in the Clean Air Amendments of 1990, in* ALI-ABA COURSE MATERIALS 207, 211 (discussing limitations on certain federal assistance in the 1990 amendments).

136. Clean Air Act Amendments of 1990, 42 U.S.C.A. § 7506(c)(2)(A) (West Supp. 1991).

137. *Id.*

138. Yuhnke, *supra* note 135, at 211.

139. 42 U.S.C.A. §§ 7511-7515 (West Supp. 1991).

140. *See, e.g., id.* § 7511a.

141. The Act contains analogous requirements for carbon monoxide (§§ 7512, 7512a), sulfur dioxide (§§ 7514, 7514a), lead (§§ 7514, 7514a), particulates (§§ 7513, 7513a, 7513b), and nitrogen oxide (§§ 7514, 7514a) nonattainment areas.

five designations: marginal, moderate, serious, severe, or extreme.[142] The time within which the area must come into compliance increases as the pollution problem becomes more extreme.[143] For example, moderate areas are allowed only three years to comply with the ozone NAAQS, but extreme areas are allowed twenty years.[144]

States are required to take certain measures based upon their ozone designation. In marginal areas, states are, among other measures, required to retain any inspection and maintenance (I & M) program[145] which they had previously enacted.[146] In moderate areas states must provide for a fifteen percent reduction of volatile organic compound (VOC) emissions within six years.[147] In order to accomplish this, states must require gasoline vapor recovery systems and promulgate I & M regulations.[148] Areas designated as "extreme" are required to enact enhanced I & M plans, effective transportation control measures, traffic control measures during hours of heavy traffic, and regulations encouraging the use of vehicles which burn cleaner fuels.[149] In sum, the greater the pollution problem, the more drastic the transportation control measures required by the 1990 amendments.

In order to ensure that air quality in nonattainment areas improves, the state is required to demonstrate that it has made significant progress every three years until it attains the NAAQS.[150] This prevents the backloading of reductions during the period within which the state has to come into compliance. A state which does not demonstrate reasonable further progress risks losing federal highway grants.[151] Thus, the Act contains enforcement mechanisms which will ensure compliance by states.

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142. 42 U.S.C.A. § 7511(a) (West Supp. 1991). Marginal areas have a concentration of ozone in the ambient air of .121 up to .138 parts-per-million (ppm), moderate areas range between .138 and .160 ppm, serious areas range between .160 and .180 ppm, severe areas range between .180 and .280 ppm, and extreme areas exceed .280 ppm. *Id.*

143. *Id.*

144. *Id.* § 7511(a)(1).

145. Inspection and maintenance programs involve periodic (usually annual) inspection of vehicles to determine whether they comply with emissions standards.

146. 42 U.S.C.A. § 7511a(a)(2)(B)(i) (West Supp. 1991).

147. *Id.* § 7511a(b)(1)(A)(i). VOCs contribute to ozone pollution.

148. *Id.* § 7511a(b)(3)-(4).

149. *Id.* § 7511a(e).

150. 42 U.S.C.A. § 7511a(b)(1)(A) (West Supp. 1991).

151. Yuhnke, *supra* note 135, at 211-12.

The 1990 amendments create a structure within which transportation controls have the potential to be an agent of significant societal change. If implemented successfully, transportation control plans could create a new era of metropolitan planning by linking our transportation systems to air quality control and by reducing our dependence on single occupant vehicles.[152] Without any explicit commitment to reducing carbon dioxide emissions within the Act, transportation control plans will reduce carbon dioxide emissions by reducing the number of vehicle miles traveled.[153] However, states have previously attempted to implement transportation control plans without success.[154] The problems encountered in past efforts must be avoided if transportation control plans are to succeed in the 1990's.

III. An Evaluation of Transportation Control Plans as a Means of Reducing Carbon Dioxide Emissions

This section demonstrates that the revitalization of transportation control plans under the 1990 Clean Air Act amendments alone will not make transportation controls an effective means of improving air quality. The transportation controls promulgated under the 1970 version of the Clean Air Act are outlined, and the reasons for the failure of these efforts are discussed. This past experience is utilized to evaluate the potential effectiveness of transportation control plans as a means of complying with a hypothetical carbon dioxide NAAQS.

A. The Use of Transportation Control Plans under the 1970 Clean Air Act

Congress, when enacting the Clean Air Act in 1970, intended for it to impact the everyday life of every American.[155] The law was passed in an atmosphere in which radical solutions to the air pollution problem were not merely considered, but were assumed to be necessary.[156] Senator Muskie noted, with regard to transportation control plans, that "realistically applied, [they] will require that urban areas do something about their transportation systems, the

152. *Id.* at 212.
153. *Id.* at 216.
154. *See infra* notes 167-73 and accompanying text.
155. 116 Cong. Rec. S42387 (daily ed. Dec. 18, 1970).
156. *Id.*

movement of used cars, the development of public transportation systems, and the modification and change of housing patterns, employment patterns, and transportation patterns generally."[157] The provisions of the Clean Air Act passed in that atmosphere were seen as powerful and far reaching.[158]

One commentator wrote that by the middle of 1975 most United States cities "should have in effect strict restrictions on the use of automobiles which will substantially change the driving habits of the American people and the way most of us live and conduct our business."[159] The same commentator predicted that "cooling the great American love affair with the automobile may be a wrenching experience initially,"[160] but that the benefits of cleaner air would make it worthwhile.

Another commentator noted that "[d]rastic, comprehensive measures are required" if Clean Air Act goals are to be achieved.[161] The commentator stated that automobile use must be "greatly curtailed," and that "[n]o longer can the automobile, a luxury embedded in custom, be allowed to destroy the quality of air necessary to life."[162]

In fact, transportation control plans did give states the power to create societal change on the scale which Senator Muskie and other commentators described. As discussed in section II,[163] transportation control measures are potentially powerful tools for achieving the air quality goals set forth in the Clean Air Act.

What is most surprising about the plans actually promulgated under the 1970 Act is that they did use the power of transportation controls and did attempt to instigate far reaching societal change.[164] In general, the plans used two strategies. First, they sought to reduce vehicle miles traveled (VMT) through regulations

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157. *Id.*

158. David Schoenbrod, *Goals Statutes or Rules Statutes: The Case of the Clean Air Act*, 30 UCLA L. REV. 740, 742 (1983).

159. BRACKEN, *supra* note 115, at 749.

160. *Id.*

161. Ann M. Levy, Comment, *Transportation Control: An Urban Reality*, 12 HOUS. L. REV. 689, 689 (1975).

162. *Id.*

163. *See supra* notes 127-54 and accompanying text.

164. *See* South Terminal Corp. v. EPA, 504 F.2d 646 (1st Cir. 1974); Brown v. EPA, 521 F.2d 827 (9th Cir. 1974); District of Columbia v. Train, 521 F.2d 971 (D.C. Cir. 1974). *See also* Jackson B. Battle, *Transportation Controls under the Clean Air Act—An Experience in (Un)Cooperative Federalism*, 15 LAND & WATER L. REV. 1, 13 (1980).

which limited off- and on-street parking, established parking fees to fund mass transit, created carpool programs, provided preferential bus/carpool lanes on highways, expanded mass transit, built bicycle paths, restricted the use of heavy duty commercial vehicles, created vehicle free zones, and required gasoline rationing.[165] Second, the plans attempted to reduce vehicle tailpipe emissions. The plans included measures such as I & M programs (combined with a requirement that automobiles with emissions in excess of federal standards be taken off the road) and the retrofitting of used cars with pollution control equipment (costing up to $300 per installation).[166]

The Massachusetts SIP required Boston to implement a wide variety of transportation control measures. The SIPs for hydrocarbons and carbon monoxide required: (1) a freeze on off- and on-street parking spaces, (2) the regulation of the construction of new parking spaces, (3) the creation of bus and carpool lanes, (4) the development of a computer carpool matching system, (5) a vehicle I & M program, and (6) a program of automobile exhaust controls.[167] The exhaust controls included the installation of oxidizing catalysts, air bleed emission controls, and vacuum spark disconnect systems on used cars.[168] The SIP also required measures to reduce gasoline vapor emissions resulting from the transfer of fuel to passenger cars.[169]

The California SIP required gasoline rationing in Los Angeles, San Francisco, the Sacramento Valley, the San Joaquin Valley, and San Diego.[170] The plan also included: (1) I & M programs, (2) limitation on the use of motorcycles, (3) a catalytic converter retrofit program for used automobiles, (4) parking surcharges, (5) a permitting system for the construction of new parking spaces, (6) computer carpool matching systems, and (7) preferential bus/carpool lanes, among other provisions.[171]

The SIP for the region including Washington, D.C. was similarly strict. It required: (1) measures to improve mass transit, (2) an I & M program, (3) measures to create at least sixty miles worth

165. South Terminal Corp. v. EPA, 504 F.2d 646 (1st Cir. 1974).
166. *Id.*
167. *Id.* at 654-55.
168. *Id.*
169. *Id.* at 680-81.
170. Brown v. EPA, 521 F.2d 827, 830 (9th Cir. 1974).
171. *Id.*

of bicycle lanes, and (4) extensive provisions for retrofitting light, medium, and heavy duty vehicles with pollution control equipment.[172]

These measures were comprehensive and would have resulted in the sort of societal change which Senator Muskie and others had predicted if it were not for one fatal flaw. All of these plans were promulgated by the EPA under a statutory provision requiring it to promulgate a plan for a state if the state did not submit an adequate plan by the statutory deadline.[173] Therefore, it was not the states who implemented these plans as a result of the incentives of the Act. Instead, these were EPA promulgated plans which the EPA was forced to implement because of the inadequate action taken by these states. As this fact suggests, there were problems with the independent state implementation of the 1970 Clean Air Act.

B. Congressional Reaction to the Implementation of Transportation Control Plans

Essentially there were three problems with transportation controls under the 1970 Clean Air Act.[174] The first, ironically, was that they worked. The second, and related, problem was that transportation control measures were expected to produce pollution reductions which were disproportionate to the reductions in tailpipe emissions required by federal mobile source standards. The final problem was that states were given insufficient time to prepare transportation control plans.

1. Transportation Control Measures Threatened Too Much Change

The first problem was that the proposed transportation control measures would have changed American driving habits. For example, the transportation control plan for Los Angeles was in-

172. District of Columbia v. Train, 521 F.2d 971, 979-80 (D.C. Cir. 1974).

173. 42 U.S.C. § 7410(c)(1). *See* Battle, *supra* note 164, at 12 (discussing the events leading up to EPA promulgation of transportation control plans for 16 states).

174. There was a third problem with these federally promulgated plans; it was not clear that the federal government could require states to adopt transportation control plans without violating the Tenth Amendment of the United States Constitution. This issue is not relevant to this note, and it is discussed in detail elsewhere. *See* GRAD, *supra* note 15, § 2.03[11][a].

tended to reduce vehicle miles traveled by eighty percent.[175] Transportation controls would have impacted businesses as well. A proposed toll on bridges across the Harlem and East Rivers in New York City was opposed by Representative Holtzman (NY) in part because it would "divide the city and discorge [sic] business in Manhattan, thus damaging New York's already troubled economy."[176] The drastic effect of these measures made them unpopular and ripe for political opposition.

Congress considered the problems with transportation control plans in 1977.[177] In the Conference Committee report it was noted that many transportation control measures had been criticized as "unreasonable or unrealistic," and parking surcharge and parking management regulations were cited as examples.[178] The report noted that as a result of amendments to the Act, EPA delays, and state inaction, these measures had not been implemented.[179] In a separate section of the report, the committee stated that it believed that the implementation of many transportation control measures was "impractical within the time frame permitted under the current Act" and that some measures "may never be practical."[180] Thus, by 1977, Congress was convinced that transportation control plans were not working.

Congress responded to these problems by amending the Clean Air Act, both in 1974 and 1977. The amendments restricted the ability of states to use many of the transportation control measures which would have changed American driving habits, such as gas rationing, parking supply management, bus/carpool lanes, tolls, and parking surcharges.[181] Instead, states were encouraged to fall back on I & M programs.

The 1974 Amendments to the Clean Air Act curtailed the use of parking surcharges by prohibiting the Administrator of the EPA from requiring parking surcharges as a condition of SIP approval and by voiding all previously approved parking surcharge regula-

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175. BRACKEN, *supra* note 115, at 753.

176. 116 CONG. REC. H30489 (daily ed. Sept. 15, 1976).

177. H.R. REP. No. 294, 95th Cong., 1st Sess. 281-91 (1977), *reprinted in* 1977 U.S.C.C.A.N. 1077, 1360-70 [hereinafter *Conference Report*].

178. *Id.* at 282, *reprinted in* 1977 U.S.C.C.A.N. at 1361.

179. *Id.*

180. *Id.* at 215, *reprinted in* 1977 U.S.C.C.A.N. at 1307-08.

181. *See supra* notes 164-72 and accompanying text.

tions.[182] A parking surcharge regulation is a regulation which imposes a fee on parking spaces in order to discourage people from driving automobiles into the city.[183]

The 1974 amendments also authorized the EPA to suspend the effective date of regulations for management of the parking supply until 1975.[184] The regulations aimed at managing the parking supply established a permitting system for construction of new parking spaces.[185] The goal of the permit program was to encourage people to rely on mass transit rather than on personal automobiles by limiting the number of available parking spaces in urban areas.[186]

In addition, the 1974 amendments prohibited the EPA from including certain types of transportation control measures in cases where the EPA was required by the Clean Air Act to promulgate an SIP for a state that had not submitted an adequate SIP by the statutory deadline. Parking supply management regulations or preferential bus/carpool lanes on highways could not be required without holding a public hearing in the effected area.[187] A preferential bus/carpool lane is a lane set aside on a highway for the exclusive use of buses and/or carpools.[188] Because the most controversial EPA promulgated transportation control plans were for areas with severe air pollution problems,[189] this amendment constituted a significant limitation on state authority.

The 1977 Clean Air Act Amendments placed further restrictions on the scope of transportation control plans. The EPA could, at the request of the Governor of the effected state, suspend, until 1979, the effective date of these regulations if the SIP contained provisions requiring that older private automobiles be retrofitted with pollution control devices, providing for gas rationing which the Administrator found would have serious "disruptive and widespread economic and social effects," or reducing on-street parking

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182. 42 U.S.C. § 7410(c)(2)(B) (1988). States may adopt parking surcharges if they so choose, the amendment simply prohibits the Administrator from requiring these surcharges. *Id.*

183. *Id.* § 7410(c)(2)(D)(i).

184. *Id.* § 7410(c)(2)(C).

185. *Id.* § 7410(c)(2)(D)(ii).

186. RODGERS, *supra* note 91, § 3.29(B)(1).

187. 42 U.S.C. § 7410(c)(2)(E) (1988).

188. *Id.* § 7410(c)(2)(D)(iii).

189. *See* RODGERS, *supra* note 91, § 3.29(B)(2).

spaces.[190]

Additionally, the 1977 amendments provided that an SIP provision requiring a toll on a bridge "located entirely within one city" could be eliminated from the SIP at the request of the Governor of that state if the state revised its SIP to meet certain conditions.[191] Those conditions were that the revised plan: (1) require, "as expeditiously as possible," the implementation of comprehensive measures which would ensure that public transportation was adequate "to meet basic transportation needs," and; (2) require implementation of other transportation control measures sufficient to attain and maintain the relevant NAAQS.[192]

The limitations on certain transportation control measures contained in the 1974 and 1977 amendments had the practical effect of forcing states to rely on those measures which remained. The most significant remaining measure required states to provide "to the extent necessary and practicable, for periodic inspection and testing of motor vehicles to enforce compliance with applicable emissions standards."[193] I & M programs involve annual inspections of vehicle emissions.[194] Congress was convinced that I & M programs would be the most efficient means for reducing mobile source pollution.[195] The Conference Committee felt that I & M programs would be cheaper, less disruptive, and, as a result, more likely to be implemented by states than other transportation control measures.[196] Thus, Congress encouraged states to implement I & M programs rather than other types of transportation control measures.

What differentiates I & M programs from other transportation control measures is that they do not require people to change their driving habits. So long as the driver can afford the cost of the emission test (estimated at between $4 and $6 per vehicle) and the cost of the required maintenance (estimated at between $10 and $35 per vehicle),[197] no other change in driving habits is required.

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190. 42 U.S.C. § 7410(c)(4) (1988).

191. *Id.* § 7410(c)(5)(A)

192. *Id.* § 7410(c)(5)(B). The SIP revisions had to result in emissions reductions equivalent to the emissions reductions that would have resulted from the implementation of the regulations requiring tolls. *Id.*

193. *Id.* § 7410(a)(2)(G).

194. RODGERS, *supra* note 91, § 3.29(c)(1)(a).

195. *Id.*

196. *Id.*

197. *Conference Report*, *supra* note 177, at 285-86, *reprinted in* 1977 U.S.C.C.A.N. at

Thus, the congressional decision to rely primarily on I & M programs for reducing vehicle pollutants indefinitely delayed the implementation of measures which would have changed the driving habits of Americans.

2. Transportation Control Measures Were Responsible for Achieving Disproportionate Pollution Reductions

The second problem with transportation controls under the 1970 Clean Air Act was that they were forced to carry a disproportionate burden of the emissions reductions required to achieve compliance with NAAQSs. Although vehicle emissions are the major source of four of the six pollutants for which NAAQSs were originally promulgated,[198] states were unable to regulate either fuel economy[199] or tailpipe emissions of new cars.[200] Thus, the only option states had for controlling automobile emissions was transportation controls. Since the Clean Air Act required states to develop an SIP which would achieve compliance with NAAQSs regardless of cost or technological feasibility,[201] states were forced to use transportation controls to fill in the gap between NAAQSs and the reductions possible from emissions controls on stationary sources.

In a situation where new car emission controls resulted in significant pollutant reductions, this might have worked. However, the history of the mobile sources emissions standards is a history of delay. In 1970, Congress decreed that by 1975 automobile emissions of hydrocarbons and carbon monoxide would have to be reduced by ninety percent from their 1970 level, and that by 1976 nitrogen oxide emissions would have to be reduced by ninety percent of their 1970 levels.[202] As a result of EPA granted waivers and congressional amendments to the statute, these goals were not reached until much later.[203] In the case of hydrocarbons, the ninety

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1364-65.

198. Battle, *supra* note 164, at 9. Automobiles were also a major source of lead pollution; lead was the pollutant for which the seventh NAAQS was eventually promulgated. *Id.*

199. Fuel economy is regulated by federal government under the Energy Policy and Conservation Act of 1975. 15 U.S.C. § 2002(a)(1) (1988) (mandating a fleet average of 27.5 mpg by 1985).

200. States are preempted from requiring emissions controls on new cars. 42 U.S.C. § 7543(a). California is excepted from this rule. *Id.* § 7543(b). Other states may adopt California standards under other circumstances. *Id.* § 7507.

201. *See* Union Electric Co. v. EPA, 427 U.S. 246 (1976).

202. *See* 42 U.S.C. § 7521(b)(5)(D) (1970).

203. *See* GRAD, *supra* note 15, § 2.06[3] (discussing the delay in reducing mobile source

percent reduction was not achieved until 1980; and the ninety percent reduction in carbon monoxide was not achieved until 1981.[204] In the case of nitrogen oxides, Congress permanently reduced the standard from 0.4 grams of nitrogen oxide emissions per mile to 1.0 grams.[205] As a result, in the mid-1970's, when the EPA promulgated control plans were coming into effect, automobile tailpipe emissions had not been significantly reduced. The gap between the reductions achieved by the use of NAAQSs and the reductions which could be achieved through stationary source emissions reductions was large, and transportation controls were the only way states could comply with federal NAAQSs.

The 1974 and 1977 amendments illustrate the effect of imbalance between air quality standards and automobile tailpipe emissions standards. In order to achieve compliance through transportation control plans, drastic transportation control measures, such as gasoline rationing, were required.[206] Since states were unwilling to enact these drastic measures, they resorted to inaction as a means of avoiding the problem.[207] The SIPs which were promulgated did not comply with the NAAQSs, and the EPA was forced to promulgate plans for these states in 1973. This situation prompted Congress to conclude that many transportation control measures were unworkable, and this conclusion was the basis of the 1977 decision to rely on I & M programs.[208] The disproportionate pollution reduction burden placed on transportation control measures in the 1970's ultimately prompted Congress to restrict their use.

3. States Did Not Have Enough Time to Develop Effective Transportation Control Plans

A third reason why states were unable to implement transportation control plans successfully was the short time given them to promulgate plans. In 1970, transportation control plans were a new concept. Designing a plan requires "tough judgments on air quality

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pollution).

204. 42 U.S.C. § 7521(a)(3) (1988).

205. *Id.* § 7521(b). The 0.4 grams per mile level was retained as a research goal. *Id.* § 7521(b)(7).

206. *See supra* notes 161-73 and accompanying text.

207. *See supra* notes 179-80 and accompanying text.

208. *See supra* notes 181-197 and accompanying text.

effects, driver response, economic costs, and political climate."[209] In 1972, the EPA recognized the difficulty of these judgments and granted states a one year extension of the deadline for the submissions of transportation control plans, and a two-year extension of the deadline for achieving air quality standards for transportation related pollutants (carbon monoxide, hydrocarbons, nitrogen oxide, and ozone).[210] However, the EPA had no statutory authority to grant these extensions, and the United States Court of Appeals for the District of Columbia ordered that they be rescinded.[211]

The EPA then ordered states to submit transportation control plans by April 1973.[212] States submitted plans, but they were both late and inadequate to comply with air quality standards.[213] The EPA attributed this failure to the "insufficient time [provided] to involve local elected officials, citizens, and the private sector in the process" of developing the plans.[214] As a result of the states' failure to submit adequate plans, the EPA was compelled to promulgate transportation control plans for the states.[215] According to a report issued by the National Commission on Clean Air, the resulting plans were frequently "unrealistic or could not be carried out by the 1977 deadlines."[216] Thus, both inexperience and insufficient time were additional factors in the failure of states to develop adequate transportation control plans in the early 1970's.

C. Comparison of the 1970 and the 1990 Clean Air Acts

In the 1990's, one of the most pressing environmental problems facing our society is global warming. As yet, the United

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209. RODGERS, *supra* note 91, § 3.29(B)(2).

210. *Id.* (citing 337 Fed. Reg. 10845 (1974)).

> The Administrator has determined that the lead-time necessary for development, adoption, and implementation of transportation control measures generally precludes their application . . . soon enough to permit attainment of the primary standards within the time period prescribed by the Act . . . . Accordingly, it is the Administrator's judgment that 2-year extensions are justified in cases where transportation control measures will be necessary.

37 Fed. Reg. 10845 (1974).

211. NRDC, Inc. v. EPA, 475 F.2d 698 (D.C. Cir. 1973).

212. 38 Fed. Reg. 6290 (1973).

213. RODGERS, *supra* note 91, § 3.29(B)(2).

214. FINAL REPORT OF THE NATIONAL COMMISSION ON AIR QUALITY, TO BREATHE CLEAN AIR 131 (1981) [hereinafter TO BREATHE CLEAN AIR].

215. *See, e.g.*, 38 Fed. Reg 31388 (1973). The EPA was compelled to promulgate plans for states which had failed to enact their own by 42 U.S.C. § 7410(c)(1) (1988).

216. TO BREATHE CLEAN AIR, *supra* note 214, at 131.

States has made no serious attempt to address this problem.[217] The 1990 Clean Air Act does not contain any reference to the problem, and the intransigence of the United States is largely responsible for the failure of the international community to adopt meaningful restrictions on emissions of greenhouse gases other than chlorofluorocarbons.[218]

In spite of the fact that it does not specifically address global warming, the Clean Air Act can be used to regulate greenhouse gas emissions. Under the Clean Air Act a pollutant may be regulated if it meets two criteria: it must "reasonably be anticipated to endanger public health or welfare" and it must be emitted by "numerous or diverse mobile or stationary sources."[219] Carbon dioxide emissions endanger public welfare because they affect the climate.[220] Numerous mobile and stationary sources emit carbon dioxide.[221] Thus, the EPA could promulgate a carbon dioxide NAAQS and require states to develop an SIP to comply with that standard.

Because automobiles are responsible for one-third of the carbon dioxide emissions in the United States,[222] an SIP for carbon dioxide would need to include provisions reducing emissions of carbon dioxide from automobiles. Transportation control measures could be used to accomplish this goal. Past efforts to reduce automobile pollutants using transportation control plans failed for the reasons detailed in section III.B.[223] Under the 1990 version of the Clean Air Act that failure could be repeated.

At the root of the problem is the fundamental similarity between the 1970 Clean Air Act transportation control provisions and

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217. Michael Weisskopf, *Global Warming Conferees to Focus on Carbon Dioxide*, WASHINGTON POST, Feb. 15, 1991, at A6 (noting that the United States government opposes the setting of carbon dioxide gas emissions standards).

218. Ellen Wallace, *Global Warming Conference Sets No Goals on Gases*, CHRISTIAN SCI. MONITOR, Nov. 9, 1990, at 7 (stating that the United States and the U.S.S.R. who are the world's largest producers of carbon dioxide emissions refused to agree to a proposed international cap on carbon dioxide emissions). *See also* Editorial, *Bush Moves in the Slow Lane*, BOSTON GLOBE, Feb. 15, 1991, at 12; James L. Franklin, *U.S. Deflects Effort to Cap Carbon Dioxide Emissions*, BOSTON GLOBE, Nov. 6, 1990, at 2. The Montreal Protocols, 52 Fed. Reg. 47489 (1987), to which the United States is a party place limits on chlorofloro-carbon emissions. *See* Ogden, *The Montreal Protocol: Confronting the Threat to the Earth's Ozone Layer*, 63 Wash. L. Rev. 997 (1988).

219. 42 U.S.C. § 7408(a)(1) (1988). *See supra* notes 87-90 and accompanying text.

220. *See supra* note 33 and accompanying text.

221. *See supra* note 76 and accompanying text.

222. FLAVIN, *supra* note 1, at 42.

223. *See supra* notes 174-216 and accompanying text.

those of the 1990 amendments. The 1970 and 1990 provisions are similar in that both require transportation control measures to produce large emissions reductions.[224] In 1970 Congress recognized the public opinion that air pollution was a serious problem which had to be addressed.[225] In 1990 the nation was gripped by a similar sense of urgency.[226] In each case, Congress passed an Act which attempted to answer the public demand for stringent air pollution controls.

Transportation controls have the potential to succeed in reducing carbon dioxide emissions significantly. Strategies such as mass transit development and inner-city parking supply controls can reduce American dependence on private automobiles.[227] Gas rationing undoubtedly has the potential to reduce automobile use drastically.[228] Bus/carpool lanes on highways can also help reduce emissions from mobile sources.[229] Transportation controls could be used to reduce emissions by changing the driving habits of Americans.

Unfortunately, many of the factors which prevented the effective use of transportation control measures in the 1970's are still present today. As in the 1970's, the Clean Air Act mobile source provisions remain weak,[230] and thus, a disproportionate quantity of the emissions reductions will need to be achieved through transportation control measures. The American public will resent drastic transportation control measures, and this resentment may result in a movement to weaken transportation control provisions in a manner similar to the 1974 and 1977 Clean Air Act amendments.[231] Thus, there is a danger that the mistakes of the past will be repeated.

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224. *See supra* notes 70-80 and accompanying text.

225. CONF. REP. No. 91-1783, 91st Cong., 2d Sess. 5 (1970), *reprinted in* 1970 U.S.C.C.A.N. 5356, 5360.

226. *See* Michael Ross, *New Clean Air Act Passed by House after Ten Years*, L.A. TIMES, Oct. 27, 1990, at 22.

227. RODGERS, *supra* note 91, § 3.29(C)(2)(d).

228. *Id.* § 3.29(C)(2)(e).

229. *Id.* § 3.29(C)(2)(a).

230. Allan R. Gold, *Critics Say Cars Got Break on Clean Air*, N.Y. TIMES, Oct. 30, 1990, at 16.

231. *See supra* notes 181-92 and accompanying text.

1. Under the 1990 Amendments, Transportation Control Plans Will Be Required to Achieve a Disproportionate Quantity of Overall Emissions Reductions

Transportation control measures would have to achieve a disproportionate share of the emissions reductions required by a carbon dioxide NAAQS. Automobile carbon dioxide emissions would have to be drastically reduced in order to comply with a carbon dioxide standard.[232] There are two potential sources for these reductions: transportation controls and tailpipe emission standards. Ideally, a balanced combination of both would be used to achieve the required emission reductions at minimal cost. However, under the 1990 amendments, it will be impossible to achieve that balance.

The tailpipe emissions standards contained in the 1990 amendments are lax. In order to get the amendments through Congress, concessions were made to automakers.[233] These concessions included: elimination of a second round of emissions reductions; watering down of provisions requiring the use of cleaner, alternative fuels; and postponement of the effective date of a variety of pollution standards.[234] While these concessions may have been necessary to the passage of the bill, the result was weak tailpipe emissions standards.[235] Since tailpipe emissions of carbon dioxide would not be drastically reduced by federal mobile source standards, there would be a gap between carbon dioxide emissions reductions from automobiles required to comply with the NAAQS and the reductions which would be produced by tailpipe standards. This gap would have to be filled by the use of transportation control plans.

Federal standards could be used to achieve carbon dioxide reductions which states will otherwise have to achieve through transportation control plans. For example, significant reductions in car-

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232. FLAVIN, *supra* note 1, at 41-2.

233. Allan R. Gold, *Critics Say Cars Got Break on Clean Air*, N.Y. TIMES, Oct. 30, 1990, at 16. If these concessions had not been made, Representative John Dingell of Detroit, Michigan would have stalled the bill in the House Energy and Commerce Committee. FLAVIN, *supra* note 1, at 41-42.

234. *Id.*

235. *Id.* (discussing the views of Richard Ayres of the NRDC, Daniel Weiss of the Sierra Club, and Albert F. Appleton, New York City Environmental Protection Commissioner). *See contra* John E. Peterson, *Big Three's Puzzle: How to Meet New Clean Air Rules*, DETROIT NEWS, Oct. 23, 1990, at E1.

bon dioxide emissions could be achieved through increased automobile efficiency. If automobiles averaged fifty miles per gallon, carbon dioxide emissions would decline by the year 2010 in spite of the increased number of cars on the road.[236] A requirement that automobiles be more fuel efficient is not drastic since it does not even require a change in American driving habits. However, states are unable to regulate automobile efficiency.[237] They would be forced to use transportation controls instead.

2. The Political Backlash of the 1970's May Be Repeated

The drastic nature of the transportation controls which would be required in order to comply with a carbon dioxide NAAQS might lead to political backlash. In the 1970's when drastic emissions reductions were required under EPA promulgated transportation control plans, there was strong resistance to the plans.[238] Congress responded by amending the Clean Air Act in 1974 and 1977 to weaken the transportation control plan provisions.[239] Congress may back off from the strong provisions of the 1990 amendments for similar reasons.

The measures which will need to be taken with respect to pollutants other than carbon dioxide under the 1990 amendments illustrate the effect of drastic transportation control measures. The 1990 amendments will require the implementation of transportation control plans in various nonattainment areas with respect to already promulgated NAAQSs.[240] In Los Angeles it is predicted that vehicle miles traveled (VMT) would have reached 390 million miles per day by 2010 (a sixty-seven percent increase over 1990 VMT).[241] In order to attain the NAAQS for ozone, the number of VMT in 2010 will have to be restricted to 300 million miles per day (only a twenty-five percent increase over present VMT).[242] In Denver, VMT will have to be held down to fifty million miles per day instead of the projected sixty million miles per day.[243] In order to achieve reductions on this scale it will be necessary for these cities

236. FLAVIN, *supra* note 1, at 35.
237. 42 U.S.C. § 7543(a) and 15 U.S.C. § 2001 (1989).
238. RODGERS, *supra* note 91, § 3.30.
239. *See supra* notes 181-92 and accompanying text.
240. 1990 Clean Air Act Amendments, 42 U.S.C.A. §§ 7511-7515 (1990).
241. Yuhnke, *supra* note 135, at 212.
242. *Id.*
243. *Id.*

to make a major shift away from the use of single occupant automobiles and toward the use of mass transit and other less polluting transportation alternatives.[244]

While these changes are intended to reduce emissions of pollutants other than carbon dioxide, they illustrate the scope of the changes necessary to achieve significant reductions of automobile pollutants through transportation control plans. The measures available to states under the 1990 amendments which would accomplish these reductions include: improved mass transit; bus/carpool lanes; ordinances requiring a reduction in the number of trips; programs to limit the use of vehicles in downtown areas; construction of bicycle lanes; and programs to encourage voluntary removal of pre-1980 (more polluting) vehicles from the road.[245] These measures are similar to those included in the EPA promulgated plans of the 1970's.[246] The 1970 transportation control plans were unpopular with voters.[247] Transportation plans promulgated under the 1990 amendments to reduce carbon dioxide emissions would use similar measures, and, thus, would have the potential to engender a similar legislative backlash.

IV. Carbon Dioxide Emissions Can Be Regulated Effectively under the Clean Air Act

Carbon dioxide emissions reduction can be accomplished under the Clean Air Act criteria pollutant provisions. The advantage of using the Clean Air Act to regulate carbon dioxide emissions is that efforts to implement the provisions of the Act will be reinforced by twenty years of experience. While our efforts over those twenty years have not been completely successful, they have provided valuable lessons which would facilitate the successful implementation of a carbon dioxide NAAQS. If the insight gained through experience is utilized, the Clean Air Act can be used to regulate carbon dioxide emissions successfully.

Past experience will be a critical factor in efforts to use transportation control plans. Transportation control plans can be used successfully to reduce carbon dioxide emissions from automobiles. Successful transportation control measures must be part of a bal-

244. *Id.* at 212-13.
245. 42 U.S.C.A. § 7408(f)(A)(i)-(xvi) (1990).
246. *See supra* notes 164-72 and accompanying text.
247. *See supra* notes 175-80 and accompanying text.

anced combination of pollution reduction measures, including stringent tailpipe emissions standards and other energy efficiency measures. Additionally, the transportation control measures which are implemented must be accepted by the general public. Steps can be taken to ensure that both of these requirements are satisfied.

A. In the 1990's States Have the Benefit of Experience

The primary difference between the transportation control plans promulgated by the EPA in the 1970's and those promulgated in the 1990's is that the latter will be designed and implemented by the states. In the early 1970's transportation control plans were new, and states had no experience with implementing control measures. Today states such as California have already begun to implement a wide variety of creative measures. The states' familiarity with transportation control plans will allow them to implement measures to reduce carbon dioxide emissions successfully.

In the first place, since there is not yet a carbon dioxide standard, states have sufficient time to develop a transportation control plan for carbon dioxide reduction. If a standard were to be promulgated, states would have sufficient warning to develop an adequate plan. This would enable state planners to consult with local elected officials, citizens, and businesses in order to develop a workable plan suited to the needs of the state.[248] The 1990 amendments encourage such consultation. For example, the provisions related to the ozone NAAQS require states to compel employers to increase carpooling among their employees.[249] Similar strategies could be used by states attempting to comply with a carbon dioxide NAAQS. Thus, in the 1990's states will have the opportunity to develop adequate transportation control plans.

Secondly, states will be able to implement transportation control measures more effectively. The state of California has recently enacted the California Clean Air Act (CCAA) which requires nonattainment areas within the state to develop plans to comply with both federal air quality standards and more stringent state

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248. The inability of states to do this was one of the problems in the 1970's.

249. 42 U.S.C.A. § 7482(d)(1)(E) (1990). This section requires that in "severe" ozone nonattainment areas employers of 100 or more persons must "increase average passenger occupancy per vehicle in commuting trips between home and the workplace during peak travel periods by not less than 25% above average vehicle occupancy." *Id.*

standards.[250] The plan for the South Coast Air Basin (which includes Los Angeles) calls for the use of a combination of regulation and market incentives to reduce traffic.[251] Proposed strategies include alternative work weeks (e.g., four ten-hour days instead of five eight-hour days), the use of non-motorized transportation, mass transit improvements, and vanpool purchase incentives.[252] The proposed transportation measures are not new, but "modifications have been made to the method of implementation."[253] The new implementation methods are the result of an attempt to evaluate the cost effectiveness of all potential control strategies[254] and efforts to improve the enforceability of control measures.[255]

Efforts to improve enforceability of transportation control plans in California have been successful. For example, in Los Angeles, businesses are required to decrease commuters' use of automobiles.[256] Companies which fail to meet specific quotas can be fined up to $25,000 per day and company officials can be put in jail.[257] In order to comply with the quotas, companies have adopted creative strategies. Capital Records offers free compact discs and other merchandise to employees who carpool. As a result, Capital Records employees have increased average vehicle occupancy from 1.02 persons to 1.25 persons.[258] While this figure is still short of the 1.5 person average which the company is required to achieve,[259] it does represent significant progress. Other companies have adopted strategies to encourage carpooling, such as giving employees free tickets to sporting events, free parking, and even the right to use special express lanes at the company's cafeteria.[260] Initial results show these strategies are successful. The experience of businesses in California can serve as a model for other states.

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250. Draft Air Quality Management Plan (South Coast Air Basin), 1-5 (1990).

251. *Id.* at 4-29.

252. *Id.*

253. *Id.* at 4-30.

254. *Id.* ES-7 (1990). The ranking by cost effectiveness was required by the CCAA. *Id.*

255. *Id.* at 4-29.

256. Larry Tye, *Environmental Protection: Smog, Drought Force New Remedies in California*, Boston Globe, Feb. 18, 1991, at 1.

257. *Id.*

258. *Id.*

259. *Id.*

260. *Id.*

B. A Balanced Approach to Reduction of Carbon Dioxide Emissions Will Be Essential

The failure of transportation control plans in the past was related to the disproportionately large quantity of emissions reductions which they were designed to achieve.[261] This problem can be avoided by a greater utilization of other emissions reduction strategies. The most obvious step would be to promulgate strict regulations reducing automobile tailpipe emissions of carbon dioxide. In addition, a national energy policy which emphasizes efficiency and conservation is essential. Finally, a national transportation policy consistent with pollution reduction goals must be developed. If these steps are taken, the reductions in carbon dioxide emissions which will need to be made through transportation control plans will be achieved.

The most direct way to reduce tailpipe emissions of carbon dioxide is to require increased efficiency of automobiles. If automobiles burned less fuel, they would emit less carbon dioxide.[262] Prototype automobiles which average ninety-nine miles per gallon exist, and automobiles which average over fifty miles per gallon are on the market.[263] The current required fleet average of 27.5 miles per gallon[264] is well below the level of efficiency which could be achieved. If the current fleet of automobiles averaged forty miles per gallon, 2.8 million fewer barrels of oil would be used each day.[265] The production of higher mileage cars would decrease the carbon dioxide emissions reductions which would have to be achieved through the use of transportation control measures.

Unfortunately, the Bush administration is opposed to measures which would require automakers to increase fuel efficiency.[266] The recently proposed administration energy plan does not include any requirements that automobile fuel efficiency be increased.[267] The plan does include a package of market incentives which are designed to encourage automakers to produce more fuel efficient

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261. *See supra* text accompanying notes 198-208.

262. FLAVIN, *supra* note 1, at 41-42.

263. *Id.*

264. Michael Kranish, *Bush's Energy Plan Relies on Free Market*, BOSTON GLOBE, Feb. 9, 1991, at 1.

265. *Id.*

266. *Id.*

267. *Id.*

cars.[268] However, critics have argued that these market incentives are not likely to prove effective and may even result in decreased fuel efficiency.[269] Until a national policy which increases automobile efficiency is enacted, stringent transportation control plans would be needed to compensate for the foregone carbon dioxide emissions reductions.

Efficient energy use would be important in many areas other than automobiles. Carbon dioxide emissions result from electricity generation, home heating, and other areas. Measures to increase the efficiency of appliances which use electricity would decrease carbon dioxide emission by reducing the quantity of electricity which would need to be generated. Noncarbon based electricity generation techniques are on the drawing board. Well-insulated homes require less fuel to heat. The use of strategies such as these to reduce carbon dioxide emissions would reduce the size of the reductions which would be required of transportation control plans.

Finally, a national transportation plan consistent with pollution reduction goals must be developed. The federal government currently contributes ninety percent of the cost of most highway improvement projects and eighty percent of the cost of mass transit improvements.[270] Thus, national transportation policy is a major determinant of the structure of the nation's transportation system. Since it is possible to transport a given number of people using mass transit with lower carbon dioxide emissions than transporting the same number of people in single occupant vehicles,[271] the content of the national transportation plan has a significant effect on carbon dioxide emissions.

While measures contained in the 1990 amendments linking federal grant money to state transportation control plans have the indirect effect of conforming the expenditure of federal transporta-

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268. *Id.*

269. *Id.* The plan provides for the relaxation of the 27.5 mpg standard for automakers who produce dual fuel cars. While the dual fuel automobiles will be capable of burning cleaner fuels than gasoline, there is no guarantee that the owner of a dual fuel automobile would use the cleaner fuel, and, thus, there would be no benefit gained from the relaxation of the 27.5 mpg standard. *Id.* Daniel Weiss of the Sierra Club stated, "[t]he efforts at fuel economy are rife with loopholes large enough to drive a gas guzzler through." *Id.*

270. Michael Kranish, *U.S. Transportation Plan Emphasizes Roads*, BOSTON GLOBE, Feb. 14, 1991, at 1.

271. Yuhnke, *supra* note 135, at 216.

tion funds with pollution reduction goals,[272] national transportation policy must contain a more explicit commitment to pollution reduction. Unfortunately, President Bush's recently proposed national transportation plan is deficient in this respect. The plan emphasizes the construction of new highways rather than the development of mass transit.[273] The plan eliminates operating subsidies for most urban subway and bus systems.[274] According to United States Transportation Secretary Samuel Skinner, there is "no guarantee" that the plan will save a single barrel of oil.[275] Thus, the plan is inconsistent with a policy of energy efficiency and conservation,[276] and it would be necessary to revise this plan in order to decrease the reductions in carbon dioxide emissions for which transportation controls would be responsible.

Conclusion

This discussion, while by no means exhaustive, makes it clear that carbon dioxide emissions can be reduced through the implementation of an integrated regulatory program. Transportation control measures have failed to realize fully the emissions reductions which they could have potentially produced. The potential to use such plans to reduce carbon dioxide emissions will remain unrealized until the United States develops a comprehensive strategy for reducing greenhouse gas emissions. The Clean Air Act is a potentially powerful vehicle for developing a comprehensive global warming strategy. As long as planners remember that no strategy applied in isolation will produce meaningful change, transportation control plans can play an important role in the future.

Michael T. Donnellan

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272. *See supra* notes 135-38 and accompanying text.

273. Michael Kranish, *U.S. Transportation Plan Emphasizes Roads*, Boston Globe, Feb. 14, 1991, at 1.

274. *Id.*

275. *Id.*

276. *Id.* (quoting Bill Roberts, legislative director of the Environmental Defense Fund).