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INTRODUCTION

Massachusetts v. EPA[1] started a wide-ranging debate concerning how, if at all, the U.S. Environmental Protection Agency ("EPA") should regulate greenhouse gases ("GHG"). Most observers agree that Congressional efforts to enact comprehensive GHG legislation have stalled.[2] Several climate-related mass tort actions claiming that climate change has increased the severity of extreme weather events and has caused incremental shoreline damage will not likely result in a comprehensive GHG regulatory system.[3] The EPA has finalized a number of GHG regulations, many of which are or have been the subject of litigation.[4]

Now that the Supreme Court has opened the door for the EPA to use the Clean Air Act[5] ("CAA") to regulate GHGs,[6] the nation

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1. 549 U.S. 497 (2007).

2. *See* Timothy Gardner & Ayesha Rascoe, *SCENARIOS – Future Is Cloudy for US Climate Change Bill*, REUTERS, (Jul. 22, 2010, 7:04 PM), http://www.reuters.com/article/2010/07/22/climate-usa-future-idUSN2210242620100722.

3. *See* Conn. v. Am. Elec. Power Co., 582 F.3d 309, 314 (2d Cir. 2009); Comer v. Murphy Oil, 585 F.3d 855, 859 (5th Cir. 2009); Native Vill. of Kivalina v. Exxonmobil Corp., 663 F. Supp.2d 863, 868 (N.D. Cal. 2009).

4. *See* Leslie Kaufman, *A Surge In Lawsuits Challenging EPA on Climate*, NY TIMES, (Nov. 3, 2010, 2:12 PM), http://green.blogs.nytimes.com/2010/11/03/a-surge-in-lawsuits-challenges-e-p-a-on-climate/?scp=4&sq=climatechange lawsuit&st=cse.

5. 42 U.S.C. §§ 7401-7671(q) (2006).

continues to wrestle with the pros and cons of CAA GHG regulation. Many commentators write that GHG regulation under the existing CAA is inappropriate, infeasible, or unjustified.[7] Some have called on Congress to intervene so that the CAA does not regulate climate change.[8] Others argue that controlling domestic GHG emissions is futile in the face of increasing international emissions, especially from China.[9] Congress has wrestled with bills restricting the EPA's ability to regulate GHGs, but has not passed a bill thus far.[10]

Others write that GHG regulation under the existing CAA is necessary[11] or at least justified.[12] Absent additional Congressional

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6. *See, e.g.*, Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66,496 (Dec. 15, 2009) (to be codified at 40 C.F.R ch. 1).

7. *See* Robert R. Nordhaus, *New Wine Into Old Bottles: The Feasibility of Greenhouse Gas Regulation Under the Clean Air Act*, 15 N.Y.U. ENVTL. L.J. 53, 54 (2007); Arnold W. Reitze, Jr., *Federal Control of Carbon Dioxide Emissions: What Are The Options?* 36 B.C. ENVTL. AFF. L. REV. 1, 77 (2009).

8. *See* Kyle Danish & Tomas Carbonell, *Second-Best World*, POINT CARBON, May 2010, at 27; Arnold W. Reitze, Jr., *Federal Control of Carbon Dioxide Emissions: What Are The Options?* 36 B.C. ENVTL. AFF. L. REV. 1, 15-16 (2009).

9. *See* CONG. BUDGET OFFICE, A CBO STUDY: POLICY OPTIONS FOR REDUCING CO_2 EMISSIONS XIII-XIV (2008), http://www.cbo.gov/ftpdocs/89xx/doc8934/02-12-Carbon.pdf; Roger R. Martella, Jr., *Climate Change Along The Northeast Corridor: How Washington and New York Are Approaching and Preparing For Greenhouse Gas Controls*, 18 N.Y.U. ENVTL. L.J. 14, 25 (2010); John Copeland Nagle, *Climate Exceptionalism*, 40 ENVTL. L. 53, 73 (2010).

10. *See* Carl Hulse & David M. Herszenhorn, *Democrats Call Off Effort For Climate Bill in Senate*, N.Y. TIMES, Jul. 23, 2010, at A15.

11. *See* Christopher T. Giovinazzo, *Defending Overstatement: The Symbolic Clean Air Act and Carbon Dioxide*, 30 HARV. ENVTL. L. REV. 99, 163 (2006); Janine Maney, *Carbon Dioxide Emissions, Climate Change, And The Clean Air Act: An Analysis of Whether Carbon Dioxide Should Be Listed as a Criteria Pollutant*, 13 N.Y.U. ENVTL. L.J. 298, 377 (2005); Patricia Ross McCubbin, *EPA's Endangerment Finding for Greenhouse Gases and the Potential Duty to Adopt National Ambient Air Quality Standards to Address Global Climate Change*, 33 S. ILL. U. L.J. 437, 467 (2009); Curtis A. Moore, *Existing Authorities in the United States for Responding to Global Warming*, 40 ENVTL. L. REP. 10185, 10191 (2010); Vera P. Pardee & Kassie R. Siegel, *The Clean Air Act: An Indispensable Tool to Combat Global Warming*, 24 NAT. RES. & ENV'T. 38 (2010); Nathan Richardson, *Greenhouse Gas Regulation Under the Clean Air Act: Does* Chevron *Set The EPA Free?*, 29 STAN. ENVTL. L.J. 283, 293-94 (2010)''.

12. *See* Daniel Brian, *Regulating Carbon Dioxide Under the Clean Air Act as a Hazardous Air Pollutant*, 33 COLUM. J. ENVTL. L. 369, 370 (2008); Holly Dormeus & W. Michael Hanemann, *Of Babies and Bathwater: Why the Clean Air Act's*

input, EPA now must decide how to apply its various CAA programs to climate change. EPA has finalized automobile GHG regulations[13] and has proposed heavy duty truck GHG regulations.[14] Large stationary source facility GHG construction permitting began in early 2011.[15]

This article explores the steps the EPA may take if it decides to regulate GHGs under current CAA regulatory programs. Part I introduces the various CAA authorities available today. Part II reviews if the EPA can or must set GHG National Ambient Air Quality Standards ("NAAQS"), and if it were to set GHG NAAQS, how it would proceed. Part III discusses how the EPA could use GHG NAAQS, combined with other existing CAA programs, to manage GHG emissions without Congressional intervention. While future judicial or Congressional action could substantially change EPA's authority or discretion, this article explores how the EPA could regulate GHGs under the CAA as of the end of 2010.

I. THE CLEAN AIR ACT

Congress defined "air pollutant" as "any air pollution agent or combination of such agents, including any physical, chemical, biological, radioactive . . . substance or matter which is emitted into or otherwise enters the ambient air."[16] Through several amendments

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Cooperative Federalism Framework is Useful for Addressing Global Warming, 50 ARIZ. L. REV. 799, 800 (2008); Robert B. McKinstry, Jr. et al., *The New Climate World: Achieving Economic Efficiency in a Federal System for Greenhouse Gas Control Through State Planning Combined With Federal Programs*, 34 N.C. J. INT'L. L. & COM. REG. 767, 768-89 (2009); Eric Schwartz, *Carbon Dioxide and The Clean Air Act*, 4 CARDOZO PUB. L. POL'Y & ETHICS J. 779, 817 (2006).

13. *See* Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, 75 Fed. Reg. 25,324 (May 7, 2010).

14. *See* Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles, 75 Fed. Reg. 74,152 (proposed Nov. 30, 2010).

15. *See* Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule, 75 Fed. Reg. 31,514, 31,520 (Jun. 3, 2010).

16. 42 U.S.C. § 7602(g) (1996). Recognizing that some emissions react in the atmosphere to create other substances that could become a concern, Congress allows EPA to regulate emissions that become precursors for other air pollutants. *Id.*

between 1955 and 1990,[17] the CAA and its predecessors has evolved into a complex and comprehensive regulatory structure impacting a "wide variety" of stationary and mobile source emissions.[18] These programs are often complementary, but occasionally overlap.[19] The EPA may utilize a variety of pollutant specific ambient air quality standards, industrial facility emissions regulations, car and truck emissions regulations, and emissions trading programs to address the challenge of regulating GHGs under the existing CAA.

A. National Ambient Air Quality Standards

Responding to the perceived failure of the 1967 CAA to manage air pollution,[20] Congress established the NAAQS program in the 1970 CAA.[21] NAAQS regulates air pollutants that "cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare"[22] and that "result[] from numerous or diverse mobile or stationary sources."[23]

Primary human health[24] and secondary welfare[25] NAAQS limit the amount or concentration of a pollutant present in the ambient air, without imposing emissions limits on individual emissions sources.[26] Other EPA and state regulatory programs limit individual emissions sources that contribute to the overall atmospheric concentration of each criteria pollutant.[27] The EPA sets NAAQS at levels no more and

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17. *See* Paul G. Rogers, *The Clean Air Act of 1970*, 16 EPA J. 21 (1990). These statutes include the Clean Air Amendments of 1970, Pub. L. No. 91-604, 84 Stat. 1676 (1970), Clean Air Act Amendments of 1977, Pub. L. No. 95-95, 91 Stat. 685 (1977), and Clean Air Act of 1990, Pub. L. No. 101-549, 104 Stat.2399 (1990).

18. NATHAN RICHARDSON ET AL., DISCUSSION PAPER, GREENHOUSE GAS REGULATION UNDER THE CLEAN AIR ACT: STRUCTURE, EFFECTS, AND IMPLICATIONS OF A KNOWABLE PATHWAY 3(2010), http://www.rff.org/RFF/Documents/RFF-DP-10-23.pdf.

19. *See* Richardson, *supra* note 11, at 288.

20. *See* Rogers, *supra* note 17, at 22.

21. Pub. L. No. 91-604, § 109, 84 Stat. 1676, 1679 (1970).

22. 42 U.S.C. § 7408(a)(1)(A) (2006).

23. *Id.* § 7408(a)(1)(B).

24. *See* 42 U.S.C. § 7409(b)(1) (2006).

25. *Id.* § 7409(b)(2).

26. *Id.*

27. *See* discussion *infra* Parts I.B-H.

no less stringent than necessary to protect human health and welfare.[28]

Because the criteria pollutants must be common and widely emitted,[29] the EPA currently only regulates six: sulfur oxides as sulfur dioxide ("SO_2"),[30] particulate matter ("PM"),[31] carbon monoxide ("CO"),[32] ozone,[33] nitrogen oxides ("NO_x"),[34] and lead ("Pb").[35] Precursors are emissions that, once emitted to the atmosphere, create other pollutants.[36] For example, NO_x, volatile organic compounds ("VOC"),[37] and CO react in the atmosphere to form ozone.[38] Five of the NAAQS originated from the implementation of the 1970 CAA.[39] The EPA promulgated the sixth criteria pollutant, lead, in response to litigation.[40]

28. *See* Whitman v. Am. Trucking Ass'ns., 531 U.S. 457, 473 (2001).

29. *See* 42 U.S.C. § 7408(a)(1)(B) (2006).

30. *See* 40 C.F.R. §§ 50.4-.5 (2010).

31. *See Id.* §§ 50.6-.7, .13. EPA regulates three different size gradations of particulate matter: (1) total suspended particulate ("TSP"), particles of all sizes; (2) particles smaller than ten microns ("PM_{10}") that cannot be readily expelled from human lung tissue; and (3) particles smaller than 2.5 microns ("$PM_{2.5}$") likely to penetrate lung tissue and enter the blood stream. *See Particulate Matter Sampling, in* APTI 435: ATMOSPHERIC SAMPLING COURSE, at 4-3, 4-4 (Air Pollution Training Inst., Student Manual, 1983), *available at* http://www.epa.gov/apti/Materials/APTI%20435%20student/Student%20Manual/Chapter_4_noTOC-cover_MRpf.pdf

32. *See* 40 C.F.R. § 50.8 (2010).

33. *See id.* § 50.9-.10.

34. *See id.* § 50.11. NO_x is regulated both as its own criteria pollutant and as an ozone precursor. *See* NE. ADVANCED VEHICLE CONSORTIUM, OZONE PRECURSOR EMISSIONS: NO_x AND NMOC, http://www.navc.org/HDozone.php (last visited Apr. 9, 2011).

35. *See* 40 C.F.R. § 50.12 (2010).

36. *See* EUR. ENV'T AGENCY, OZONE PRECURSOR, http://eea.europa.eu/maps/ozone/resources/glossary/ozone-precursor (last visited Mar. 26, 2011).

37. *See* 40 C.F.R. § 51.100(s) (2010). Most organic compounds react with NO_x in the atmosphere to create atmospheric ozone. Northeast Advanced Vehicle Consortium, Ozone Precursor Emissions: NO_x and NMOC, http://www.navc.org/HDozone.php (last visited Apr. 9, 2011). Those that EPA found did not form ozone in the atmosphere are exempted from the VOC definition. 40 C.F.R. S51.100(s)(1) (2010).

38. *See* National Ambient Air Quality Standards for Ozone, 75 Fed. Reg. 2,938, 2,980 (proposed Jan. 19, 2010).

39. *See* National Primary and Secondary Ambient Air Quality Standards, 36 Fed. Reg. 8,186 (Apr. 30, 1971). The form, averaging period, and value of the NAAQS standards has changed several times over forty years in response to evolving science. *See* OMB WATCH, POLLUTED LOGIC: HOW EPA'S OZONE

B. Attainment Designations

The EPA and the states determine NAAQS compliance locally.[41] The country is divided into several air quality control regions ("AQCR"), often described as regional or metropolitan airsheds, where states monitor compliance with air quality standards.[42] Attainment designations are set for all or part of each AQCR.[43]

C. State Implementation Plans

Within three years of the EPA setting NAAQS, states submit a State Implementation Plan ("SIP") that shows, as required in CAA Section 110, how the state will attain each NAAQS, maintain attainment given anticipated economic growth, and enforce provisions designed to attain or maintain each NAAQS.[44] States must also update SIPs to account for changes in local circumstances or NAAQS changes,[45] and address how areas not attaining a NAAQS will come into attainment.[46]

1. Plan Development

SIPs include appropriate state-developed emissions limitations, applied to individual emitting facilities, to meet NAAQS.[47] These limitations may include "marketable permits[ ] and auctions of emissions rights" that reduce overall emissions of a NAAQS pollutant.[48] States must evaluate new and modified large industrial facilities to determine that emissions increases from new projects do not cause or aggravate a NAAQS attainment problem.[49] States must

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STANDARD ILLUSTRATES THE FLAWS OF COST-BENEFIT ANALYSIS IN REGULATORY DECISION MAKING 3 (2007), http://www.ombwatch.org/files/regs/PDFs/PollutedLogic.pdf.

40. *See* National Primary and Secondary Ambient Air Quality Standards, 43 Fed. Reg. 46,246 (Oct. 5, 1978).

41. *See* 42 U.S.C. § 7410(a)(1) (2006).

42. *See* 40 C.F.R. § 81 (2010). AQCRs often cover multi county areas and occasionally cross state lines. *Id.*

43. *See* 42 U.S.C. § 7407(d)(1) (2006).

44. *See* 42 U.S.C. § 7410(a)(1) (2006).

45. *See id.* § 7410(a)(2)(H).

46. *See* 42 U.S.C. § 7502 (2006).

47. *See* 42 U.S.C. § 7410(a)(2)(A) (2006).

48. *Id.*

49. *See id.* § 7410(a)(2)(C).

also implement ambient air monitoring programs to measure air quality and show that the state meets each NAAQS.[50]

States typically rely on a number of federal programs to help attain or maintain attainment.[51] For instance, the EPA manages the New Source Performance Standard ("NSPS") program, which regulates emissions from a variety of new or reconstructed emissions sources.[52] Mobile source regulations address emissions from a variety of vehicles, including passenger cars and trucks.[53] EPA allows states to incorporate expected emissions reductions from these, and other, programs as part of a SIP demonstration.[54]

2. Failure to Attain A NAAQS

States containing nonattainment areas must implement additional SIP measures designed so that each state can attain a NAAQS in a timely manner.[55] Typically, a state has five years to demonstrate that a nonattainment area has attained a primary NAAQS standard,[56] extendable to ten years in some situations.[57] Two additional one year extensions are also possible.[58] However, the 1990 CAA Amendments extended the attainment schedule for some pollutants to as far as twenty years in certain cases.[59] States must demonstrate attainment with secondary standards as soon as practicable, with no fixed deadline.[60]

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50. *See id.* § 7410(a)(2)(B).

51. ENVTL. PROT. AGENCY, SIP PROCESSING MANUAL, WHAT'S NOT IN A SIP, *available at* http://icode.pes.com/sipman/mContent.cfm?chap=1&filePos=8 (last visited May 15, 2011).

52. 42 U.S.C. § 7411 (2010).

53. *Id.* §§ 7521-7571.

54. SIP PROCESSING MANUAL, *supra* note 51.

55. 42 U.S.C. § 7502(c)(1) (2010).

56. *Id.* § 7502(a)(2)(A). Congress has specified specific ozone attainment schedules in Subtitle 2. NAAQS compliance schedule issues are beyond the scope of this paper.

57. *Id.*

58. *Id.* § 7502(a)(2)(C).

59. *See id.* § 7511(a)(1). Congress determined, as part of the 1990 Amendments, that ozone nonattainment area attainment deadlines should be set as a function of the severity of the effort required to reach attainment. Congress implemented similar provisions for carbon monoxide (§ 7512(a)(1)) and particulate mater (§ 7513(c)).

60. *Id.* § 7502(a)(2)(B).

3. Interstate and International Considerations

Air pollution does not recognize political boundaries. Section 126 of the CAA allows "[a]ny State of political subdivision [to] petition the Administrator for a finding that any major source or group of stationary sources emits or would emit any air pollutant" that would cause another state to not attain a NAAQS.[61] The EPA then determines if emissions controls on one or more sources within an upwind state must facilitate downwind NAAQS compliance.[62] CAA Section 115 includes provisions governing international air pollution. EPA may require domestic emissions sources to eliminate emissions that "may reasonably be anticipated to endanger public health or welfare in a foreign country" or upon request of the Secretary of State.[63] Rarely utilized Section 179B authorizes the EPA to address international air pollution causing or contributing to nonattainment problems.[64] This provision requires the EPA Administrator to refrain from sanctioning a state for long term nonattainment where the state can demonstrate that its SIP would be adequate to attain the NAAQS "but for emissions emanating from outside the United States."[65]

D. New Source Review

The CAA requires states to impose specific permitting requirements on new large industrial sources of air pollution and existing large sources of air pollution that undergo significant modifications.[66] New Source Review ("NSR") is the generic name for the EPA large source construction permitting program applied in

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61. *Id.* § 7426(b).

62. *Id.* § 7426(c).

63. *Id.* § 7415(a). Section 115 international protections are limited to countries that provide reciprocal authority for the United States to request foreign emissions sources to reduce emissions that may endanger United States public health or welfare. *See* PETER TSIRIGOTIS, ENVTL. PROT. AGENCY, DISCUSSION OF CLEAN AIR ACT AUTHORITIES AND GHGS 14 (2008), *available at* http://www.epa.gov/air/caaac/pdfs/2008_01tsirigotis.pdf.

64. 42 U.S.C. § 7509a(a)(2) (2010). El Paso, TX has implemented the best known Section 179B plan. *See* BRIAN FOSTER, TEX. NATURAL RES, CONSERVATION COMM'N, SECTION 179B INTERNATIONAL BORDER AREAS 14 (2002), http://www.jac-ccc.org/minutes/jac-0602/179B.ppt.

65. *Id.*

66. 42 U.S.C. § 7475(a) (2010).

both attainment and nonattainment areas.[67] NSR requires new or "modified"[68] "major"[69] stationary sources of any regulated air pollutants to obtain special permits before beginning construction.[70] The CAA and EPA regulations specifically define several key NSR concepts. Stationary sources are operations, facilities, or locations that emit air pollutants regulated under the CAA.[71] Major emitting facilities sources in attainment areas are those stationary sources with the specified minimum potential to emit thresholds.[72] Regulated air pollutants include any pollutant regulated under any part of the CAA, including the six criteria pollutants, and several others.[73] Sources increasing emissions by specified amounts must obtain NSR permits or state permits for "minor" projects.[74]

E. Acid Rain and Emissions Trading Programs

In the 1990 Amendments to the CAA, Congress established the acid rain trading system, where electric generating unit ("EGU")

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67. ENVTL. PROT. AGENCY, NEW SOURCE REVIEW: BASIC INFORMATION, http://www.epa.gov/NSR/info.html (last visited May. 15, 2011).

68. 40 C.F.R. § 52.21 (b)(2) (2010). "Major modification means any physical change in or change in the method of operation of a major stationary source that would result in a significant net emissions increase of any pollutant subject to regulation under the Act." EPA exempts "routine maintenance, repair and replacement" from the definition of a major modification. *Id.* § 52.21(b)(2)(iii)(a).

69. *Id.* § 52.21(b)(1).

70. 42 U.S.C. § 7475(a) (2010). Section 169(1) (42 U.S.C. § 7479(1) (2010)) requires NSR permitting for large projects emitting "any air pollutant." The regulations implementing Section 165 (40 C.F.R. § 52.21 (2010)) list the regulated air pollutants to which NSR applies, including the criteria pollutants and non-criteria pollutants regulated under the 40 C.F.R. § 60 NSPS program.

71. 42 U.S.C. § 7602(z) (2010).

72. *Id.* § 7479(1) (2010). The statute lists most common industrial activities in the source category list subject to the 100 ton per year ("TPY") threshold. These categories include steam generating units and large boilers, most mining and mineral processing, and refining and chemical manufacturing. Other sources are subject to a 250 TPY threshold. A 100 TPY threshold applies in all nonattainment areas. Potential to emit is the maximum amount a facility may emit in a year. 40 C.F.R. § 52.21(b)(4) (2010).

73. 40 C.F.R. § 52.21(s) (2010).

74. ENVTL. PROT. AGENCY, NEW SOURCE REVIEW WORKSHOP MANUAL: PREVENTION OF SIGNIFICANT DETERIORATION AND NONATTAINMENT AREA PERMITTING DRAFT A.22 (1990), *available at* http://www.epa.gov/ttn/nsr/gen/wkshpman.pdf.

operators and other large industrial sulfur dioxide emitters would be allocated emissions allowances for trading.[75] The CAA set the total number of allowances available for use each year, and allowed facilities to emit based on their allocated allowances plus purchased allowances beyond the unit allocation.[76] Unused excess allowances for a given year may be sold to others, providing economic incentives for those capable of cost-effective emissions to reduce emissions.[77] By allowing affected sources flexibility to decide to reduce emissions to trade allowances, the acid rain program reduced regulated emissions quicker and for less cost than a comparable command and control system, requiring all sources to reduce emissions without regard to cost, would have.[78]

F. New Source Performance Standards

The NSPS program has regulated emissions from new or reconstructed large industrial facilities since 1970.[79] The EPA develops nationally uniform NSPS regulations for a category of stationary sources[80] "if in his[81] judgment it causes, or contributes significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare."[82] The EPA may regulate criteria pollutants and other pollutants regulated under any part of the CAA in the NSPS program.[83] NSPS standards require best demonstrated

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75. 42 U.S.C. §§ 7651-7651(o) (2010).

76. *Id.* § 7651b(a)(2010).

77. *Id.* § 7651b(b)(2010).

78. ENVTL. PROT. AGENCY, CAP AND TRADE: ACID RAIN PROGRAM RESULTS, *available at* http://www.epa.gov/capandtrade/documents/ctresults.pdf.

79. AM. METEOROLOGICAL SOC'Y, Legislation: A Look at U.S. Air Pollution Laws and Their Amendments, http://www.ametsoc.org/sloan/cleanair/cleanairlegisl.html (last visited Oct. 10, 2010).

80. 42 U.S.C. § 7411(b)(1)(B) (2010). Because facilities must comply with NSPS standards as of the proposal date, EPA must finalize proposed NSPS standards within one year of proposal. *Id.*

81. In the statute, "his" refers to the judgment of the current EPA Administrator. *See* 42 U.S.C. § 7411(a)(1) (2011).

82. *Id.* § 7411(b)(1)(A).

83. *Id.* § 7411(b). The NSPS regulatory authority, as discussed below, applies to any pollutant emitted from any source category EPA finds endangers public health or welfare. Once EPA promulgates an NSPS emission standard for a pollutant that pollutant is considered to be "subject to regulation under the Act," and is subject to NSR, as explained above. *See* 40 CFR § 52.21 (b)(50)(iv); *see also*

technology ("BDT") emissions controls for each source category.[84] The CAA also authorizes the EPA to issue "emissions guidelines" where states regulate emissions of existing sources listed in NSPS source categories.[85] The CAA authorizes the EPA to regulate existing sources where states have declined to regulate,[86] but the EPA has rarely used this authority.[87] The EPA is required to reevaluate NSPS standards, and update as necessary, every eight years.[88]

G. Maximum Achievable Control Technology

Technology based maximum achievable control technology ("MACT") standards regulate hazardous air pollutant ("HAP")[89] emissions from specified source categories.[90] Because the MACT major source threshold is ten tons per year ("TPY") of each listed HAP and twenty-five TPY of total HAP, evaluated on a facility-wide potential to emit basis,[91] Congress excluded HAPs from the NAAQS program.[92]

Memorandum from Stephen L. Johnson, Administrator, EPA, to Regional Administrators, EPA, *EPA's Interpretation of Regulations that Determine Pollutants Covered by Federal Prevention of Significant Deterioration (PSD) Permit Program* (Dec. 18, 2008), *available at* http://www.epa.gov/NSR/documents/psd_interpretive_memo_12.18.08.pdf.

84. 42 U.S.C. § 7411(a)(1) (2010).

85. *Id.* § 7411(d)(1).

86. *Id.* § 7411(d)(2).

87. *See* 40 C.F.R. §§ 60.2500-2875 (2010). NSPS Subpart DDDD regulates existing source solid waste incinerators not otherwise subject to NSPS regulations. EPA has used existing source authority under section 129 (42 U.S.C. § 7429 (2010)) for waste combustion sources. EPA has rarely used its existing section 111(d) source category regulatory authority, outside of waste combustion. *See* David Roberts, *The Senate Climate Bill Gives EPA Authority Over Both Old and New Coal Plants*, GRIST (Jun. 3, 2010, 12:54 PM), http://www.grist.org/article/2010-06-02-senate-climate-bill-gives-epa-authority-over-old-new-coal-plants.

88. 42 U.S.C. § 7411(b)(1)(B) (2010).

89. *Id.* § 7412(b)(2) (2010). The statute specifically requires EPA to identify carcinogenic, mutagenic, tetraogenic, and neurotoxic human health risks as a criteria to list a compound as a HAP.

90. Reitze, *supra* note 8, at 131.

91. 42 U.S.C. § 7412(a)(1) (2010).

92. *Id.* § 7412(b)(2).

H. Mobile Sources

CAA Title II regulates mobile sources, including cars and trucks, airplanes, and offroad engines in motorcycles and all-terrain vehicles.[93] The EPA can regulate mobile sources under several provisions, most importantly CAA Section 202's[94] new motor vehicle engine emissions standards and CAA Section 211's[95] fuel and fuel additives standards.

The EPA regulates mobile sources under Section 202 by finding that "the emission of any air pollutant from any class or classes of new motor vehicles or other new motor vehicle engines. . . cause[s], or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare."[96] Mobile source regulation includes criteria pollutant emissions standards for light duty vehicles (passenger cars) and trucks.[97] The EPA may revise mobile source standards "as needed to protect public health or welfare, taking costs, energy, and safety into account."[98] In a process known as "transportation conformity," EPA works with the states to incorporate changing mobile source emissions standards into state SIPs.[99]

EPA regulates motor vehicle fuels and fuel additives under the very similar Section 211 when "if in the judgment of the Administrator any emission product of such fuel or fuel additive causes, or contributes, to air pollution which may reasonably be

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93. *Id.* §§ 7521-7590.

94. *Id.* § 7521.

95. *Id.* § 7545.

96. *Id.* § 7521(a)(1). Section 211 includes a similar regulatory trigger for emissions related to fuel additives. *Id.* § 7545(c)(1).

97. *Id.* § 7521(g). Congress set the initial mobile source VOC, CO, and NO_x standards. *Id.* § 7521(g)(1).

98. *Id.* § 7521(b)(1)(C). EPA may only reduce the emissions standards.

99. 40 C.F.R. §§ 93.100-60 (2010). The transportation conformity process reflects the balance between vehicle miles traveled within a AQCR and the expected emissions rates, given the current state of EPA mobile source regulations. States update their transportation conformity demonstrations during the SIP update process, incorporating updated mobile source emissions standards. FED. HIGHWAY TRANSP. ADMIN., TRANSPORTATION CONFORMITY: A BASIC GUIDE FOR STATE & LOCAL OFFICIALS 3-4 (2010), *available at* http://www.fhwa.dot.gov/environment/air_quality/conformity/basicguide2010.pdf.

anticipated to endanger the public health or welfare."[100] As discussed below, EPA has used this authority once before.

I. Ozone Depleting Substances

CAA Title VI regulates ozone depleting substances ("ODS"),[101] such as chloroflorocarbons ("CFC") and hydrochlorofluorocarbons ("HCFC"). ODSs, including common refrigerants and several industrial chemicals, deplete upper atmosphere ozone when emitted, causing the "ozone hole" over the Southern Hemisphere observed in the second half of the twentieth century.[102] In implementing the Montreal Protocol to repair the ozone hole,[103] Congress directed the EPA to phase out CFCs[104] and HCFCs[105] over time, and identify safe replacement products for ODSs.[106] Congress also established an ODS trading system,[107] weighing ODS usage on an ozone depleting potential ("ODP") basis.[108] Trading was allowed between companies in Class I[109] substances, and is allowed in Class II[110] substances, subject to a declining cap phased in over several decades.[111]

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100. 42 U.S.C. § 7545(c)(1) (2010).

101. *Id.* § 7671(k).

102. ENVTL. PROT. AGENCY, OZONE LAYER PROTECTION GLOSSARY, http://www.epa.gov/ozone/defns.html (last visited May 15, 2011).

103. *See generally* U.N. ENV'T PROGRAM, OZONE SECRETARIAT, HANDBOOK FOR THE MONTREAL PROTOCOL ON SUBSTANCES THAT DEPLETE THE OZONE LAYER (2009), *available at* http://ozone.unep.org/Publications/MP_Handbook/MP-Handbook-2009.pdf.

104. 42 U.S.C. § 7671c (2010).

105. *Id.* § 7671d.

106. *Id.* § 7671k.

107. *Id.* § 7671f.

108. *Id.* § 7671a(e) tbl.1. ODP is weighted to the stratospheric ozone impact of CFC-11 (trichlorofluoromethane, CAS 75-69-4). Statutory ODP values range from 0.06 for HCFC-142b (1-chloro-1,1-difluoroethane, CAS 75-68-3) to 10.0 for Halon 1301 (bromotrifluoromethane, CAS 75-63-8). *Id.*

109. 40 C.F.R. § 82.12 (2010).

110. *Id.* § 82.23 (2010).

111. *See* 40 C.F.R. § 82.16 (2010). The details of the HCFC declining cap are beyond the scope of this article.

II. APPLYING GHGs TO THE NAAQS/SIP PROCESS

This section explores how the EPA might regulate GHGs as air pollutants under the existing CAA.[112] Some CAA programs are mandatory for GHGs. For example, this Article suggests that the EPA has already satisfied the statutory conditions to develop a GHG NAAQS.[113] EPA has significant discretion in implementing other CAA programs,[114] the flexibility to incorporate several market based mechanisms within its existing regulatory authority;[115] and the NAAQS program casts a long shadow over other CAA programs, providing some regulatory opportunities[116] and precluding others.[117] No GHG regulatory discussion would be complete without, after reviewing the current status of GHG regulation, discussing potential NAAQS applicability and implementation issues.

A. Steps Already Taken To Regulate GHGs Under the CAA

The EPA has already begun to regulate GHGs, following an eight year GHG petition process resulting in the landmark *Massachusetts v. EPA*[118] Supreme Court decision. In response to *Massachusetts* the EPA finalized several regulations and is in the process of proposing several others. [119]

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112. The issue of the relative merits of regulating GHGs within the existing CAA is beyond the scope of this article.

113. *See* Richardson, *supra* note 11, at 295.

114. *See* McKinstry, *supra* note 122, at 784-85.

115. *See id.* at 806-14.

116. *See* 42 U.S.C.§ 7411(a)(1)(A) (2011). EPA may set NSPS standards to "source categories," irrespective of the pollutants emitted from such categories. *See also* Clean Air Act (CAA) 42 U.S.C. § 7410(a)(2)(A) (2006), where states set emissions standards to meet State Implementation Plan requirements.

117. *See* Clean Air Act (CAA), 42 U.S.C. § 7412(b)(6) (2006). Congress restricted EPA from applying NSR to hazardous air pollutants. *Id.* ("The provisions of part C of this subchapter (prevention of significant deterioration) shall not apply to pollutants listed under this section.").

118. Mass. v. Envtl. Prot. Agency, 549 U.S. 497 (2007).

119. 40 C.F.R. § 86 (2010), 40 C.F.R. § 87 (2010), 40 C.F.R. § 89 (2010), 40 C.F.R. § 98 (2010), 40 C.F.R. § 1033 (2010), 40 C.F.R. § 1039 (2010), 40 C.F.R. § 1042 (2010), 40 C.F.R. § 1045 (2010), 40 C.F.R. § 1048 (2010), 40 C.F.R. § 1051 (2010), 40 C.F.R. 1054 (2010), 40 C.F.R. § 1065 (2010); Mandatory Reporting of Greenhouse Gases, 74 Fed. Reg. 56,260 (Oct. 30, 2009).

1. *Massachusetts v. EPA*

In 1999, a group of private organizations petitioned the EPA to regulate GHGs under Section 202, claiming that GHG emissions from new mobile sources caused or contributed to air pollution that endangered the public health or welfare.[120] These groups petitioned the EPA partially in response to a 1998 opinion by then EPA General Counsel Jonathan Cannon that EPA could regulate GHGs under the CAA.[121] The "Cannon Memo" noted, in theoretical terms, that GHGs could potentially be subject to regulations under one or more of the mobile and stationary source programs described above.[122]

In early 2001, the new EPA Administrator requested public comment on the GHG regulation petition,[123] and rejected the petition almost two years later.[124] The rejection claimed that the prior EPA General Counsel's memorandum was misguided, and the EPA did not have the authority to regulate GHGs under the Act.[125] The EPA noted that "Congress was well aware of the global climate change issue when it last comprehensively amended the [CAA] in 1990, yet it declined to adopt a proposed amendment establishing binding emissions limitations."[126] The EPA approached the GHG regulatory issue as a political question with its own "political history" outside the CAA.[127] The EPA further explained that only by improving fuel economy could it impact GHG emissions from new mobile sources.[128] The petitioners, along with several state and local

120. *See Massachusetts*, 549 U.S. at 510.

121. *See id.*

122. *See* Memorandum from Jonathan Z. Cannon, General Counsel, EPA, to Carol M. Browner, Administrator, EPA, *EPA's Authority to Regulate Pollutants Emitted by Electric Power Generation Sources* (April 10, 1998), *available at* http://www.law.umaryland.edu/faculty/bpercival/casebook/documents/epaco2memo1.pdf.

123. *See* Control of Emissions From New and In-use Highway Vehicles and Engines, 66 Fed. Reg. 7,486 (Jan. 23, 2001).

124. *See* Control of Emissions From New Highway Vehicles and Engines, 68 Fed. Reg. 52,922 (Sep. 8, 2003).

125. *See id.* at 52,925.

126. Massachusetts. v. Envtl. Prot. Agency, 549 U.S. 497, 511-12 (2007) (internal quotations omitted).

127. *See id.* at 512 (internal quotations omitted).

128. *See id.* at 513.

governments, appealed the EPA's petition rejection, but the D.C. Circuit Court of Appeals affirmed.[129]

The petitioners appealed to the Supreme Court, which held that political considerations do not trump plain statutory language that requires the EPA to consider if emissions may endanger public health or welfare.[130] The court also rejected the EPA's assertion that mileage standards set by the Department of Transportation do not conflict with the EPA's independent health and welfare obligations.[131] Rather than instructing the EPA to find GHG endangerment under Section 202, the Court instructed the agency to reconsider the petition and provide a statutory basis to either find endangerment or reject the petition.[132]

2. The EPA Response to *Massachusetts*

In response to the Court's decision, the EPA published an advance notice of proposed rulemaking ("ANPR") to again solicit comments concerning regulating GHGs under the CAA, including the still pending 1999 Section 202 endangerment petition.[133] Just as the ANPR comment period closed, EPA Administrator Stephen Johnson issued the "PSD Interpretation Memo," noting that the PSD does not apply to a newly regulated air pollutant, such as GHGs, until the EPA

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129. Mass. v. Envtl. Prot. Agency, 415 F.3d 50 (D.C. Cir. 2005), *rev'd*, 549 U.S. 497 (2007).

130. *See Massachusetts*, 549 U.S. at 529-30. EPA analogized the GHG rejection to Food & Drug Admin. v. Brown & Williamson Tobacco Corp., 529 U.S. 120 (2000), where Congress explicitly restricted the Food and Drug Administration from regulating tobacco products. Because FDA could not regulate tobacco due to a Congressional mandate to not regulate, EPA could not regulate GHGs because Congress did not mandate climate change regulation. The court rejected the analogy because Congress never directly addressed the GHG question in legislation that became law.

131. *See Massachusetts*, 549 U.S. at 531-32. The Court observed the overlap between EPA and DOT, and noted that the two agencies could likely harmonize their roles. As discussed below, EPA and DOT jointly issued the first GHG air emissions regulation/mileage standard regulation in 2010. Control of Air Pollution from Mobile Sources, 40 C.F.R. § 85 (2010), 40 C.F.R. § 86 (2010), 40 C.F.R. § 600 (2010), 49 C.F.R. § 531 (2010), 49 C.F.R. § 533 (2010), 49 C.F.R. § 536 (2010), 49 C.F.R. § 537 (2010), 49 C.F.R. § 538 (2010).

132. *See Massachusetts*, 549 U.S. at 534-35.

133. *See* Regulating Greenhouse Gases Under The Clean Air Act, 73 Fed. Reg. 44,354, 44,366-67 (Jul. 30, 2008) (to be codified at 40 C.F.R. ch. I).

regulates that newly regulated air pollutant under one of the stationary or mobile source standards described above.[134] The EPA must regulate a new pollutant under NAAQS, NSPS, MACT, or the mobile source program before PSD applies to that new air pollutant.[135]

The EPA began finalizing several GHG related rules and notices in late 2009. In October 2009, the EPA finalized the first comprehensive climate change reporting rule, requiring thousands of GHG emitting facilities to begin reporting GHG emissions to the EPA starting in calendar year 2010.[136] Next, in December 2009, the EPA found that GHGs emitted from new mobile sources endanger public health and public welfare under Section 202.[137]

In 2010, the EPA reaffirmed the Johnson memo, noting that PSD will not begin until the EPA regulates GHGs under a stationary or

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134. *See* Memorandum from Stephen L. Johnson, *supra* note 83 (EPA wrote this memo to clarify when PSD might apply for newly regulated air pollutants); see also Clean Air Act (CAA) Pub. L. 101-549, § 821, 104 Stat. 2699 (uncodified but for a note in section 412 of the Clean Air Act (CAA) (42 U.S.C. § 7651k (2006)), requires electric generating units ("EGU") to monitor and report CO_2 emissions data. The EPA Environmental Appeals Board had recently heard the Deseret PSD permit appeal. See In re Deseret Power Elec. Coop., PSD Appeal No. 07-03 (Envtl. Appeals Bd. Nov. 13, 2008), available at http://yosemite.epa.gov/oa/EAB_Web_Docket.nsf/PSD+Permit+Appeals+%28CAA%29/C8C5985967D8096E85257500006811A7/$File/Remand...39.pdf. The EAB remanded to EPA Region VIII the decision to require, or not, PSD for a new electric generating unit. EPA was also concerned that, once GHG endangerment is found, that PSD would apply by operation of law immediately. The memo concludes that PSD would not apply until EPA actually began regulating GHGs. Reporting GHGs alone does not trigger PSD under this memo. *Id.*

135. Johnson, *supra* note 83, at 6-7. EPA could also theoretically regulate a new pollutant under other programs, such as the ozone depleting substances program, to trigger PSD.

136. *See* Mandatory Reporting of Greenhouse Gases, 74 Fed. Reg. 56,260, 56,266 (Oct. 30, 2009) (to be codified at 40 C.F.R. pts, 86, 87, 89, 90, 94, 98, 1033,1039,1042,1045,1048,1051, 1054,1065). This reporting system incorporates the prior section 821 EGU reporting system. Most facilities began reporting in March 2011 for the 2010 reporting year.

137. *See* Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66,496 (Dec. 15, 2009) (to be codified at 40 C.F.R. ch. I).

mobile source regulation.[138] The EPA then published the first GHG emissions standards, regulating GHG emissions from model year 2012 new light duty cars and trucks.[139] The new mobile source GHG rule triggered PSD as soon as the GHG regulations took effect on January 2, 2011.[140]

Next, the EPA finalized the GHG "Tailoring Rule,"[141] which used both the absurd results doctrine[142] and administrative necessity doctrine from *Alabama Power v. Costle*[143] to override the 100 and 250 ton per year statutory PSD thresholds for GHGs.[144] The EPA identified the statutory PSD thresholds as an undue burden on smaller facilities that would not otherwise be subject to PSD except for GHG emissions, usually from fuel combustion.[145]

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138. *See* Reconsideration of Interpretation of Regulations That Determine Pollutants Covered by Clean Air Act Permitting Programs, 75 Fed. Reg. 17,004, 17,019 (Apr. 2, 2010) (to be codified at 40 C.F.R. pts. 50, 51, 70, 71).

139. Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule, 75 Fed. Reg. 25,324 (May 7, 2010) (to be codified at 40 C.F.R. pts. 85, 86, 600, 49 C.F.R. pts. 531, 533, 536, 537, 538). The 2012 automobile model year begins the first business day of January 2011.

140. *See* Reconsideration of Interpretation of Regulations That Determine Pollutants Covered by Clean Air Act Permitting Programs, 75 Fed. Reg. 17,007 (Apr. 2, 2010).

141. *See* Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule, 75 Fed. Reg. 31,514 (Jun. 3, 2010) (to be codified at 40 C.F.R. pts. 51, 52, 70, 71).

142. *See id.* at 31,546.

143. *See id.* (citing Alabama Power v. Costle, 636 F.2d 323 (D.C. Cir. 1980)).

144. *See id.* at 31,543.

145. *See id.* For example, standard natural gas combustion units emit 1,000 times the amount of GHGs from normal fuel combustion than NO. *See* ENVTL. PROT. AGENCY, AP-42 FIFTH EDITION, COMPILATION OF AIR POLLUTANT EMISSION FACTORS, VOL. I: STATIONARY POINT AND AREA SOURCES tbl.1.4-1 (1998), *available at* http://www.epa.gov/ttnchie1/ap42/ch01/final/c01s04.pdf [hereinafter COMPILATION OF AIR POLLUTANT FACTORS]. Small boilers, less than 100 million British Thermal Units (mmBTU) per hour, emit 100 pounds NO_x per million standard cubic feet (mmSCF) per hour. Table 1.4-2 indicates that the same unit emits 120,000 pounds of CO_2, plus a small amount of nitrous oxide and methane, per mmSCF combusted. Other sizes of combustion units burning commodity fuels will emit similar ratios between NO_x and CO_2. Typically, fuel combustion units trigger PSD for NO_x, or when burning coal or oil, possibly SO_2. Holding the PSD thresholds at 100 or 250 tons, the size of a fuel combustion source triggering PSD would fall from approximately the size of a electric generating unit to the size of unit required to heat a large office complex. Therefore, EPA considered requiring

The EPA then applied the three part *Alabama Power* test to evaluate the appropriateness of invoking the administrative necessity doctrine.[146] First, the EPA streamlined the administrative burden as much as possible within statutory constraints.[147] Second, the EPA determined that, after streamlining, that the administrative burden of the new regulation causes an undue burden on the agency.[148] Third, once the EPA determined that it must adjust the statutory requirements to become administrable, it attempted to preserve Congressional intent to the maximum extent possible.[149] The EPA found that requiring small sources, such as office buildings, restaurants, and large homes, not otherwise subject to PSD permitting to become major sources of air pollutants was an undue burden to both the owners of these sources and to the agency.[150] The EPA also found that revising the GHG PSD thresholds, and phasing in the GHG PSD rules over several years[151] maintained Congressional intent as much as possible.[152] Finding administrative necessity, the EPA then set the PSD threshold at 100,000 TPY CO_2 equivalent ("CO_2e") for new major sources, and the significance threshold of 75,000 TPY CO_2e for modified sources.[153] Without the Tailoring Rule, the statutory PSD system, with its 100 and 250 TPY major source thresholds, took effect on January 2, 2011.[154]

The EPA has announced several additional GHG rulemaking proposals. In November 2010, EPA the National Highway Traffic Safety Administration ("NHTSA") proposed GHG standards for

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office complexes to obtain PSD permits for GHGs to be an absurd result, requiring the agency to invoke administrative necessity.

146. *See* Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule, 75 Fed. Reg. 31,514, 31,543-44 (Jun. 3, 2010) (to be codified at 40 C.F.R. pts. 51, 52, 70, 71).

147. *See id.* at 31,544.

148. *See id.*

149. *See id.*

150. *See id.* at 31,516.

151. *See id.* The Tailoring Rule's details are beyond the scope of this paper.

152. *See id.* at 31,517.

153. *See id.* at 31,567. The PSD thresholds will effectively keep sources that would not invoke PSD in the example in *supra* note 145, from invoking GHG PSD before invoking PSD for NO_x or SO_2.

154. *See id.* at 31,544.

model year 2014 and later medium and heavy duty trucks.[155] In December 2010, EPA and NHTSA announced their intent to set GHG emissions standards for model year 2017 and later light duty cars and trucks.[156] In December 2010, the EPA also announced that it would propose GHG emissions limits for electric generating units ("EGU") and petroleum refineries.[157]

B. Regulating GHGs under the NAAQS/SIP Process

The conventional wisdom among many in the regulated community decries GHG regulation under the CAA as inappropriate, burdensome, or unnecessary.[158] Because CO_2 is uniformly distributed in the atmosphere with a long atmospheric residence time, the existing CAA attainment structure doesn't facilitate states writing effective GHG SIPs.[159] Three-fourths of CO_2 emissions originate outside the United States.[160] While states can generally manage attainment issues concerning traditional criteria pollutants, states are helpless in reducing GHG emissions on their own.[161] If the EPA were to set a GHG NAAQS standard below the current average ambient CO_2 concentration, "the entire country would have a non-attainment status with no realistic expectation that any measure taken as part of a SIP would lead to attainment of the standard."[162] These authors

155. *See* Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles, 75 Fed. Reg. 74,152 (proposed Nov. 30, 2010) (to be codified at 40 C.F.R. pts, 85, 86, 1036, 1037,1065, 1066, 1068, 49 C.F.R. pts. 523, 534, 535).

156. *See* 2017 and Later Model Year Light-Duty Vehicle GHG Emissions and CAFE Standards, 75 Fed. Reg. 76,337 (Dec. 8, 2010).

157. *See* OFFICE OF AIR QUALITY PLANNING AND STANDARDS, ENVTL. PROT. AGENCY, AVAILABLE AND EMERGING TECHNOLOGIES FOR REDUCING GREENHOUSE GAS EMISSIONS FROM COAL-FIRED ELECTRIC GENERATING UNITS (2010), *available at* http://epa.gov/nsr/ghgdocs/electricgeneration.pdf; *see also* OFFICE OF AIR QUALITY PLANNING AND STANDARDS, ENVTL. PROT. AGENCY, AVAILABLE AND EMERGING TECHNOLOGIES FOR REDUCING GREENHOUSE GAS EMISSIONS FROM THE PETROLEUM REFINING INDUSTRY (2010), *available at* http://www.epa.gov/nsr/ghgdocs/refineries.pdf.

158. *See e.g.*, Nordhaus, *supra* note 7, at 61.

159. *See id.* at 61-62.

160. *See id.*

161. *See* Eric Schwartz, *Carbon Dioxide and the Clean Air Act*, 4 CARDOZO PUB. L. POL'Y & ETHICS J. 779, 814 (2006).

162. Nordhaus, *supra* note 7, at 62 (quoting ARNOLD REITZE, AIR POLLUTION CONTROL LAW: COMPLIANCE AND ENFORCEMENT 417 (2001)).

suggest that market based regulation is best, and contend that you cannot accomplish market based regulation under the existing CAA.[163] These authors prefer that Congress pass comprehensive GHG legislation to address climate change, preempting the CAA.[164] However, Congress has not, as of 2010, passed any GHG legislation. Below, this Article attempts to apply the existing CAA to GHGs, discussing several critical decision points the EPA would have to consider and how the EPA might make these decisions.

1. Section 108: The Mandatory Duty to Set a GHG NAAQS

NAAQS, by definition, are the broadest of all CAA programs. The existence or nonexistence of a GHG NAAQS substantially impacts how EPA would manage other CAA programs. GHG NAAQS are discretionary or mandatory. As stated above, the EPA has only named one criteria air pollutant, lead, that was not identified as a potential criteria pollutant when the 1970 Amendments were passed.[165] The lead NAAQS decision process should inform the process the EPA should use to respond to the pending GHG NAAQS petition.[166]

The EPA must set a NAAQS for an identified pollutant if it makes three findings specified at Section 108.[167] The EPA Administrator must find that, 1) in her judgment, emissions of the proposed air pollutant "cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare,"[168] 2) the proposed air pollutant is emitted from "numerous or diverse mobile

163. *See id.* at 56.

164. *See id.* at 72.

165. *See* National Primary and Secondary Ambient Air Quality Standards, 36 Fed. Reg. 8,186 (Apr. 30, 1971) (to be codified at 42 C.F.R. pt. 410). Section 108(A)(1), part of the 1970 Amendments, required the EPA Administrator to timely develop NAAQS for pollutants identified before Oct. 31, 1970. Other than lead, EPA has not promulgated any other new NAAQS standards.

166. *See* CTR. FOR BIOLOGICAL DIVERSITY & 350.ORG, PETITION TO ESTABLISH NATIONAL POLLUTION LIMITS FOR GREENHOUSE GASES PURSUANT TO THE CLEAN AIR ACT (2009), *available at* http://www.biologicaldiversity.org/programs/climate_law_institute/global_warming_litigation/clean_air_act/pdfs/Petition_GHG_pollution_cap_12-2-2009.pdf.

167. *See* Richardson, *supra* note 11, at 288-89.

168. 42 U.S.C. § 7408(a)(1)(A) (2006).

or stationary sources"[169] and 3) she plans to issue air quality criteria for the proposed air pollutant.[170]

a. Endangerment

Because the EPA has already found that GHGs endanger public health or welfare under Section 202, the first prong of the Section 108 analysis has been satisfied.[171] Responding to the *Massachusetts* decision, EPA Administrator Jackson found that, for purposes of Section 202, GHGs endanger human health or welfare.[172] In the mobile source endangerment finding, the EPA found that GHG emissions and associated climate change would likely cause a variety of human health or welfare harms.[173] The Section 202 language the EPA used to find GHG endangerment is almost identical to the Section 108 language governing the NAAQS first prong, except for the Section 202 mobile source reference. The EPA may be hard pressed to factually distinguish the two required determinations.

b. Numerous and Diverse Sources

The second prong is also easily met for CO_2. It's hard to imagine a more omnipresent air emission than CO_2, which is emitted by every combustion source in every segment of the economy.[174] In 2007, over 254 million light vehicles, including cars, light trucks and motorcycles, were registered to operate in the United States.[175] Almost fifteen million of these vehicles were purchased as new in

169. *Id.* § 7408(a)(1)(B).

170. *Id.* § 7408(a)(1)(C).

171. *See supra* text accompanying note 51. Congress established the NSPS and MACT programs to address localized issues common to specific types of emissions sources.

172. Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66,496-97 (Dec. 15, 2009).

173. *Id.* at 66,496. EPA found that increasing mean ambient temperatures would increase atmospheric allergen concentrations, increasing pulmonary illness incidence rates. Increasing ambient temperatures would also effect food production, coastal flooding, infrastructure, and wildlife.

174. Regulating Greenhouse Gas Emissions Under the Clean Air Act, 73 Fed. Reg. 44,354, 44,380 (July 30, 2008).

175. U.S. DEP'T. TRANSP., NATIONAL TRANSPORTATION STATISTICS tbl.1-11 (2011), *available at* http://www.bts.gov/publications/national_transportation_statistics/pdf/entire.pdf. 2007 was the last year for which vehicle registrations and new vehicle purchases is available.

2007.[176] In addition, approximately 163,000 industrial boilers operate in the United States.[177] All of these mobile[178] and stationary[179] sources emit CO_2, and to some extent, other GHGs. The extensive population of mobile and stationary sources meets the diversity of emissions sources condition in the second prong.

c. Air Quality Criteria

The third prong creates ambiguity with respect to the application of Section 108 to GHGs. On its face, the third prong may seem to allow the EPA full discretion to elect to, or elect not to, promulgate a NAAQS.[180] But in the only court decision to interpret Section 108, the Second Circuit Court of Appeals read it differently, holding that the third prong did not give EPA discretion to decline to set a lead NAAQS.[181]

i. Lead

The only previous occasion on which an EPA Section 108 determination has been challenged was in the case of lead.[182] In the lead NAAQS process, EPA was required to evaluate the Section 211 endangerment clause, which is very similar to the Section 202 clause the EPA used to find GHG endangerment and the Section 108 endangerment provisions.[183] Under Section 211, the EPA could regulate fuel additives "if in the judgment of the Administrator any emission product of such fuel or fuel additive causes, or contributes, to air pollution which may reasonably be anticipated to endanger the public health or welfare."[184] The EPA had found that lead anti-knock

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176. *Id.* at tbl.1-12.

177. ENERGY & ENVTL. ANALYSIS INC., CHARACTERIZATION OF THE U.S. INDUSTRIAL COMMERCIAL BOILER POPULATION ES-1 (2005), *available at* http://www.cibo.org/pubs/industrialboilerpopulationanalysis.pdf.

178. Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66,496 (Dec. 15, 2009).

179. COMPILATION OF AIR POLLUTANT FACTORS, *supra* note 145, at 1.4-2.

180. *See* Richardson, *supra* note 11, at 300-01.

181. Natural Res. Def. Council, Inc. v. Train, 545 F.2d 320, 324 (2d Cir. 1976).

182. *Id.* at 324.

183. *See* discussion *supra* Part I.H.

184. *See* 42 U.S.C. § 7545(c)(1) (2010). The only substantive difference between § 211 and the § 108 and § 202 endangerment provisions is the emissions control language unique to § 211.

gasoline additives caused or contributed to high lead blood levels[185] in urban populations living near highways.[186] In the *Train* litigation, the EPA conceded that the Section 108 endangerment finding requirements had been met.[187]

For the second Section 108 prong in the lead NAAQS evaluation, the EPA found that lead additives were emitted from millions of dispersed gasoline powered motor vehicles that operate throughout the entire United States.[188] The *Train* court found the second prong uncontroversial.[189]

The third prong, that the EPA did not plan to publish lead air quality criteria, attracted the most court attention in *Train*.[190] In rejecting the EPA's decision not to set a lead NAAQS from the third Section 108 condition, the *Train* court held that the 1970 CAA statutory history precluded the EPA's discretion to avoid setting a lead NAAQS.[191] The court acknowledged that, standing alone, the third prong was ambiguous as to whether or not the EPA could elect to develop lead air quality criteria.[192] But in statutory context, the court concluded, the third prong did not give the EPA discretion to decline to develop Section 108 air quality criteria once it found that the first two prongs were satisfied.[193]

When Congress passed the 1970 Act, the EPA was considering issuing air quality criteria for upwards of twenty air pollutants.[194] EPA had already found that several of these pollutants had satisfied the first Section 108 prongs.[195] Interested in resolving the air pollution problems of the day, Congress wrote Section 108 to remove

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185. Regulation of Fuels and Fuel Additives, 38 Fed. Reg. 33,734, 33,738 (Dec. 6, 1973).

186. *See id.* at 33,735.

187. *See* Natural Res. Def. Council, Inc. v. Train, 545 F.2d 320, 324 (2d Cir. 1976).

188. *Id.*

189. *See* Richardson, *supra* note 11, at 301-02.

190. *See id.*

191. *Id.* at 303-04.

192. *Train*, 545 F.2d at 327.

193. Richardson, *supra* note 191, at 304.

194. Rogers, *supra* note 17. However, upon developing air quality criteria, EPA only finalized six NAAQS standards in the immediate aftermath of the 1970 Amendments. The hydrocarbon NAAQS was subsumed into the ozone NAAQS in 1979. The other pollutants remained regulated under other CAA authority.

195. *Id.*

the EPA's discretion to decline to develop air quality criteria for these pollutants that were pending review in 1970.[196] Once the EPA completed its criteria development process for the twenty pollutants in 1971, the EPA and the regulated community were unsure what the third prong would mean going forward.[197]

Lead was the first pollutant to come along that had not been in the initial group. While the EPA argued that the third prong gave it discretion whether or not to issue a NAAQS for a new pollutant like lead, the *Train* court disagreed. The court held that the third prong had been intended to constrain rather than expand EPA's discretion with regard to new pollutants.[198] Otherwise, if the EPA declined to set NAAQS standards for widely emitted pollutants that endanger human health or welfare, the EPA could tie up the NAAQS process in the same administrative gridlock that Congress sought to correct in the 1970 Amendments.[199]

ii. *Chevron* and Endangerment

After *Train* was decided, the *Chevron U.S.A. v. Natural Resources Defense Council*[200] decision changed how courts evaluate agency deference questions. In 1984, the Supreme Court held in *Chevron*, that agencies must follow clearly written statutes and interpret vague statutes within "permissible construction[s] of the statute."[201] Some authors have proposed that the EPA might distinguish a GHG NAAQS decision from *Train* by a *Chevron* analysis,[202] especially since a different court will hear the upcoming Section 202

196. *Id.*

197. *See* Maney, *supra* note 11, at 346.

198. *Id.* at 321-22.

199. *See* Richardson, *supra* note 11, at 302.

200. Chevron, U.S.A., Inc. v. Natural Res. Def. Council, Inc., 467 U.S. 837 (1984).

201. *Chevron*, 467 U.S. at 866.

202. *See* INIMAI CHETTIAR & JASON SCHWARTZ, INSTITUTE FOR POLICY INTEGRITY, N.Y.U. SCH. OF L., THE ROAD AHEAD: EPA'S OPTIONS AND OBLIGATIONS FOR REGULATING GREENHOUSE GASES 37 (2009), *available at* http://policyintegrity.org/files/publications/TheRoadAhead.pdf; *see also* Schwartz, *supra* note 12, at 793; *see also* Timothy J. Mullins & M. Rhead Enion, *(If) Things Fall Apart: Searching For Optimal Regulatory Solutions To Combating Climate Change Under Title I of the Existing CAA If Congressional Action Fails*, 40 ENVTL. L. REP. 10864, 10870 (2010).

endangerment challenge than the court that decided *Train*.[203] In addition, changes in the CAA since the *Train* decision now require that CAA regulatory challenges, including any NAAQS decisions, must be raised in the first instance in the United States Court of Appeals for the District of Columbia ("DC Circuit").[204] Accordingly, the Second Circuit Court of Appeals that heard *Train* no longer has the authority to hear CAA regulatory cases. The DC Circuit, which would hear any GHG NAAQS challenge, would only consider *Train* to be persuasive authority.

The *Chevron* two-step process requires courts reviewing agency decisions to first consider if Congress has plainly spoken to an issue, or whether the statutory language is ambiguous.[205] Next, if the reviewing court determines that Congress had not spoken plainly, it must defer to the agency's interpretation if it was reasonable.[206] A court reviewing the third prong in a post-*Chevron* world may decide, against the explicit *Train* holding, that the third prong is ambiguous.[207] If a reviewing court found the third prong ambiguous, the reviewing court would, under *Chevron*, be required to defer to agency discretion under the second *Chevron* prong.

It is more likely, however, that a court reviewing a GHG NAAQS would affirm *Train*. The reviewing court would likely find that the third prong ambiguity is settled within the statute, and a GHG NAAQS would be required.[208] The factors used by a court in evaluating a *Chevron* step one claim do not significantly differ from the factors used by the *Train* court.[209] The D. C. Circuit would evaluate the direct statutory language, construction, structure, and history, to complete the *Chevron* step 1 evaluation.[210] This process would substantially mirror the *Train* court analysis, which found that Section 108 is not ambiguous when considered within CAA context

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203. Richardson, *supra* note 11, at 305-06. The Second Circuit Court of Appeals heard *Train*. 42 U.S.C. § 7607(b)(1), as modified in the 1977 Act, requires all CAA regulatory challenges be heard by the Court of Appeals for the District of Columbia Circuit.

204. 42 U.S.C. § 7607(b)(1) (2010).

205. *Chevron*, 467 U.S. at 842-43.

206. *Id.*

207. Mullins & Enion, *supra* note 202, at 10870-71.

208. Richardson, *supra* note 11, at 307.

209. *Id.* at 308-10.

210. *Id.* at 310.

and history.[211] Accordingly, using *Train* as persuasive precedent, the D.C. Circuit might well find that Section 108 unambiguously removes the EPA's discretion and thereby overturn an EPA decision not to issue a GHG NAAQS under *Chevron* step one.[212]

Alternatively, even if the D.C. Circuit were to find the third prong ambiguous under *Chevron* step one, it might well require EPA to set a GHG NAAQS under step two. At *Chevron* step two, a court determines if the agency decision is a permissible statutory construction worthy of judicial deference.[213] The court's step 2 questions do not significantly differ from step one, where the court looks to canons of construction to guide what deference Congress granted the agency.[214] The *Train* court conducted this analysis, concluding that the third prong of the Section 108 finding was mandatory once the first two prongs were met.[215] If *Train* is still good law, EPA may have no discretion to avoid issuing a GHG NAAQS.[216] Even if the court were to find ambiguity and conduct the second *Chevron* step, it would likely reach the same result as the *Train* court.

A strong argument exists to suggest that the EPA has a mandatory duty to establish a GHG NAAQS. If the D.C. Circuit found the Section 108 third prong ambiguous, the EPA may still not find adequate discretion under *Chevron* to avoid issuing a GHG NAAQS.

2. Section 109: Setting a GHG NAAQS

Were the EPA to develop a GHG NAAQS, it would begin the well documented NAAQS development process.[217] The primary standard

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211. *Id.* at 311.

212. *Id.* at 313. *See also*, McCubbin, *supra* note 11, at 458. This author suggests that, because of a scrivener's error during the drafting of Section 108, the third prong should have been separated from the first two prongs. Under her theory, once EPA has found endangerment and emissions from numerous and diverse sources, it must set a NAAQS. No *Chevron* analysis is necessary.

213. Chevron, U.S.A., Inc. v. Natural Res. Def. Council 467 U.S. 837, 843 (1984).

214. Richardson, *supra* note 11, at 314.

215. Natural Res. Def. Council v. Train, 545 F.2d 320, 328 (2d Cir. 1976).

216. Richardson, *supra* note 11, at 315.

217. *See EPA Clean Air Act Scientific Advisory Committee (CASAC): Final Reports by Topic*, ENVTL. PROT. AGENCY, http://yosemite.epa.gov/sab/sabproduct.nsf/WebReportsbyTopicCASAC!OpenView (last visited May 20,

protects the public health with an adequate margin of safety,[218] including health effects that the EPA finds occur because of human exposure to the air pollutant. The secondary standard protects the public welfare,[219] including effects on the environment, agriculture, and other impacts not normally considered in the primary standard process. The EPA, while required to conduct detailed scientific studies to establish primary and secondary NAAQS levels, receives substantial deference in setting scientifically based ambient standards. The EPA has developed a NAAQS implementation process to meet statutory requirements for all criteria pollutants.[220]

Once the EPA decides to promulgate a NAAQS standard, it must establish a Clean Air Scientific Advisory Committee ("CASAC") panel for the new air pollutant.[221] CASAC panels advise the EPA concerning each primary and secondary NAAQS.[222] Each CASAC NAAQS panel, supported by the EPA Science Advisory Board ("SAB"),[223] is required to review each primary and secondary NAAQS every five years,[224] though not all five-year reviews occur on schedule.[225]

The NAAQS development process includes several steps, which result in a "staff paper" for the proposed NAAQS.[226] The EPA and CASAC develop a series of documents that, in the end, include a recommended range of NAAQS options from which the EPA Administrator will choose a NAAQS standard.[227] The Administrator,

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2011). EPA, through the Clean Air Science Advisory Committee, prepares a series of documents to demonstrate each element of the NAAQS process.

218. 42 U.S.C. § 7409(b)(1) (2010).

219. *Id.* § 7409(b)(2).

220. *Id.* § 7409(a)(1)(B).

221. 42 U.S.C. § 7408(b)(1) (2010).

222. 42.U.S.C. § 7409(d)(2) (2010).

223. *EPA Science Advisory Board Staff*, ENVTL. PROT. AGENCY, http://yosemite.epa.gov/sab/sabproduct.nsf/WebSABSO/index?OpenDocument (last visited May 20, 2011).

224. 42 U.S.C. § 7409(d)(2)(B) (2010).

225. *See Final Reports by Topic*, *supra* note 217.

226. ENVTL. PROT. AGENCY, REVIEW OF THE NATIONAL AMBIENT AIR QUALITY STANDARDS FOR OZONE: POLICY ASSESSMENT OF SCIENTIFIC AND TECHNICAL INFORMATION, OAPQS STAFF PAPER 1-7-1-8 (2007), *available at* http://www.epa.gov/ttnnaaqs/standards/ozone/data/2007_07_ozone_staff_paper.pdf.

227. *See, e.g.*, National Ambient Air Quality Standards for Ozone, 73 Fed. Reg. 16,436, 16,477-78 (Mar. 27, 2008) (codified at 40 C.F.R. §§ 50.15-58). Here, the EPA Administrator judged that the CASAC recommended 0.060-0.070 ppm ozone

evaluating the policy assessment, proposes to set a new NAAQS standard, or in the case of an existing NAAQS, retain, modify, or replace the NAAQS standard.[228] Because the relationship between ambient GHG concentrations and climate impacts is established,[229] the EPA should only consider a unified GHG NAAQS evaluation. The EPA issues the final rule, implementing the Administrator's judgment, after another notice and comment period.[230] The EPA would need to consider several issues in a NAAQS setting process, as outlined below.

a. Setting NAAQS Standards for Multiple Pollutants

The EPA would have to decide if it would set one NAAQS for all GHGs, or set separate NAAQS standards for each GHG. In some instances, the EPA must set a NAAQS standard that includes more than one discrete air pollutant. Historically, the EPA has determined that, for NAAQS pollutants that encompass more than one discrete pollutant, a single member of the group representing most of the risk associated with the NAAQS standard may serve as the NAAQS proxy.[231] For the NO_x NAAQS, nitrogen oxide ("NO_2") represents the majority of NO_x emissions.[232] The EPA regulates the NO_x emission category as NO_2.[233]

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primary NAAQS was inappropriate within his authority to set the NAAQS within the AMOS framework. EPA set the NAAQS at 0.075 ppm. However, EPA proposed to reconsider the 2008 NAAQS decision at 75 Fed. Reg. 2,938 (Jan. 19, 2010).

228. Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule, 75 Fed. Reg. 31,514 (June 3, 2010).

229. *Id.* at 31,529.

230. *Id.*

231. *See* Retention of the National Ambient Air Quality Standards for Nitrogen Oxides, 50 Fed. Reg. 25,532-33 (Jun. 19, 1985). For the nitrogen oxides ("NO_x") criteria pollutant, EPA found that emissions of one constituent pollutant, nitrogen dioxide ("NO_2"), represented the bulk of the human health and welfare risk associated with NO_x. EPA then studied NO_2 emissions throughout the NAAQS assessment process, set the NO_x NAAQS using the NO_2 proxy, and developed measurement and attainment demonstration systems based on NO_2.

232. *Id.*

233. *Id.*

In the case of GHGs, CO_2 represented 82.8% of 2008 US GHG emissions.[234] Because the EPA has already established a reporting infrastructure to report GHGs on a CO_2 equivalent basis,[235] it would follow that, were the EPA to set a GHG NAAQS, it would use a CO_2 equivalent basis for consistency. The EPA has already begun regulating GHGs as a single class of pollutants.[236] The EPA could, alternatively, set a NAAQS for each of the six commonly emitted GHGs, but such a decision would likely cause undue confusion and expense. While CO_2 air concentration instruments are widely implemented today (including in power plants), instruments to measure several GHGs, especially the fluorinated gases, have not yet been developed in the ambient air measurement market.[237] The EPA could, instead of attempting to develop individual GHG measurement technology, utilize the existing global warming potential ("GWP") conversions for recorded emissions of the other GHGs and utilize the existing CO_2 measurement system to implement a CO_2 based GHG NAAQS. GWP represents the ratio between the warming associated with a unit of any GHG to the global warming associated with CO_2.[238] Were the EPA to set a GHG NAAQS, it should follow its

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234. *Energy and the Environment Explained: Where Greenhouse Gases Come From*, U.S. ENERGY INFO. ADMIN., http://www.eia.doe.gov/energyexplained/index.cfm?page=environment_where_ghg_come_from (last visited May 20, 2011). Methane represented 10.5%, nitrous oxide 4.3%, and other GHGs 2.5% of total GHG emissions, reported on a CO_2 equivalent basis.

235. *See* 40 C.F.R. § 98 (2010).

236. Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule, 75 Fed. Reg. 31,514, 31,529 (Jun. 3, 2010).

237. Laboratory ambient HFC concentrations can be measured for some compounds at a limited number of locations worldwide. *See, e.g.*, A. MCCOLLUCH, MARBURY TECHNICAL CONSULTING, DETERMINATION OF COMPARATIVE HCFC AND HFC EMISSION PROFILES FOR THE FOAM AND REFRIGERATION SECTORS UNTIL 2015 PART 3: TOTAL EMISSIONS AND GLOBAL ATMOSPHERIC CONCENTRATIONS (2004), http://www.epa.gov/ozone/snap/emissions/downloads/FoamEmissionProfiles_Part3.pdf; INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, FOURTH ASSESSMENT REPORT: CLIMATE CHANGE 2007, WORKING GROUP I: THE PHYSICAL SCIENCE BASIS 143 (2007), *available at* http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-3-3.html [hereinafter CLIMATE CHANGE 2007].

238. *See* CLIMATE CHANGE 2007, *supra* note 237, at 210-11. IPCC also publishes 20 year and 500 year GWP values. Changes in GWP values over time reflect atmospheric lifetimes of different GHGs. *Id.*

NO_x and Section 202 precedents and issue a single NAAQS for the major GHGs, measuring each gas on a CO_2 equivalent basis.

b. Adequate Margin of Safety

The EPA is required to set NAAQS standards "not lower or higher than necessary . . . to protect the public health within an adequate margin of safety."[239] The EPA considers scientific and technical uncertainties, including hazards not yet identified in scientific and technical literature, when defining the margin of safety.[240] The EPA takes the available science, performs the required evaluation as explained below, and develops NAAQS recommendations based on the information available at the time of recommendation.[241] The adequate margin of safety ("AMOS") level is set to "protect against effects which have not yet been uncovered by research and effects whose medical significance is a matter of disagreement."[242] "[R]equiring EPA to wait until it can conclusively demonstrate that a particular effect is adverse to health before it acts is inconsistent with both the Act's precautionary and preventative orientation and the nature of the Administrator's statutory responsibilities."[243]

The AMOS determination would impact where, in the possible range of concentrations, the EPA might set a NAAQS.[244] Any EPA Administrator weighing a GHG NAAQS decision should expect considerable political pressure from any number of sources. Many of those sources would expect the EPA to utilize the maximum amount of flexibility in setting a NAAQS.

c. Primary or Secondary Standard

Section 109 requires the EPA to set both primary and secondary standards once it begins the NAAQS process.[245] However, some have

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239. Whitman v. Am. Trucking Ass'n, 531 U.S 457, 475-76 (2001).

240. Retention of the National Ambient Air Quality Standards for Nitrogen Dioxide, 50 Fed. Reg. 25,532 (June 19 1985) (codified at 40 C.F.R. § 50.11) (citing Lead Indus. Ass'n v. Envtl. Prot. Agency, 647 F.2d 1130, 1154 (D.C. Cir. 1980)); Am. Petroleum Inst. v. Costle, 665 F.2d 1176, 1177 (D.C. Cir. 1981) .

241. *See* Maney, *supra* note 11, at 327.

242. *Lead Indus. Ass'n*, 647 F.2d at 1154.

243. *Id.* at 1155.

244. *See Whitman*, 531 U.S at 475-76.

245. 42 U.S.C. § 7409(a)(1)(A) (2006).

argued that the EPA could elect to set only one NAAQS standard for GHGs: either only a primary NAAQS or only a secondary NAAQS.[246] However, clear statutory language obviates the option to pick a primary or secondary NAAQS for a criteria pollutant.[247] Those arguing that the EPA may select a primary or secondary NAAQS, instead of promulgating both primary and secondary standards, misread the plain statutory language or seek a practical infeasibility argument not present for GHGs[248].

The secondary standard must "protect the public welfare from any known or anticipated adverse effects associated with the presence such air pollutant in the ambient air."[249] Welfare effects include impacts on soil or water, crops or vegetation, wildlife, weather or visibility, and manmade materials or property.[250] The EPA may also consider personal comfort and well being, as well as economic values of property, when setting a secondary NAAQS.[251]

d. Relevant Policy Background

When setting primary NAAQS standards, the EPA recognizes the existence of non-anthropogenic air pollution by establishing a "Policy Relevant Background" ("PRB") level for the pollutant before proceeding to recommend NAAQS standards.[252] The EPA defines PRB as "the distribution of . . . concentrations that would be observed in the U.S. in the absence of anthropogenic (man-made) emissions [ ] in the U.S., Canada, and Mexico."[253] The EPA then treats the PRB as a floor below which the NAAQS should not be set.[254] The EPA then

246. *See* Moore, *supra* note 11, at 10192-93.

247. 42 U.S.C. § 7409(a)(1) (2011).

248. *See* Richardson, *supra* note 11, at 295.

249. 42 U.S.C. § 7409(b)(2) (2010).

250. *See* 42 U.S.C. § 7602(h) (2010).

251. *See id.*

252. *See* National Air Ambient Quality Standards for Ozone, 73 Fed. Reg. 16,436, 16,443 n.13 (Mar. 29, 2008) (codified at 40 C.F.R. §§ 50.15-58).

253. REVIEW OF THE NATIONAL AMBIENT AIR QUALITY STANDARDS FOR OZONE, *supra* note 226, at 2-48.

254. *See id.* at 2-48, 2-54. *See also*, Coal. of Battery Recyclers Ass'n v. Envtl. Prot. Agency, 604 F.3d 613 (D.C. Cir. 2010) (holding that the EPA was within *Chevron* discretionary authority to set lead NAAQS below levels observed near lead smelter).

sets the NAAQS standard by evaluating the marginal risks from additional pollutant concentrations above the PRB.[255]

Many air pollutants subject to NAAQS standards exist in the atmosphere with or without human activity.[256] While other criteria pollutant ambient concentrations largely depend on local emissions, GHG concentrations are consistent throughout the world.[257] The EPA would, in setting a GHG NAAQS, determine a background CO_2 concentration as PRB.[258] However, the EPA typically determines PRB from remote areas barely impacted by localized emissions.[259] Well mixed GHG concentrations do not significantly vary from place to place, so no monitoring station exists from where the EPA could measure background CO_2 concentrations that are not impacted by anthropogenic emissions.

The pre-industrial ambient CO_2 concentration was approximately 280 ppm.[260] Current ambient CO_2 concentrations average approximately 390 ppm.[261] A no-effects level, where global warming is expected to stop, has been estimated at or below 350 ppm,[262] less than the current ambient CO_2 concentration. Other work suggests that climate impacts have occurred throughout the industrial age, and the no-effects level should be set at the pre-industrial level of 280 ppm.[263]

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255. *See* A. Fiore et.al., *Variability In Surface Ozone Background Over the United States: Implications For Air Quality Policy*, 108 J. GEOPHYSICAL RES. 4787, 4788 (2003); *see also* National Air Ambient Quality Standards for Ozone, 73 Fed. Reg. at 16443; 40 C.F.R. § 50.15(a) (2010). EPA set a 40 ppb_v PRB value and a 75 ppb_v. NAAQS level in the final 2007 ozone standard. *Id.*

256. *See* REVIEW OF THE NATIONAL AMBIENT AIR QUALITY STANDARDS FOR OZONE, *supra* note 226, at 2-54.

257. *See* Richardson, *supra* note 11 at 296.

258. *See* REVIEW OF THE NATIONAL AMBIENT AIR QUALITY STANDARDS FOR OZONE, *supra* note 226, at 2-48, 2-54.

259. *See id.*

260. *See* Johan Rockstrom et.al., *A Safe Operating Space For Humanity*, 461 NATURE 472, 473 (2009); *see also 350 Science*, 350.ORG, http://www.350.org/en/about/science (last visited May 18, 2011).

261. *See* Rockstrom, *supra* note 260, at 473.

262. *See 350 Science*, *supra* note 260 (advocating that the appropriate ambient CO_2 concentration should be set no higher than 350 ppm).

263. *See* Rockstrom, *supra* note 260, at 473.

Because of the inability to directly measure background,[264] the EPA may need to redefine how it would develop a GHG PRB level. Instead of direct measurement, the EPA would need to calculate a GHG PRB level. The EPA could elect to include the three quarters of GHG emissions from outside North America[265] in the PRB, setting the PRB at seventy-five percent of the current anthropogenic GHG loading, or approximately 370 ppm.[266] The EPA could claim that because GHGs are well mixed that it can't reasonably distinguish emissions from North America from emissions elsewhere, and declare the entire current ambient concentration the PRB. However, such a claim would contradict the historic EPA determination that PRB represents naturally occurring pollution from North America.[267]

Instead, the EPA could set the PRB level at pre-industrial CO_2 concentrations, deciding that all industrial GHG emissions are above PRB. Such a finding would require the EPA to ignore all historic GHG emissions that came before GHG regulations took effect. Policy considerations and industrial considerations may not allow the EPA to begin the NAAQS setting process with a 280 ppm floor. These factors could motivate an EPA Administrator to conclude that the requisite PRB concentration should be held close to current ambient CO_2 concentrations.

Because GHGs are well mixed, the first two PRB options may not adequately describe a baseline level appropriate for EPA decisionmaking. The EPA could set PRB at pre-industrial concentrations by redefining PRB as ambient CO_2 concentrations absent anthropogenic sources anywhere in the world. By excluding the geographical restrictions in the current PRB practice, the EPA would no longer be required to isolate North American emission from other GHG in the atmosphere. This redefinition would not be

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264. *See* CLIMATE CHANGE 2007, *supra* note 237, at 211-14. Total GWP concentration is expressed as CO_2 equivalents by converting ambient concentrations to a common basis. *Id.*

265. *See, e.g.*, INT'L. ENERGY AGENCY, CO_2 EMISSIONS FROM FUEL COMBUSTION: HIGHLIGHTS 8 (2010), http://www.iea.org/co2highlights/co2highlights.pdf.

266. For example, assuming the current ambient concentration is 400 ppm and pre-industrial levels were 280 ppm. Assume the U.S. placed 25% of the industrial GHGs into the atmosphere. 25% of 420 – 280 (or 120) is 30 ppm. Subtracting 30 from 400 equals 370 ppm.

267. *See* REVIEW OF THE NATIONAL AMBIENT AIR QUALITY STANDARDS FOR OZONE, *supra* note 226, at 2-48, 2-54.

consistent with traditional criteria pollutant PRB analyses, where PRB is mostly influenced by local emissions.[268] However, the EPA would be hard pressed to completely ignore international emissions in setting a PRB.

Another option is to follow EPA's lead example, where the EPA declines to set a PRB level because of scientific complications due to other sources of lead impacting human health.[269] However, because the EPA could reasonably develop a defendable GHG PRB level, it would likely lack the scientific support within CASAC to declare that it cannot reach a PRB decision.

The PRB becomes the effective floor the EPA uses to set a NAAQS level. The EPA will need to evaluate how the PRB concept aligns to GHG realities to reach a PRB decision.

e. Primary Standard Level Using the Lead NAAQS Model

When the EPA last developed a new NAAQS standard for lead, it developed a five-part test to guide the NAAQS setting process:

> Determine the critical sensitive population
> Determine the pivotal adverse health effects
> Determine the human dosing level of the pollutant consistent with protecting the sensitive population
> Determine the relationship between airborne exposures and resulting harms.
> Determine the allowable increment from air. [270]

Below, the current GHG science is applied to each of these questions to evaluate the issues EPA would need to evaluate were it to set a GHG NAAQS.

i. Critical Populations

Because of the several disparate critical populations potentially impacted by climate change, the EPA would need to identify and

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268. *See* Coal. of Battery Recyclers Ass'n v. Envtl. Prot. Agency, 604 F.3d 613, 624 (D.C. Cir. 2010).

269. *See* Lead: Proposed National Ambient Air Quality Standard, 42 Fed. Reg. 63,076, 63,081 (Dec. 14, 1977) (codified at 40 C.F.R. § 50.12).

270. *See id.* at 63,077.

assess these sensitive populations in a different manner than in other NAAQS standards.[271] Urban populations subject to additional heat island effects,[272] especially the elderly or health compromised who may not have access to air conditioning, would likely be sensitive to climate impacts. Residents of the southern United States, where hot summers will become hotter for longer, will also become a sensitive population for NAAQS purposes.[273] In addition, the EPA will need to determine if it must consider populations beyond the United States when evaluating NAAQS public health criteria.

The second sensitive group includes populations living in areas that may become uninhabitable or in low lying areas susceptible to flooding, either by extreme weather events or sea level rise.[274] These populations are at direct risk of their homes or communities being damaged by floods or rising sea levels,[275] infrastructure issues associated with changing flood and drainage patterns not originally anticipated when their communities were first built,[276] and increased disease carrying rodent, insect, and bird activity.[277] As disease vectors migrate, the population risk increases over time, possibly unpredictably.[278] As plants that cause human allergic reactions migrate northward, asthma and allergic health effects will impact populations not now managing these health risks.[279] These impacts

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271. *See, e.g.*, *id.* at 63,077-78 (identifying urban children living near highways as the sensitive population in the lead NAAQS).

272. *See Heat Island Effect: Basic Information*, ENVTL. PROT. AGENCY, http://www.epa.gov/heatisld/about/index.htm (last visited May 11, 2011). This effect occurs when summer heat builds up in central cities more so than in nearby suburbs. *Id.*

273. *See* NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., FINAL ENVIRONMENTAL IMPACT STATEMENT: CORPORATE AVERAGE FUEL ECONOMY STANDARDS, PASSENGER CARS AND LIGHT TRUCKS, MODEL YEARS 2012-2016 4-146 (2010), http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/MY2012-2016_FEIS.pdf.

274. *See id.* at 4-110.

275. *See id.* at 4-147.

276. *See id.* at 4-150.

277. *See* W. J. Tabachnick, *Challenges in Predicting Climate and Environmental Effects on Vector-Borne Disease Episystems in a Changing World*, 213 J. EXPERIMENTAL BIOLOGY 946 (2010).

278. *See* ENVTL. PROT. AGENCY, REVIEW OF THE IMPACTS OF CLIMATE VARIABILITY AND CHANGE ON AEROALLERGENS AND THEIR ASSOCIATED EFFECTS 4-25 (2008), *available at* http://oaspub.epa.gov/eims/eimscomm.getfile?p_download_id=490474.

279. *See id.*

are expected to start in the Southern United States first, and slowly migrate northward across the entire Continental United States to the Canadian border regions.[280] A third susceptible group includes those living in areas where water supplies are expected to become constrained over the next fifty to one hundred years.[281]

Enough information likely exists to establish this factor in the GHG NAAQS context,[282] though the application of NAAQS principles to evolving sensitive population analysis somewhat complicates the analysis over time. Fortunately, the five-year review process would allow the EPA to monitor and manage changes to the policy-relevant sensitive populations.

ii. Pivotal Health Effects

The different sensitive populations identified above would be impacted by a variety of health effects that the EPA would need to evaluate in a NAAQS evaluation. Identification and documentation of critical health effects requires the EPA to evaluate the current state of climate science.

1. Primary Standard Science

The EPA would first review the available morbidity, mortality, and secondary health effects from the scientific literature.[283] Several scientific studies are available for review in this emerging field. [284] During the development of the 2010 mobile source GHG regulations, the National Highway Traffic Safety Administration ("NHTSA") developed an Environmental Impact Statement ("EIS"),[285] as required

280. *See* NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273, at 4-77 to -79.

281. *See* Giovinazzo, *supra* note 11, at 144-46 (citing Ethyl Corp. v. Envtl. Prot. Agency, 541 F.2d 1, 13-20 (D.C. Cir. 1976)).

282. *See* Air Quality Criteria for Ozone and Related Photochemical Oxidants, 65 Fed. Reg. 57,810 (Sep. 26, 2000).

283. *See generally*, NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273; ENVTL. PROT. AGENCY, TECHNICAL SUPPORT DOCUMENT FOR ENDANGERMENT AND CAUSE OR CONTRIBUTE FINDINGS FOR GREENHOUSE GASES UNDER SECTION 202(A) OF THE CLEAN AIR ACT (2009), http://www.epa.gov/climatechange/endangerment/downloads/Endangerment%20TSD.pdf [hereinafter TECHNICAL SUPPORT DOCUMENT].

284. *See* NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273.

285. *See id.*

under the National Environmental Protection Act ("NEPA") for large federal rulemakings.[286] The NHTSA EIS identified several climate change health impacts, including heat and cold waves, extreme weather events, air quality impacts, and increased disease vector activity.[287] Parallel with the EIS, the EPA published a technical support document ("TSD"), containing much of the same climate science and impacts information to support the EPA part of the mobile source GHG rulemaking process.[288]

The NHTSA, EPA, and others have identified a wide range of expected climate health effects that will emerge over the 21st century. More people are expected to die from higher urban summertime temperatures,[289] even accounting for decreased health problems from wintertime cold.[290] The frequency and intensity of extreme weather events, such as hurricanes, tornados and floods, are expected to increase as mean ambient temperatures increase.[291]

As local temperatures change, several species, including many disease vectors like rodents and mosquitoes, are expected to migrate

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286. *See* 42. U.S.C. § 4332 (2006). An EIS evaluates the environmental impacts of certain federal actions significantly affecting the quality of the human environment, it also lists alternative options to minimize the expected environmental impact. The EPA is typically exempt from this, being that the core of EPA rulemaking necessarily evaluates environmental impacts of its rulemaking. However, because the recent mobile source rule was issued by the EPA and the NHTSA, jointly the NHTSA, published a comprehensive climate change science and impacts review in the EIS as required under NEPA. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 272, at 1-2.

287. NAT'L. HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273, at 4-150.

288. *See* TECHNICAL SUPPORT DOCUMENT, *supra* note 283.

289. *See* Paul B. English et.al., *Environmental Health Indicators of Climate Change For the United States: Findings From the State Environmental Health Indicator Collaborative*, 117 ENVTL. HEALTH PERSP. 1673, 1676 (2009); Jonathan A. Patz et.al., *The Potential Health Impacts of Climate Variability For the United States: Executive Summary of the Report of the Health Sector of the U.S. National Assessment,* 108 ENVTL. HEALTH PERSP. 367, 369-70 (2000).

290. *See* NAT'L RESEARCH COUNCIL, CLIMATE STABILIZATION TARGETS: EMISSIONS, CONCENTRATIONS, AND IMPACTS OVER DECADES TO MILLENNIA 192 (2011), *available at* http://www.nap.edu/catalog/12877.html; J. Elizabeth Jackson et.al., *Public Health Impacts of Climate Change in Washington State: Projected Mortality Risks Due to Heat Events and Air Pollution*, 102 CLIMATIC CHANGE 351 (2010); Neville Nichols, *Estimating Changes In Mortality Due To Climate Change*, 97 CLIMATIC CHANGE 313 (2009).

291. *See* NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273, at 4-151; TECHNICAL SUPPORT DOCUMENT, *supra* note 283, at 85-86.

to new areas.[292] Diseases associated with these migrations, like dengue fever, Lyme disease and Hantavirus, will spread to new areas and impact different populations.[293] Plant life will also migrate to more hospitable climates, where pollen, algae and other aeroallergen concentrations in the air will increase, and pollen will stay in the atmosphere more of the year as the growing season becomes longer.[294] Increased mean ambient temperatures also are expected to increase ambient ozone concentrations, increasing well known pulmonary health effects from higher ozone levels.[295] One study noted that skin cancer incidence rates are expected to increase because of increased ultraviolet radiation reaching the earth's surface.[296] CASAC and the EPA would request that, over time, the scientific community extend the heat wave mortality studies to more of the United States, review and update how disease transmission rates change over time, and monitor flooding damage to adjust expected health risks as sea levels and water flow patters change.

2. Secondary Standard Science

Because the EPA has considered a wide variety of welfare impacts in previous NAAQS evaluations,[297] it would likely consider a wide

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292. *See* NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273, at 4-151; TECHNICAL SUPPORT DOCUMENT, *supra* note 283, at 87; NAT'L. RESEARCH COUNCIL, *supra* note 290, at 197-98; Stephanie K. Moore et.al., *Impacts of Climate Variability and Future Climate Change on Harmful Algal Blooms and Human Health*, 7 ENVTL. HEALTH: S4 (2008).

293. *See* NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273, at 4-153.

294. *See id.*, at 4-151.

295. *Id.* at 4-152; TECHNICAL SUPPORT DOCUMENT, *supra* note 283, at 90-92; NAT'L RESEARCH COUNCIL, *supra* note 290, at 158; JANET L. GAMBLE, U.S. CLIMATE CHANGE SCI. PROGRAM, ANALYSES OF THE EFFECTS OF GLOBAL CHANGE ON HUMAN HEALTH AND WELFARE AND HUMAN SYSTEMS FINAL REPORT 2-20 (2008), *available at* http://oaspub.epa.gov/eims/eimscomm.getfile?p_download_id=475107; Noelle E. Selin et.al., *Global Health and Economic Impacts of Future Ozone Pollution*, 4 ENVTL. RES. LETTERS 2-4 (2009), *available at* http://iopscience.iop.org/1748-9326/4/4/044014/pdf/1748-9326_4_4_044014.pdf.

296. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, FOURTH ASSESSMENT REPORT: CLIMATE CHANGE 2007, WORKING GROUP II: IMPACTS, ADAPTATION AND VULNERABILITY 397, 405 (2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter8.pdf.

297. *See, e.g.*, National Ambient Air Quality Standards for Ozone, 73 Fed. Reg. 16,436, 16,485 (Mar. 27, 2008) (to be codified at 40 C.F.R. pts. 50, 58) (discussing

variety of impacts in a future secondary NAAQS evaluation, including for any future GHG NAAQS. The NHTSA EIS[298] reports climate change welfare impacts would likely include sea level rise, increased storm event frequency, wildfire frequency increases, and agriculture impacts.[299]

Many scientists have concluded that sea level rise,[300] reduced fresh water availability,[301] increased frequency of extreme weather events,[302] changes in wildfire impacts,[303] crop damage,[304] changes in ocean acidity,[305] and extinctions and species migration[306] will occur, or have already begun occurring, as impacts of climate change. These authors suggest that the impacts will increase over time,

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impact of ozone on vegetation); National Ambient Air Quality Standards for Particulate Matter, 71 Fed. Reg. 61,144, 61,203 (Oct. 17, 2006) (to be codified at 40 C.F.R. pt. 50) (discussing impact of particulates on visibility); 71 Fed. Reg. 61,144, 61,209 (discussing impacts of particulate on vegetation, ecosystems and manmade materials); National Ambient Air Quality Standards for Lead, 73 Fed. Reg. 66,964, 67,008 (Nov. 12, 2008) (to be codified at C.F.R. pts. 50, 51, 53, 58) (discussing effects of lead on vegetation, soils and water, animals, and property).

298. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273.

299. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273, at 4-112, 4-121.

300. *Id.* at 4-115 to 4-116; NAT'L. RESEARCH COUNCIL, *supra* note 290, at 148-51.

301. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273, at 4-72.

302. English, *supra* note 289, at 1675; GAMBLE, *supra* note 295, at 1-12; NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273, at 4-70 to 4-71.

303. GAMBLE, *supra* note 295, at 4-24 to 4-25; NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273, at 4-121 to 4-122.

304. GAMBLE, *supra* note 295, at 2-25; NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273, at 4-123 to 4-125.

305. Moore, *supra* note 292, at 4; NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273, at 4-171.

306. Moore, *supra* note 292, at 4; DANIEL MORRIS & MARGARET WALLS, RES. FOR THE FUTURE, CLIMATE CHANGE AND OUTDOOR RECREATION 6, 20 (2009), *available at* http://www.rff.org/RFF/Documents/RFF-BCK-ORRG_ClimateChange.pdf; Walter J. Tabinchak, *Challenges In Predicting Climate and Environmental Effects On Vector-Borne Disease Episystems In A Changing World,* 213 J. EXPERIMENTAL BIOLOGY 946, 952 (2010); Dan Glaister, *Plague of Beetles raises Climate Change Fears for American Beauty*, GUARDIAN U.K., Mar. 19, 2007, *available at* http://www.guardian.co.uk/environment/2007/mar/19/usnews.conservationandendangeredspecies; Howard Pankratz, *Beetle Scourge Goes From Bad to Worse*, DENVER POST, Jan. 15, 2008, *available at* http://www.denverpost.com/ci_7972146.

especially as airborne CO_2 concentrations increase over the next several years.[307]

Expected climate-related sea level rise impacts have been well documented.[308] Fresh water resources have already been impacted in the Rocky Mountain region,[309] and have been predicted to occur in the Southwest United States throughout the 21st century.[310] Prior infrastructure investments that manage weather conditions may become obsolete over time, requiring different investments to manage rainfall. Where rainfall rates decline, wildfires may strike more frequently and may impact larger areas.[311]

Planting areas for specific crops would likely migrate significantly as temperatures increase,[312] with grain crops initially, but only temporarily, benefitting from increased temperatures.[313] Summer livestock heat stress could reduce production over the next century by approximately one to two percent.[314] Fresh water fisheries are expected to become less productive or in some cases, be wiped out, as a consequence of climate change.[315]

As CO_2 dissolves into seawater, seawater slowly becomes more acidic.[316] The average ocean pH has dropped by 0.1 pH units in the last thirty years, and is expected to decrease by 0.3 to 0.5 pH units by 2100.[317] Terrestrial life forms will face similar evolutionary challenges, having to migrate, evolve, or become extinct as mean surface temperatures increase.[318] Climate change is expected to cause

307. *See* English, *supra* note 289; GAMBLE, *supra* note 295; Moore, *supra* note 292.

308. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273, at 4-113, 4-159. For example, as much as twenty-one percent of the Mid-Atlantic coastal wetlands are expected to be submerged.

309. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273, at 3-89.

310. *Id.* at 4-161.

311. *Id.* at 4-122.

312. *Id.* at 4-124. Farms growing tree crops, like nuts, and vine crops, like grapes, are not easily moved to other locations in response to increasing temperatures.

313. *Id.* at 4-124.

314. *See* NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273, at 4-125 to 4-126.

315. *Id.* at 4-126.

316. *Id.* at 4-170.

317. *Id.* Much marine life is susceptible to pH changes of 0.2 pH units.

318. Tabinchak, *supra* note 306, at 952; Glaister, *supra* note 306; Pankratz, *supra* note 306.

increased urban ozone concentrations.[319] Ozone, in addition to causing well documented health effects, also inhibits plant growth.[320]

3. State of Current GHG Science

Current science evaluating the public health impacts of climate change is not as well developed as the science evaluating welfare impacts.[321] Over time, more quantitative science should emerge, both as a function of the scientific process and to support EPA decisionmaking. The current health science likely supports EPA action regarding the available science under the *Train* precautionary theory where the EPA is not expected to wait for perfect science to establish a NAAQS.[322] Once the EPA determines that a NAAQS is necessary, the EPA is expected to develop the requisite science to support the primary and secondary NAAQS setting process.[323]

Two distinct differences exist between the GHG health science and the science the EPA uses to support contemporary NAAQS standards. First, most of the GHG health science addresses health effects at between 500 and 750 ppm CO_2 concentrations,[324] far above today's levels, but well within the IPCC predicted concentrations by the second half of the 21st century.[325] In contrast, the science used to set the ozone NAAQS examined adverse health effects in a wide range of ambient ozone concentrations, some less than, some at, some above, current ambient concentrations.[326]

Another difference between today's NAAQS standards and a GHG NAAQS is the number of significant health effects and the uniformity of sensitive populations impacted by the health effects.[327] Most current NAAQS criteria documents address a small number of

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319. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273, at 4-151 to 4-152.

320. National Ambient Air Quality Standards for Ozone, 73 Fed. Reg. 16,436, 16,486 (Mar. 27, 2008) (to be codified at 40 C.F.R. pts. 50, 58).

321. *See* discussion *supra* Part II.B.2.e.ii.2.

322. Giovinazzo, supra note 11, at 144-46.

323. Natural Res. Def. Council v. Train, 411 F. Supp 864, 870 (S.D.N.Y. 1976), *aff'd,* 545 F.2d 320 (2d Cir. 1976).

324. Giovinazzo, *supra* note 11, at 144-46.

325. TECHNICAL SUPPORT DOCUMENT, *supra* note 283, at 64-75.

326. REVIEW OF THE NATIONAL AMBIENT AIR QUALITY STANDARDS FOR OZONE, *supra* note 226, at 3-1 to 3-103.

327. *Id.* at 4-70 - 4-165.

substantial health effects.[328] For instance, the ozone and particulate NAAQS health reviews concentrate on pulmonary risks.[329] Climate change implicates a wide range of health impacts, many of which may only emerge over time.

Climate change welfare science is much more developed than the health effects science. Scientists can predict, within documented ranges, some welfare impacts, such as sea level rise, and the impacts of GHGs already emitted over the next fifty to 100 years.[330] Scientists can also predict, with reasonable certainty, some of the GHG welfare impacts expected to be emitted over the next fifty years.[331] To support its findings, EPA should better document which species may become endangered or extinct, and which species may migrate to new homes.

Changing weather patterns will emerge over time, defining where heat waves, droughts, floods, and sea level rise will impact populations.[332] The EPA would need to track these impacts to better identify impacts to these newly sensitive populations.

iii. Pollutant Dosing Level To Protect Critical Populations

In the climate context, the analysis of what pollutant level may be appropriate to protect critical populations remains unsettled. IPCC uses several temperature models to estimate temperature increases over the 21st century, each with an uncertainty level that will reduce as the models become more refined over time.[333] How much the United States can adapt to increasing temperatures, migrating pests, and changes in water resources remains in doubt.[334]

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328. *See* National Ambient Air Quality Standards for Ozone, 73 Fed. Reg. 16,436, 16,440 (Mar. 27, 2008) (to be codified at 40 C.F.R. pts.50, 58).

329. *Id.*

330. ROBERT HENSON, THE ROUGH GUIDE TO CLIMATE CHANGE 34-36 (2d. ed. 2008).

331. REVIEW OF THE NATIONAL AMBIENT AIR QUALITY STANDARDS FOR OZONE, *supra* note 226, at 4-70 - 4-165.

332. *See* discussion *supra* Part II.B.2.e.ii.

333. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, FOURTH ASSESSMENT REPORT: CLIMATE CHANGE 2007, WORKING GROUP I: SUMMARY FOR POLICYMAKERS 7-8 (2007), *available at* http://ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf.

334. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273, at 4-134.

iv. Relationship Between Airborne Exposures and Resulting Harms

The current GHG health science shows a positive correlation between GHG emissions and heat related mortality. Studies show that, over the next century, climate induced deaths would increase, for example, by between 100 and 200 in Seattle by 2050 under the IPCC A2 temperature scenario.[335] The EPA has readily available science to estimate ozone health impacts of the 0.2 to 0.4 ppb expected ozone concentration increases expected this century.[336] However, similar correlations are not available for the health risks potentially subject to adaptation.[337] As the science evolves, additional health and welfare risks may become apparent, which would cause the EPA to reassess NAAQS levels. Because climate impact science is still developing, the EPA will need to evaluate this relationship using its scientific judgment.

v. Allowable Airborne Increments

In this last step in the lead test, the EPA sets a numeric primary NAAQS standard.[338] For the first five year NAAQS period, the EPA could possibly set a primary GHG NAAQS in one of three ranges: below current ambient concentrations, as recommended by 350.org;[339] at or near current ambient concentrations; or at a higher concentration than current ambient, reflecting progress towards a long term climate stabilization goal. However, the EPA should also consider the long range implications of any GHG NAAQS.[340]

The EPA would need to incorporate uncertainty analysis into the AMOS determination.[341] The EPA Administrator will consider the

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335. J. Elizabeth Jackson et.al., *Public Health Impacts of Climate Change in Washington State: Projected Mortality Risks Due To Heat Events and Air Pollution*, 102 CLIMATIC CHANGE 159, 178 (2010).

336. *Id.* at 162.

337. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273, at 4-151.

338. *See* discussion *supra* Part I.A.

339. *350 Science*, *supra* note 260.

340. *See* discussion *infra* Part II.B.2.e.v.4. *See also* Robert B. McKinstry, Jr. et al., *The New Climate World: Achieving Economic Efficiency In A Federal System For Greenhouse Gas Control Through State Planning Combined With Federal Programs,* 34 N.C. J. INT'L L. & COM. REG. 767, 801-06 (2009).

341. *See* National Ambient Air Quality Standards for Ozone, *supra* note 226, at 16,476-16,477. As EPA evaluates NAAQS science, it determines the relative

PRB concentration when setting a NAAQS standard.[342] As described above, the EPA will need to consider how to address international GHG emissions in setting a GHG PRB.

The EPA is under no obligation to set a risk free NAAQS standard.[343] The NAAQS health-based mandate allows the EPA to consider the severity and incidence of adverse health effects within established uncertainties.[344] The AMOS determination provides the EPA Administrator with the flexibility to set NAAQS values at appropriate levels, considering health effects, but not cost.[345] When the EPA follows the NAAQS process, courts will defer to EPA judgment, knowing that the EPA must include value judgments in setting NAAQS standards.[346]

1. 350 ppm

Historic GHG emissions have already begun to cause climate-related health impacts.[347] Because Congress intended the CAA to protect the public from adverse health effects, it requires EPA to set protective health standards.[348] To protect the public from ongoing health effects, an argument could be made to set a primary GHG NAAQS below current ambient concentrations. One group advocates targeting 350 ppm as a protective ambient CO_2 concentration.[349]

To set a primary GHG NAAQS below current ambient GHG concentrations, the EPA would need to find specific current health effects impacting today's sensitive populations. However, those who generally do not support applying the CAA to GHGs would likely object to the EPA finding that climate impacts health. Those who generally do not support applying the CAA to GHGs will likely exert

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amount of uncertainty in the science. The Administrator evaluates the uncertainty determination when setting a NAAQS.

342. *See id.* at 16,465. The PRB guides the EPA Administrator's determination of background concentrations of the NAAQS pollutant as a consideration when setting a NAAQS standard.

343. Giovinazzo, *supra* note 11, at 109.

344. *Id.*

345. Whitman v. Am. Trucking Ass'ns., 531 U.S. 457, 473 (2001).

346. Giovinazzo, *supra* note 11, at 130.

347. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 296, at 391, 396-97. For example, the 2003 French heat wave.

348. 42 U.S.C. § 7409(b) (2010).

349. *350 Science*, *supra* note 260.

political pressure on the EPA not to force the entire country into GHG NAAQS nonattainment in the first five year NAAQS period. Industry will advocate for the EPA to begin any GHG NAAQS program with the country in attainment to allow time to develop new technologies that will be necessary to adapt to GHG nonattainment, develop policies for how to manage reducing GHG emissions, and minimize short term business disruptions. Because climate health science does not appear to be well developed today, the EPA may not, absent improved health science data, set a primary NAAQS at levels below current ambient concentrations in the first instance.

2. Current Ambient Concentrations

The EPA could justify a precautionary GHG NAAQS at or near current ambient concentrations. The EPA could argue that health, and possibly welfare, impacts only occur above current ambient concentrations.[350] The EPA could find, based on a review of current GHG health science, that adverse health effects will begin as the climate warms.

3. Long Term Stabilization

Many countries, including the United States, have announced a goal to restrain global warming to a net 2° C increase in mean planetary temperature increase, compared with pre-industrial times.[351] Maintaining a net temperature increase of 2° C translates into maintaining average ambient CO_2 concentrations at or below approximately 450 ppm by 2050.[352] While President Obama stated in the Copenhagen Accord[353] that the United States subscribes to the 2°C goal, the EPA would be required to revaluate the climate goal, and the ambient concentration goal based on that climate goal, de

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350. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 296, at 156.

351. Rockstrom, *supra* note 259, at 473.

352. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, FOURTH ASSESSMENT REPORT: CLIMATE CHANGE 2007, WORKING GROUP III: MITIGATION 227 (2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter3.pdf.

353. Conference of the Parties to the U.N. Framework Convention on Climate Change, 15th Sess., Draft Decision -/CP 15: Proposal by the President, Copenhagen Accord, U.N. Doc. FCCC/CP/2009/L.7 (Dec. 18, 2009) [hereinafter Copenhagen Accord], *available at* http://unfccc.int/resource/docs/2009/cop15/eng/l07.pdf.

novo.[354] No precedent exists for the EPA Administrator accepting a pre-negotiated NAAQS standard, or a pre-determined health goal, as a basis for setting a NAAQS standard. Between the reasonable further progress ("RFP") program and statutory five year NAAQS reviews, the EPA could adjust the national GHG budget by setting one or more intermediate emission reduction goals, like the recently proposed seventeen percent reduction by 2020.[355]

The weight of currently available scientific evidence indicates that climate change health effects are expected to cause or contribute to human health impairment at or below the IPCC recommended 450 ppm ambient concentration.[356] The IPCC report documenting the relationship between 2° C and 450 ppm[357] represents the current scientific basis used for GHG policy around the world.[358] The EPA would be required to evaluate the health effects at the expected 2° C increase to validate or amend this finding. When the EPA and the CASAC update the science evaluation, it will consider emerging IPCC science as part of its periodic scientific review.

4. Long Term Planning

If the EPA were to set a GHG NAAQS, one conflict the EPA would need to address is the five year statutory NAAQS planning horizon, which seems inappropriate for CO_2 emissions expected to persist in the atmosphere for a century or more.[359] Traditional criteria pollutants typically do not persist in the atmosphere for long periods

354. 42 U.S.C. § 7409(b) (2010).

355. PEW CENTER ON GLOBAL CLIMATE CHANGE, WAXMAN-MARKEY SHORT SUMMARY 1 (2009) *available at* http://www.pewclimate.org/docUploads/Waxman-Markey-short-summary-revised-June26.pdf.

356. Daniel Bodansky, *The Copenhagen Climate Change Conference: A Postmortem*, 104 AM. J. INT'L L. 230, 234 (2010).

357. Copenhagen Accord, *supra* note 353, at 1.

358. However, IPCC publishes a new assessment approximately every five years, and the next assessment is due in 2014. IPCC will update the scientific basis in the upcoming Fifth Assessment Report. IPCC, THE IPCC'S FIFTH ASSESSMENT REPORT (AR5), *available at* http://www.ipcc.ch/pdf/ar5/ar5-leaflet.pdf.

359. Some of the fluorinated GHGs also persist in the atmosphere for a long period of time, but, as mentioned above, CO_2 comprises the vast majority of GHG emissions and GHG atmospheric loading.

of time.[360] For example, in the great northeast brownout of 2002, ambient SO_2 concentrations over Pennsylvania dropped by ninety percent, and ambient ozone concentrations dropped by half, compared with comparable August days, simply because the electric generating grid was offline for an afternoon.[361] These pollutants, where a short-term interruption of anthropogenic emissions can cause a substantial change in ambient air quality, conform well to a five year planning horizon. However, because CO_2 remains in the atmosphere for a hundred years and it takes time for the earth's mean ambient temperature to respond to a given concentration of GHGs in the atmosphere, short term action cannot significantly influence the ambient CO_2 concentration.[362] Although not reported in the 2002 brownout study described above, the electric grid going offline for an afternoon likely had no measurable impact on ambient CO_2 concentrations.[363]

CO_2 emissions now exceed total CO_2 removal rates.[364] If natural removal processes could keep up with ever increasing CO_2 emissions rates, the ambient CO_2 concentration would not increase over time.[365] The IPCC has developed a number of emissions and concentration scenarios to predict future GHG emission rates and ambient impacts.[366] In each of these scenarios, emissions over the next century are expected to increase substantially.[367] These long term CO_2 ambient concentration predictions assume GHG emissions will increase over time, eventually stabilizing as the worldwide economy shifts towards overall lower carbon emissions.[368] The five year

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360. Lackson T. Marufu et al., *The 2003 North American Electrical Blackout: An Accidental Experiment In Atmospheric Chemistry*, 31 GEOPHYSICAL RES. LETTERS 1 (2004).

361. *Id.*

362. HENSON, *supra* note 330 at 34-36.

363. Marufu, *supra* note 360 at 1.

364. HENSON, *supra* note 330 at 34-36.

365. *Id.*

366. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, FOURTH ASSESSMENT REPORT: CLIMATE CHANGE 2007, GLOBAL WARMING POTENTIALS AND OTHER METRICS FOR COMPARING DIFFERENT EMISSIONS fig.TS-4 (2007), *available at* http://www.ipcc.ch/publications_and_data/ar4/wg2/en/figure-ts-4.html.

367. *Id.*

368. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, FOURTH ASSESSMENT REPORT: CLIMATE CHANGE 2007, SYNTHESIS REPORT 68 (2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf.

NAAQS review would only fit GHGs if the EPA utilizes its available science to conduct long range planning, in the fifty to one hundred year horizons, to shape not only a current five-year NAAQS level, but to also integrate the current NAAQS into how a longer term standard may develop.[369] The EPA should utilize the existing CO_2 concentration trend knowledge to predict, over time, how a GHG NAAQS relates to longer term CO_2 concentration trends. Therefore, any GHG NAAQS analysis must look fifty to one hundred years out, even in a statutory five year review cycle.

vi. Implementation Issues

As stated above, the EPA has just begun to regulate GHGs.[370] As such, EPA has developed very little GHG regulatory guidance.[371] By setting a GHG NAAQS above current ambient concentrations in the early years, the EPA would have time to establish a number of other programs to coordinate the GHG SIP process, provide emissions reduction guidance, and plan for how a nonattainment system might work in the future. However, if the NAAQS is set so that the entire United States is in nonattainment, then the EPA would need to accelerate the nonattainment rulemaking process. While implementation concerns should not influence NAAQS levels, implementing a GHG NAAQS in an attainment scenario would significantly ease the regulatory burden on all stakeholders grappling with the GHG SIP process concerns, including Lowest Achievable Emission Rate ("LAER"),[372] RFP,[373] and offset provisions.[374] Allowing short term GHG NAAQS attainment also delays primary nonattainment sanctions.

Areas that fail to attain primary NAAQS standards after the appropriate attainment deadlines are subject to a number of sanctions.[375] States failing to attain a NAAQS face the loss of federal

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369. Robert N. Stavins, *A Meaningful U.S. Cap-And-Trade System To Address Climate Change*, 32 HARV. ENVTL. L. REV. 293, 311 (2008).

370. *See* discussion *supra* INTRODUCTION.

371. *See generally Clean Air Act Permitting For Greenhouse Gases*, ENVTL. PROT. AGENCY, http://www.epa.gov/nsr/ghgpermitting.html (last visited Dec. 25, 2010).

372. 42 U.S.C. §7501(3) (2010).

373. *Id.* §7501(1) (2010).

374. 42 U.S.C. §7503(c) (2010).

375. 42 U.S.C. § 7509(b) (2010).

highway funds.[376] Major sources of VOC and NO_x in severe or extreme ozone nonattainment areas[377] that do not timely attain the ozone NAAQS must pay $5,000 per ton fees, in 1990 dollars adjusted for inflation, per year because their AQCR did not attain the ozone standard.[378]

If a state fails to develop a SIP, the EPA will develop a Federal Implementation Plan ("FIP") to take the place of the SIP in states without an appropriate SIP,[379] where a state has not completed a SIP,[380] or the EPA has disapproved a state SIP.[381] FIPs must be established within two years of an EPA finding that a FIP is necessary.[382]

Several medical, technological, and early warning support system adaptation techniques may reduce health impacts from ongoing climate change.[383] Effectiveness of each adaptation strategy depends on local context, public outreach, and local government preparedness.[384] Because adaptation primarily involves a series of evolving risk management decisions, adaptation strategies will necessarily emerge over time as climate change impacts become apparent.[385] The EPA will need to cautiously predict how sensitive populations will or will not be able to adapt to climate based health risks.

f. Setting A Secondary GHG NAAQS Standard

The EPA must set secondary NAAQS standards at a level to "protect the public welfare from any known or anticipated adverse

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376. *Id.* § 7509(b)(1). States failing to attain a primary NAAQS by a statutory deadline may not spend federal highway funds in a nonattainment area that has failed to attain the NAAQS.

377. 42 U.S.C. § 7511(a)(1) (2010). Ozone nonattainment areas are classified in one of five categories, depending on the difference between the local air quality and the NAAQS level. Details of this classification system, and requirements for each category of nonattainment area, are beyond the scope of this paper.

378. *Id.* § 7511(b). The actual fee formula contains a number of conditions and exceptions beyond the scope of this paper.

379. 42 U.S.C. § 7410(c)(1) (2010).

380. *Id.* § 7410(c)(1)(A).

381. *Id.* § 7410(c)(1)(B).

382. *Id.* § 7410(c)(1).

383. GAMBLE, *supra* note 295, at tbl.2-5.

384. *Id.* at 2-29.

385. *Id.* at 2-27.

effects associated with the presence of such air pollutant in the ambient air."[386] Congress also defined welfare as including a wide variety of soil, water, crop, and building damage.[387]

i. Secondary Standard History

The EPA has often, but not always, set the secondary standard at the level driven by the primary standard.[388] On occasions where the secondary standard was set at a different level, the EPA had scientific evidence of secondary effects occurring at airborne concentrations below the primary standard level.[389] However, the EPA, having evidence that would support a lower or different secondary standard, does not always follow through.[390] For instance, in the most recent ozone NAAQS, the EPA developed and proposed, but did not finalize for policy reasons, the W126 crop damage secondary standard.[391] The EPA proposed the W126 secondary NAAQS that reflected a secondary NAAQS level that it believed better evaluated how ozone degrades plant and crop growth and better protected plant life against summer season peak ozone exposures.[392] The EPA declined to adopt the new W126 secondary ozone NAAQS structure, instead adopting the primary standard as the secondary standard.[393]

386. 42 U.S.C. § 7409(b)(2) (2010).

387. 42 U.S.C. § 7602(h) (2010). The CAA section 302(h) welfare definition "includes, but is not limited to, 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." *Id.*

388. *See, e.g.*, National Air Ambient Quality Standards for Ozone, 73 Fed. Reg. 16,436, 16,500 (Mar. 29, 2008) (codified at 40 C.F.R. §§ 50.15-58) (identical primary and second ozone standards); National Ambient Air Quality Standards for Particulate Matter, 71 Fed. Reg. 61,144, 61,209-10 (Oct. 17, 2006) (to be codified at 40 C.F.R. pt. 50) (identical primary and secondary particulate standards).

389. 73 Fed. Reg. 16,436, 16,500.

390. *Id.*

391. *Id.* The EPA Administrator, citing to the lack of rural W126 monitoring data, declined to change the form of the secondary standard, only changing the value to conform to the new primary ozone NAAQS.

392. *Id.*

393. *Id.*

ii. Secondary Standard Setting

Given the variety of impacts that climate change has on the secondary standards, the approach taken by the EPA in setting the lead NAAQS could guide how it may set any secondary GHG NAAQS. In the climate change context, the EPA could easily find that the airborne CO_2 concentration necessary to mitigate one secondary standard concern may be very different than the concentration required to manage harms from public health risk. GHGs emitted in the past will persist in the atmosphere for many years.[394] The EPA could find that these existing atmospheric GHG emissions have already caused welfare damage, such as disease vector migration already observed.[395] Further, the EPA could find that the secondary NAAQS should be set at, or below, current ambient concentrations. Alternatively, the EPA could find that welfare impacts at the current ambient CO_2 concentrations are within the AMOS determination, and set a secondary standard above the current background levels.[396]

iii. PRB Level

The EPA uses the PRB concept differently in the secondary standard process.[397] The EPA attempts to utilize the science to develop a PRB assessment in the secondary standard setting process.[398] However, because the secondary standard science is not usually well developed as health-based science, the policy relevant background analysis for welfare effects is not as mature as the policy relevant background process for health effects. For example, in the 2007 ozone NAAQS process, the EPA and CASAC attempted to customize a policy relevant welfare level to better account for ozone related crop and vegetation damage.[399] However, the EPA

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394. NAT'L. HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273, at 10-53. The published expected atmospheric lifetime, the amount of time CO_2 persists in the atmosphere, is estimated at 100 years. Emissions from the last century will continue to impact the atmosphere through the entire atmospheric life cycle.

395. NAT'L. HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 273, at 4-109 to 4-112.

396. Giovinazzo, *supra* note 11, at 157.

397. ENVTL. PROT. AGENCY, *supra* note 226, at 7-19 to 7-22.

398. *Id.*

399. *Id.*

Administrator rejected this proposal due to inadequate science, setting the secondary ozone NAAQS identically to the primary standard.[400] The EPA has proposed to revive the rejected policy relevant welfare analysis in the 2010 ozone NAAQS proposal.[401]

PRB analyses for secondary standards have not yet matured to where consistent decision rules exist.[402] The EPA would need to develop metrics to evaluate what CO_2 concentrations negatively impact the variety of GHG welfare impacts already underway or expected over time. If the EPA Administrator found that climate related welfare impacts were already underway, then she could set the policy relevant welfare levels below current ambient CO_2 concentrations. The EPA would necessarily need to develop a more structured policy relevant welfare analysis to better support a secondary GHG NAAQS.

iv. Secondary Standard Options

The EPA Administrator could elect to set a secondary standard lower than the approximately 400-450 ppm primary standard level recommended above.[403] The EPA could, based on the state of the current science, assert that climate change has already impacted welfare and it should set a secondary standard at or near the suggested 350 ppm. As a result, the EPA could set a primary NAAQS above current ambient CO_2 concentrations and a secondary NAAQS below current ambient concentrations.

III. IMPLEMENTING A GHG NAAQS

A GHG NAAQS presents several challenges never faced before by the EPA and the states. The United States, along with the rest of the world, needs to sharply reduce GHG emissions to stabilize global mean temperatures. Existing emissions sources often cannot be economically redesigned to substantially reduce GHG emissions.[404]

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400. National Air Ambient Quality Standards for Ozone, 73 Fed. Reg. 16,436, 16,500 (Mar. 29, 2008) (codified at 40 C.F.R. §§ 50.15-58).

401. National Air Ambient Quality Standards for Ozone, 75 Fed. Reg. 2,938, 2,999 (Jan. 19, 2010) (to be codified at 40 C.F.R. §§ 50 and 58).

402. 73 Fed. Reg. 16,436, 16,500.

403. *See* discussion, *supra* Part II.B.2.e.*v.3*.

404. Regulating Greenhouse Gas Emissions Under the Clean Air Act, 73 Fed. Reg. 44,354, 44,413 (July 30, 2008) (codified at 40 C.F.R. Ch. 1).

The traditional CAA authorities would not regulate many existing GHG emissions sources that would need to be constrained to reach temperature stabilization goals.[405] Not only must GHG emissions be managed, but fuel supplies and consumption rates must also be managed to reduce emissions enough to stabilize ambient temperatures. Emissions trading is seen by many as an appropriate mechanism to achieve climate stabilization goals,[406] but will require creative applications of several CAA authorities to implement.

A. SIP Requirements

Many authors writing about GHG regulations under the CAA describe the process by which a state could implement a GHG NAAQS SIP program.[407] Some indicate that no state could develop an appropriate SIP allowing a state to attain a NAAQS, especially a nonattainment SIP.[408] Specifically, the CAA requires that: "[e]ach such plan shall – include enforceable emissions limitations and other control measures, means, or techniques (including economic incentives such as fees, marketable permits, and auctions of emissions rights) as well as schedules and timetables for compliance, as may be necessary or appropriate to meet the [NAAQS]."[409]

No state could possibly meet a GHG NAAQS on its own without assistance from other states and the EPA. GHG emissions from around the world mix in the atmosphere, where no state can distinguish its atmospheric GHG contribution from GHG emissions coming from other states or countries. This is known as the "uniform mixing" problem.[410] Because of uniform mixing, states cannot design enforceable limits "necessary and appropriate" to meet a GHG

405. *Id.*

406. Robert R. Nordhaus & Kyle W. Danish, *Assessing The Options For Designing A Mandatory U.S. Greenhouse Gas Reduction Program*, 32 B.C. ENVTL. AFF. L. REV. 97, 113-114 (2005).

407. *See, e.g.*, Arnold W. Reitze, Jr., *Air Quality Protection Using State Implementation Plans – Thirty-Seven Years of Increasing Complexity*, 15 Vill. Envtl. L.J. 209, 230-33 (2004) (discussing the process of state implementation plans and the potential impracticability of attainment for certain CAA standards).

408. See Roger Martella, *Climate Change Along the Northeast Corridor: How Washington and New York Are Approaching and Preparing For Greenhouse Gas Controls*, 18 N.Y.U. Envtl. L.J. 14, 21-22 (2010); Reitze, supra note 8 at 4; Dormeus and Hanneman, supra note 11 at 822.

409. 42 U.S.C. § 7410(a)(2)(A) (2010).

410. Stavins, *supra* note 369, at 294.

NAAQS standard without further coordination.[411] EPA and the states would need to adjust their SIPs to provide "necessary and appropriate" emissions reductions that meet SIP requirements.

Mostly, these arguments revolve around the uniform mixing problem, where the ambient GHG concentration does not significantly vary across the United States, or across the planet. Because of uniform mixing, GHGs emitted from one place impacts air quality across the entire globe.[412] States can reduce local ambient air quality by regulating local sources for ozone, NO_x, and other traditional criteria pollutants. However, state emission control techniques cannot significantly impact ambient GHG concentrations when emissions from across the country, or across the globe, can increase local ambient GHG concentrations.[413] Unlike any criteria pollutant the EPA currently regulates under the NAAQS program, a state can zero out its GHG emissions without significantly impacting local GHG concentrations.[414] With any GHG NAAQS, all fifty states risk simultaneously falling into GHG NAAQS nonattainment if and when ambient GHG concentrations exceed a NAAQS concentration.[415]

The CAA was written as an aspirational, rather than strictly a command-and-control, standard.[416] Congress understood, as it amended the CAA several times over the years, that the NAAQS mandate might not be strictly achievable to the letter of the law.[417] However, under its symbolic Congressional mandate, the EPA and the states are expected to take available pragmatic steps to reduce pollution impacts.[418] In *American Trucking*, the Supreme Court upheld the ozone NAAQS even though the EPA could not possibly ensure absolute public safety as required by the CAA.[419] Because there is no safe ambient ozone concentration, the EPA should have,

411. McKinstry, *supra* note 12, at 802-03.

412. Stavins, *supra* note 369, at 311.

413. Giovinazzo, *supra* note 11, at 139.

414. McKinstry, *supra* note 12, at 801. The US must reduce GHG emissions by approximately eighty percent by 2100 to meet established climate targets. No state emits eighty percent of the total US GHG emissions.

415. Reitze, *supra* note 8, at 4.

416. Giovinazzo, *supra* note 11, at 101-02.

417. *Id.* at 109.

418. *Id.* at 162.

419. *See* Whitman v. Am. Trucking Ass'n, 531 U.S. 457, 494 (2001) (Breyer, J., concurring in part and concurring in the judgment).

theoretically, set a zero ozone primary NAAQS. Instead, the EPA set a NAAQS based on the available science within its NAAQS authority, not a zero ozone concentration.[420] Based on *American Trucking*, the EPA may formulate a pragmatic response to regulatory challenges, such as GHG regulation, within its symbolic mandate.[421] With some innovative views of existing CAA programs, the EPA could, for the most part, develop a GHG NAAQS implementation program that allows states to develop a valid SIP while addressing most GHG emissions sources.

1. Emissions Budgeting

Congress provided the states substantial latitude in developing, and the EPA in approving, flexible SIPs customized to include "necessary or appropriate" emissions control programs.[422] No emission limitation program could substantially reduce ambient GHG concentrations or actually bring a state not attaining a GHG NAAQS into attainment. Absent substantial international cooperation, nothing the United States can do will stop ambient CO_2 concentrations from increasing substantially over the next century. However, the EPA has flexibility in the statutory language to only ask states to reduce emissions as "appropriate" to meet a NAAQS.[423] The SIP command should be seen in symbolic terms when the "[CAA instructs EPA to do the impossible: to set standards strict enough to clean the air,"[424] as the Supreme Court held in *American Trucking*.[425] The CAA requires states to meet strict CAA standards with built in aggressive deadlines, which states repeatedly miss.[426] Courts will defer to EPA's NAAQS setting logic so long as it properly evaluates health issues.[427]

With respect to a GHG NAAQS, where it would be literally impossible for the states to meet an ambient standard, perhaps it might be "appropriate" for states to reduce their emissions by that percentage which, if matched by every other state and country on

420. *See* National Ambient Air Quality Standards for Ozone, 73 Fed. Reg. 16,436, 16,482-83 (Mar. 27, 2008).

421. Giovinazzo, *supra* note 11, at 162.

422. 42 U.S.C. § 7410(a)(2)(A) (2006).

423. *Id.*

424. Giovinazzo, *supra* note 11, at 99.

425. Whitman v. Am. Trucking Ass'n, 531 U.S. 457 (2001).

426. Giovinazzo, *supra* note 11, at 99-100.

427. *See id.* at 107-08.

earth, would reduce ambient concentrations to the level of the NAAQS. In this way, the impossible to meet ambient NAAQS standard could be translated into a more workable emissions budget for each state. Existing statutory authority and precedent would allow the EPA to translate the total emissions inventory of GHGs into an emissions budget for each state, providing each state the opportunity to design programs to meet the emission budget, and evolve the budget over time to reach a longer term goal.

Such a program could be modeled after the successful EPA NO_x SIP Call budgeting program. The EPA issues a SIP Call "[w]henever the applicable implementation plan for any area is substantially inadequate to attain or maintain the relevant [NAAQS]."[428] In a SIP Call notice, "[t]he Administrator shall require the State to revise the [SIP] as necessary to correct . . . inadequacies" preventing the state from attaining a NAAQS.[429] States submit amended SIPs within a reasonable time, not more than eighteen months.[430]

In implementing the 1992 ozone NAAQS standards, the EPA was faced with the challenge of reducing NO_x emissions from most of the states east of the Mississippi River. [431] Because of the nature of fuel combustion emissions, weather patterns, and close geographical proximity, NO_x emissions from downwind states interfered with regional ozone attainment.[432] As would be true for greenhouse gases, no single state was able to address its own, or its neighbors, ozone attainment without cooperation from upwind and downwind states.[433]

In response to this dilemma, the EPA issued the "NO_x SIP Call"[434] in 1998 to address ongoing ozone transport problems interfering with ozone NAAQS attainment throughout the eastern United States.[435]

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428. 42 U.S.C. § 7410(k)(5) (2010).

429. *Id.*

430. *Id.*

431. ENVTL. PROT. AGENCY, NO_x BUDGET TRADING PROGRAM – BASIC INFORMATION (2009), *available at* http://www.epa.gov/airmarkt/progsregs/nox/docs/NBPbasicinfo.pdf [hereinafter NO_x BUDGET TRADING PROGRAM].

432. *See* Michigan v. Envtl. Prot. Agency, 213 F.3d 663, 673 (D.C. Cir. 2000) (citing 42 U.S.C. § 7410(a)(2)(D)(i)(I) (2006)).

433. *See id.*

434. 40 C.F.R. § 96 (2010). This program was known as the "Ozone Transport Commission ("OTC") NO_x Budget Program" between 1999 and 2002.

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

EGUs and large industrial combustion sources, many of which were regulated under the acid rain program, were required to trade NO_x emissions within state-wide budgets.[436]

The EPA conducted a computer modeling study that correlated NO_x emissions from large industrial facilities in the covered states to ambient ozone levels throughout the covered region.[437] Using this study, the EPA evaluated what NO_x emissions reductions would be needed for these areas, mostly large population centers along the Atlantic seaboard and in the Great Lakes region, to attain the ozone NAAQS.[438] It then calculated the cost to achieve these emissions reductions, and determined that highly cost effective controls would achieve adequate emissions reductions from within the twenty-two states to allow downwind states to achieve the ozone NAAQS and comply with Section 110 requirements.[439] The EPA converted these maximum emissions levels determined in the modeling project into state NO_x emissions budgets.[440] Each participating state submitted a SIP document describing how the state would manage emissions within the budget.[441] In exchange for complying with the state specific budget, each participating state was deemed to have not "contribute[d] significantly to nonattainment in, or interfere[d] with maintenance by, any other state with respect to any such national primary or secondary ambient air quality standard."[442] Participating facilities decreased NO_x emissions by sixty-two percent between 2000-2008 and seventy-five percent between 1990-2008.[443]

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was replaced by the Clean Air Interstate Rule, which is now in the process of being replaced by the Clean Air Transport Rule. Discussion of the fate of the NO_x trading system is beyond the scope of this paper.

436. NO_x BUDGET TRADING PROGRAM, *supra* note 431, at 5.

437. *See Michigan*, 213 F.3d at 673.

438. Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for the Purposes of Reducing Transport of Ozone, 63 Fed. Reg. at 53,758.

439. *Id.*

440. *Id.*

441. Interstate Ozone Transport: Response to Court Decisions on the NOx SIP Call, NOx SIP Call Technical Amendments, and Section 126 Rules, 69 Fed. Reg. 21,604, 21,606-07 (Apr. 21, 2004).

442. *Michigan*, 213 F.3d at 671; *see id.* at 688.

443. ENVTL. PROT. AGENCY, THE NO_x BUDGET TRADING PROGRAM: 2008 EMISSION, COMPLIANCE, AND MARKET DATA 1 (2009), http://www.epa.gov/airmarkets/progress/NBP_1/NBP_2008_ECM_Data.pdf.

Similarly, the EPA could make a finding that states had met their GHG budgets were not "contributing significantly" to nonattainment with the GHG NAAQS in other states.[444]

This interstate NO_x trading program was legally justified as a component of the SIP attainment demonstrations in each of the twenty-two participating states.[445] One judicial review of the OTC NO_x Budget Program left the base program in place, vacating certain technical program details.[446] The EPA may implement trading programs within the SIP attainment demonstration process.[447] Similarly, for GHG purposes, the EPA could find that states that had met their GHG budgets were not "contributing significantly" to nonattainment with a GHG NAAQS in other states.[448]

The EPA could, once it determined that a state had met its GHG emissions budget, use its Section 179B authority to find that, but for international emissions, the state would attain the NAAQS.[449] The EPA may make such a finding if:

> the submitting State establishes to the satisfaction of the Administrator that the implementation plan of such state would be adequate to attain and maintain the relevant national ambient air quality standards by the attainment date supecified under the applicable provision of this chapter, or in a regulation promulgated under such

444. Interstate Ozone Transport: Response to Court Decisions on the NOx SIP Call, NOx SIP Call Technical Amendments, and Section 126 Rules, 69 Fed. Reg. at 21,606-07.

445. Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for the Purposes of Reducing Regional Transport of Ozone, 63 Fed. Reg. 53,758 (Oct. 27, 1998).

446. *See Michigan*, 213 F.3d at 695.

447. *See* Rule To Reduce Interstate Transport of Fine Particulate Matter and Ozone (Clean Air Interstate Rule); Revisions to Acid Rain Program; Revisions to the NO_x SIP Call, 70 Fed. Reg. 25,162, 25,174 (May 12, 2005).

448. *See* 42 U.S.C. § 7410(a)(2)(D)(ii) (2006).

449. *See* Sierra Club v. Envtl. Prot. Agency, 346 F.3d 955, 963 (9th Cir. 2003). The court found that international emissions could not have caused the particulate nonattainment in Imperial County, California based on a factual inquiry of the circumstances surrounding ambient air quality data. The court required EPA to show that all available evidence indicated that the state could not comply with the NAAQS because of international emissions. EPA failed to show that the emissions causing the NAAQS exceedance were emitted from outside the United States.

> provision, but for emissions emanating from outside of the United States.[450]

Such a finding would allow the EPA and the states to develop SIPs that restrain United States based emissions, recognize international emissions, and meet SIP obligations.

One state has attempted to invoke Section 179B before.[451] California's Imperial Valley, a region bordering Mexico east of San Diego, was declared a moderate nonattainment area under the 1987 PM NAAQS.[452] In 2001, California redesignated the Imperial Valley as an attainment area for the PM NAAQS.[453] The redesignation request, which the EPA published as a direct final NAAQS redesignation in the Federal Register, reasoned that, but for international particulate emissions, the Imperial Valley would have attained the NAAQS standard.[454] An environmental organization challenged the redesignation because domestic emissions contributed to the Imperial Valley PM attainment issues.[455] The Ninth Circuit Court of Appeals held that a state attempting to use Section 179B to demonstrate NAAQS attainment must develop adequate scientific evidence to show that international emissions caused the failure to attain the NAAQS.[456] Here the court held that California did not present adequate evidence that international emissions caused the ongoing nonattainment.[457]

This proposal would place less pressure on the nonattainment standards process described above. Such a system would provide the states and the EPA with more flexibility in setting GHG SIPs.[458] States meeting these budgets would, per Section 179B, be deemed in attainment with a GHG NAAQS. "[I]f a state could comply 'but for

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450. 42 U.S.C. § 7509a(a)(2) (2010).

451. *Sierra Club*, 346 F.3d at 957.

452. *Id.* at 958.

453. Revisions to the California State Implementation Plan, Kern County Air Pollution Control District and Imperial County Air Pollution Control District, 66 Fed. Reg. 42,126 (Aug. 10, 2001).

454. *Sierra Club*, 346 F.3d at 959 (*citing* Revisions to the California State Implementation Plan, Kern County Air Pollution Control District and Imperial County Air Pollution Control District: Direct Final Rule, 66 Fed. Reg. at 42,127).

455. *Id.* at 960.

456. *Id.* at 963.

457. *See id.*

458. *See* Giovinazzo, *supra* note 11, at 156.

emissions eminating from outside the United States,' then EPA can approve the jurisdiction's regulatory plan and avoid the sanctions."[459] This finding would not be necessary if the other major emitting countries around the world would enforce appropriate emissions reductions to reach a NAAQS level within the United States. However, because of the complexities involved with international negotiations, emission reduction programs outside the United States are beyond the scope of this paper.

2. Emissions Trading

Many authors have argued that economy-wide GHG trading would most efficiently and cost-effectively reduce GHG emissions.[460] The question arises whether such a trading program could be made part of EPA's NAAQS/SIP regulatory scheme. A properly designed emission trading program should minimize compliance cost by encouraging cost-effective emissions reductions, regardless of the regulatory status of the source of the emissions.[461] As additional emissions reductions are required to meet a declining emissions cap, the cost-effective emissions reduction threshold adjusts to provide a market signal for additional emission reductions from those in the best financial position to reduce emissions.[462]

As described above, trading exists in the existing CAA, in the nonattainment NSR permitting program, Acid Rain, NO_x SIP Call, and the HCFC program.[463] These trading programs include a reasonable number of participants, from dozens in HCFC trading to a few thousand in the NO_x SIP Call and Acid Rain programs.[464] These programs have been shown effective and within EPA's management

459. McCubbin, *supra* note 11, at 464.

460. *See, e.g., id.*

461. *See* Richardson, *supra* note 11, at 298.

462. See Stavins, supra note 369 at 298-99

463. 42 U.S.C. § 7503 (2006); 42 U.S.C. §§ 7651-7651(o) (2006); Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for the Purposes of Reducing Regional Transport of Ozone, 63 Fed. Reg. 57,356 (Oct. 27, 1998); 42 U.S.C. §§ 7671-7671p (2006).

464. Protection of Stratospheric Ozone: Adjustments to the Allowance System for Controlling HCFC Production, Import, and Export, 73 Fed. Reg. 78,680, 78,694 (Dec. 23, 2008); Nordhaus & Danish, *supra* note 40606, at 129-30.

capabilities.[465] However, a trading system can only properly function with members on approximately equal footing, where industrial users exist in one market removed from smaller, less sophisticated actors like homeowners and automobile drivers.

GHGs are emitted from every corner of modern society, including electricity generation, home heating, transportation, landfills, and many other daily activities.[466] GHG regulation would necessarily impact virtually the entire economy, from the largest industrial facility to the family car to the smallest outdoor barbeque grill. Regulating this variety of sources would require a comprehensive approach. Piecemeal regulation will necessarily miss many emissions sources.

To reach this variety of emissions sources, and thereby make a program's coverage as close to economy-wide as possible, many of these authors have proposed economy-wide trading systems that regulates "upstream" emissions.[467] An upstream program regulates inputs resulting in emissions, such as fuel supplies powering cars, homes, and industrial facilities.[468] Millions of cars and homes emit GHGs from normal operation.[469] Because of the complexities associated with involving millions of individuals in emissions trading, in an upstream system, all trading would occur at the point of fuel supply.[470] Assuming that effectively all fuels purchased are consumed for heat or power, upstream trading would capture all fuel combustion related GHG emissions. Upstream regulation would fit the homeowner and automobile sectors, as these GHG emissions are predictably related to fuel usage, and individuals almost always

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465. *See 2008 Emission, Compliance, and Market Analyses*, ENVTL. PROT. AGENCY, http://www.epa.gov/airmarkt/progress/ARP_2.html (last visited May 20, 2011).

466. ENVTL. PROT. AGENCY, DRAFT INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2009 ES-4 to ES-16 (2011), *available at* http://epa.gov/climatechange/emissions/downloads11/US-GHG-Inventory-2011-Complete_Report.pdf.

467. *See, e.g.*, McKinstry, *supra* note 12, at 785-86; Nordhaus & Danish, *supra* note 406, at 129-30; Reitze, *supra* note 8, at 24-25.

468. David M. Driesen & Amy Sinden, *The Missing Instrument: Dirty Input Limits*, 33 HARV. ENVTL. L. REV. 65, 80-81 (2009).

469. Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, 75 Fed. Reg. 25,324 (May 7, 2010); COMPILATION OF AIR POLLUTANT FACTORS, *supra* note 145, at 1.4-1.6.

470. *See id.*

purchase natural gas, heating oil, and gasoline to burn it for its intended purpose.[471]

Some problems arise in an upstream system, since not all fuel produced upstream ends up being burned to release GHGs downstream.[472] Many industrial facilities do not burn all of their purchased fuel or fuel-like materials. Several manufacturing processes utilize fuels as raw materials to manufacture other goods.[473] Emissions, including CO_2, from fuel combustion can also vary by the size, age, design, and maintenance of each large fuel combustion device.[474] Some industrial operations create and emit CO_2 or other GHGs under normal operations, unrelated to fuel use, which would escape upstream fuel usage regulation.[475] Industrial facilities typically are better able to determine direct emissions, and therefore should be capable of direct GHG emissions reporting.[476] Direct reporting of industrial facility fuel use and combustion, already partially in place in the Part 98 GHG reporting system,[477] would help alleviate this issue. Therefore, because upstream activity may not accurately predict industrial GHG emissions, many commentators have proposed a split upstream/downstream hybrid GHG trading system that would regulate industrial emission downstream and

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471. *See id.*

472. Nordhaus & Danish, *supra* note 406, at 128-29.

473. For example, hydrogen steam reformers use natural gas to manufacture hydrogen, used in a variety of applications, such as removing sulfur from gasoline. *See* HYDROGEN LEARNING CTR., EDWARD J. BLOUSTEIN SCH. OF PLANNING AND PUB. POLICY, HYDROGEN PRODUCTION 1 (2008), http://policy.rutgers.edu/ceeep/hydrogen/basics/production.php (last visited Apr. 18, 2011).

474. *See, e.g.*, National Emission Standards for Hazardous Air Pollutants for Area Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters, 76 Fed. Reg. 15,554, 15,573-74 (Mar. 21, 2011). EPA requires energy assessments because of operating variability among boilers over time.

475. For example, CO_2 is created as a byproduct of the hydrogen steam reformation process. *See* HYDROGEN LEARNING CTR., *supra* note 473.

476. The largest 10,000 GHG emitting facilities begin GHG reporting in 2011 for calendar year 2010 emissions. *See* News Release, ENVTL. PROT. AGENCY, EPA Finalizes the Nation's First Greenhouse Gas Reporting System/Monitoring to Begin in 2010 (Sept. 22, 2009), *available at* http://yosemite.epa.gov/opa/admpress.nsf/d985312f6895893b852574ac005f1e40/194e412153fcffea8525763900530d75!OpenDocument.

477. 40 C.F.R. § 98 (2011).

transportation and home heating emissions upstream.[478] The systems being considered in Congress during 2010 followed the hybrid model.[479]

a. Implementing a Downstream GHG Emissions Trading System for the Electricity and Industrial sectors Through the NAAQS/SIP Process

States may, under existing SIP requirements, incorporate the existing Section 110 SIP authority to build "economic incentives such as fees, marketable permits, and auctions of emissions rights" into SIP plans.[480] Some states have accepted this Congressional invitation to create state based trading programs, such as the Texas Commission on Environmental Quality ("TCEQ") Highly Reactive Volatile Organic Compound[481] program and the South Coast Air Quality Management District ("South Coast") RECLAIM trading programs.[482] These trading programs complement existing EPA, state, and local programs to achieve cost effective VOC emissions reductions within local ozone nonattainment areas.

Just as TCEQ and South Coast have used trading to reduce VOC emissions, states could implement trading systems within their SIPs to reduce GHG emissions. However, these state-based trading programs address localized problems, and have not been extended beyond their local coverage areas in the Houston and Los Angeles metropolitan areas. An effective and efficient GHG trading system should cover the entire country, preferably one either operated by or coordinated through the EPA. State or regional trading systems could effectively manage a subset of GHG emissions within their boundaries, but would likely not provide the variety of trading opportunities a national trading program might.

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478. *See, e.g.*, Nordhaus & Danish, *supra* note 406, at 129-30; Stavins, *supra* note 369, at 309-10.

479. PEW CENTER ON GLOBAL CLIMATE CHANGE, *supra* note 355, at 1.

480. 42 U.S.C. § 7410(d)(2)(A) (2010).

481. *HRVOC Emissions Cap and Trade Program*, TEXAS COMM'N ON ENVTL. QUALITY, http://www.tceq.state.tx.us/implementation/air/banking/hrvoc_ept_prog.html (last visited May 20, 2011).

482. *Regional Clean Air Incentives Market*, S. COAST AIR QUALITY MGMT. DIST., http://www.aqmd.gov/reclaim/index.htm (last visited Apr. 30, 2011).

i. NO_x SIP Call As A Model

The NO_x SIP call could serve as a model for a stationary source GHG trading program, or a framework in which the EPA could incorporate existing GHG trading programs through the SIP process. The EPA used NO_x SIP Call trading to allocate limited emissions budgets over the twenty-two state program area to assist the states in attaining the ozone NAAQS.[483] The EPA found that, by participating in the NO_x SIP Call, states would not cause or contribute to downwind ozone nonattainment problems.[484] As explained below, each state allocates emissions within its budget to avoid federalism problems concerning how states construct SIPs.[485] The EPA could construct a similar system to allocate GHG emissions. First, the EPA and the states would establish a national GHG emissions budget. The EPA would then, as it had in the NO_x SIP Call process, convert the emissions into state budgets in a GHG NAAQS implementation rule, and call states to submit SIPs in conformance with the state budgets.

The existing SIP system could be adapted to allow for emissions trading, in a manner not significantly different than proposed in the literature, without further Congressional action. Any trading system will need long term planning to provide a stable market for facilities to make rational investment decisions.[486] Long term NAAQS planning, with the EPA setting a cap with each five year NAAQS review, would facilitate a predicable system to allow rational decision making.

The downstream trading program will not capture many smaller industrial sources or any commercial and residential GHG emissions sources.[487] The EPA would need a size cutoff, an emissions level below which the source would not participate in the trading program. The EPA has identified a 25,000 metric TPY ("mTPY") reporting threshold in the Climate Change Reporting Rule, which could be used as a trading threshold.

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

484. *Id.* at 57,358.

485. Virginia v. Envtl. Prot. Agency, 108 F.3d 1397, 1415 (D.C. Cir. 1997).

486. Stavins, *supra* note 369, at 299. Carbon taxes or other systems could provide a level of regulatory stability, but do not easily translate into verifiable emissions reductions. Carbon tax details are beyond the scope of this paper.

487. *Id.* at 311.

Some states have implemented regional GHG emissions trading systems. The EPA could develop a trading approach where the EPA coordinates regional trading systems as part of a national trading coordination program. Several states already participate in the Regional Greenhouse Gas Initiative ("RGGI") GHG trading system.[488] Affected sources in member states, including EGU's, trade CO_2 allowances within a regional market.[489] Like the proposal above, RGGI does not include any upstream sources, smaller downstream sources, or GHGs other than CO_2.[490] The EPA could allow, or encourage, states to build RGGI type systems into their SIP demonstrations. However, the EPA and RGGI sponsor states would need to coordinate the RGGI caps with the new state GHG emissions budgets to provide the appropriate emissions constraints in the system.[491] If the RGGI caps were more lenient than the new state emissions budgets, states would need to adjust their RGGI caps to conform to the new budgets or develop alternate emissions reduction strategies in other sectors of the economy.

ii. Federalism Concerns

The SIP process, by the state submittal and EPA review process, requires cooperation between the state and federal governments.[492] The EPA may not, in the first instance, dictate SIP emissions reduction programs to the states.[493]

"EPA may not, under [S]ection 110, condition approval of a state's implementation plan on the state's adoption of a particular control measure."[494] The EPA may only work with states choosing to

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488. REG'L GREENHOUSE GAS INITIATIVE, http://www.rggi.org/home (last visited May 20, 2011).

489. REG'L GREENHOUSE GAS INITIATIVE, OVERVIEW OF RGGI CO_2 BUDGET TRADING PROGRAM 1 (2007), http://www.rggi.org/docs/program_summary_10_07.pdf.

490. *See generally* REG'L GREENHOUSE GAS INITIATIVE, REG'L GREENHOUSE GAS INITIATIVE MODEL RULE (2007), *available at* http://www.rggi.org/docs/model_rule_corrected_1_5_07.pdf.

491. *See, e.g.*, John C. Dernbach et al., *Making the States Full Partners In A National Climate Change Effort: A Necessary Element For Sustainable Economic Development*, 40 ENVTL. L. REP. 10,597, 10,597-98 (2010).

492. McKinstry, *supra* note 12, at 780-82.

493. Virginia v. Envtl. Prot. Agency, 108 F.3d 1397, 1415 (D.C. Cir. 1997).

494. *Id.*

implement certain controls.[495] "The states are responsible in the first instance for meeting the [NAAQS] through state-designed plans that provide for attainment, maintenance, and enforcement of the [NAAQS] in each [AQCR]."[496] A voluntary system allowing states to opt into a trading program, modeled after the voluntary NO_x SIP Call, and would satisfy the cooperative federalism requirement in *Virginia v. EPA*.[497] States could also propose another method to manage its share of GHG emissions and submit an approvable SIP.

If the EPA were to take this approach, it would need to introduce these concepts no later than during the NAAQS SIP implementation process. After promulgating a NAAQS, the EPA develops a regulation describing how each state should customize their SIP process for that NAAQS standard.[498] In an implementation rule, the EPA sets forth common ambient air quality monitoring methods, permitting practices, and air quality planning needed to maintain NAAQS compliance and PSD compliance.[499] These implementation rules also become part of any SIP demonstration.[500] By including trading proposals in a GHG NAAQS implementation rule, the EPA would provide guidance to the states forming their GHG SIP plans.

b. Implementing a Upstream Emissions Trading System For the Transportation Section

The trading system proposed above cannot reach every source. In 2009, the United States direct energy usage breakdown was approximately 40% electricity generation, 29% transportation, 20% industrial, 4% commercial, and 7% residential.[501] The downstream trading program described above would capture just over half of energy consumption by including the electricity generation and large

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495. *Id.*

496. *Id.* at 1410 (citing Natural Res. Def. Council v. Browner, 57 F.3d 1122, 1123 (D.C. Cir. 1995)).

497. *Id.*

498. 42 U.S.C. § 7471 (2010).

499. *See* Implementation of the New Source Review (NSR) Program for Particulate Matter Less Than 2.5 Micrometers ($PM_{2.5}$), 73 Fed. Reg. 28,321 (proposed May 16, 2008) (to be codified at 40 C.F.R. pts. 51 and 52).

500. *Id.* at 28,322.

501. ENERGY INFO. ADMIN., MAY 2011 MONTHLY ENERGY REVIEW, DOE/EIA-0035 3 (2011), *available at* http://www.eia.gov/totalenergy/data/monthly/pdf/mer.pdf.

industrial energy users. Several commentators have suggested capturing emission from the transportation sector in a cap-and-trade program by moving the point of regulation for that segment of the economy upstream.[502] The EPA could do just that using its Section 211 authority to complement the downstream trading program described above with an "upstream" trading program to regulate the amount of motor vehicle fuels introduced into the economy.[503]

Under Section 211(c):

> The Administrator may . . . control or prohibit the manufacture, introduction into commerce, offering for sale, or sale of any fuel or fuel additive for use in a motor vehicle, motor vehicle engine, or nonroad engine or nonroad vehicle if in the judgment of the Administrator any emission product of such fuel or fuel additive causes, or contributes, to air pollution which may reasonably be anticipated to endanger the public health or welfare.[504]

While this provision does not mandate regulation, it clearly gives the EPA broad authority to use almost any means to regulate motor vehicle fuel to limit emissions endangering human health or welfare if it wants to. The EPA found that GHGs endanger human health or welfare under a very similar Section 202 endangerment provision,[505] and could easily use the same information to make a GHG endangerment finding under Section 211. Once the endangerment finding is made, the phrase "control or prohibit" gives the EPA very broad authority to regulate vehicle fuels using almost any regulatory mechanism.[506] The EPA could, for example, create an upstream trading program, which would require producers and importers of transportation fuels to obtain a tradable allowance for each unit of fuel they introduce into the United States market.

The EPA used this authority once before to implement a trading program, as a mechanism to phase out the use of lead additive in

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502. Driesen & Sinden, *supra* note 468, at 80-81.

503. CHETTIAR & SCHWARTZ, *supra* note 202, at 77-78.

504. 42 U.S.C. § 7545(c)(1) (2010).

505. Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. § 66,496 (Dec. 15, 2009).

506. Richardson, *supra* note 12, at 289-90.

gasoline during the 1970s.[507] In the lead trading program, petroleum refiners were allowed to trade lead additive allowances during the control period, so long as the average lead content in gasoline met cap limits across an entire refinery.[508] This trading system allowed manufacturers needing more time to reduce, and then eventually eliminate, gasoline lead additives to implement long lead time projects to adapt to lead free gasoline manufacturing.[509]

A Section 211 trading program could be used to cap mobile source emissions to complement the downstream trading program for power plants and large industrial sources described above.[510] An upstream trading system should include as many sources of fuel as possible to maximize program coverage.[511] Otherwise, owners could switch from regulated and supply limited fuels to unregulated and freely available fuels.[512]

Using Section 211 authority to regulate the total fuel supply would complement the existing Section 202 GHG regulatory program now regulating GHG emissions from new automobiles. Section 202 standards regulate the mass emission rate of a pollutant from a vehicle mile traveled ("VMT"), and not total emission from any single vehicle in a year or in the lifetime of any single vehicle.[513] Because the EPA has no Section 202 authority to regulate how many miles an individual drives their car, the EPA could not regulate total mobile source GHG emissions from any single car, or all cars and trucks through the entire country, in any year, with a Section 202 program. Accordingly, Section 202 standards would not completely constrain mobile source GHG emissions, and budgeted GHG emissions could grow even as per mile emissions decline over time.

Should the EPA be interested in upstream regulation, it could construct an allowance system similar to a proposal recently passing

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507. Regulation of Fuel and Fuel Additives, 38 Fed. Reg. 1,258 (proposed Jan. 10, 1973) (to be codified at 40 C.F.R. pt. 80).

508. Reitze, *supra* note 8, at 26.

509. *Id.*

510. *See* discussion *supra* Part I.H.

511. Stavins, *supra* note 369, at 311.

512. *Id.*

513. Reitze, *supra* note 8, at 70. States typically regulate motor vehicle emissions from existing vehicles from implementation and maintenance plans required of nonattainment areas. *See* 42 U.S.C.§ 7511a(a)(2)(B) (2006) (vehicle emissions testing in marginal nonattainment areas).

the House of Representatives.[514] The EPA would then adjust the fuel supply cap over time in response to NAAQS attainment needs. States would participate in the process by including the Section 211 program as part of their SIP submittals, taking credit for emission reductions from all mobile source programs.

c. Gaps In a SIP Trading System

As described above, the proposed trading system would not capture all GHG sources within the economy.[515] Several existing EPA programs could help fill these gaps by promoting emission reductions and stabilizing emission rates from these activities.

i. Residential and Commercial Sources

Neither the upstream nor the downstream trading programs described above would reach emissions from home heating units, which comprise seven percent of total United States energy demand.[516] Section 211, regulating mobile source fuels, cannot reach fuels used in homes, offices, and other buildings.[517] Additionally, the downstream program proposed above would not reach sources below a certain threshold, perhaps, 25,000 tons/year.[518] Such a program may be achievable as part of the SIP process, where states would be required to include a stationary source fuels budget in their GHG NAAQS SIP submittals using the process described above.

States may use their SIP regulatory programs to impose emissions limits on smaller stationary residential and commercial combustion units.[519] However, regulating individual homeowners and businesses

514. PEW CENTER ON GLOBAL CLIMATE CHANGE, *supra* note 355, at 1.

515. *See* discussion *supra* Part III.A.2.b.

516. ENERGY INFO. ADMIN., ANNUAL ENERGY REVIEW 2009, *available at* http://www.eia.doe.gov/aer/pdf/pages/sec2_6.pdf. For year 2009, the last year of data available, primary residential energy consumption was 6,606 trillion British Thermal Units ("BTU"), compared with 94, 578 trillion BTU, or seven percent.

517. 42 U.S.C. § 7545(c)(1) (2006). Section 211 regulation is limited to fuels and fuel additives.

518. *See e.g.*, 40 C.F.R. § 98.2(a)(3)(iii) (2010). In the Climate Change Reporting Rule, EPA used 25,000 tons per year as a reporting cutoff for several source categories. Such a threshold would be consistent with the existing EPA reporting system.

519. 42 U.S.C. § 7410(a)(2)(A) (2006). States may limit emissions for all types of units.

would be cumbersome, if not impossible. The EPA could attempt to propose an economy-wide fuel limitation structure for these sources if all states would agree to participate. But as the states are primarily responsible for regulating smaller emissions sources within the SIP system, any state not opting into a common scheme for smaller GHG sources would bring about the collapse of the entire system. A comprehensive emissions management system relies on full participation, and if a larger state were to opt out, the other states may not be able to make up the difference to reach national goals. If even one state did not agree to a residential heating budget process, the EPA would then likely rely on existing authority to limit emissions from these smaller and dispersed sources. This authority, which regulates equipment design but not fuel inputs, would have limited impact on total GHG emissions.

ii. New Source Performance Standards

Several smaller GHG emissions source categories, such as residential wood stoves, would still not be included in the regulatory scheme described above, except for state SIP provisions.[520] The EPA uses the NSPS program to regulate new sources in specific source categories that other federal programs would not typically reach.[521] The EPA could rely on the NSPS program to limit GHG emissions from certain source categories, such as smaller fuel combustion units and landfills, which would not otherwise be included in the trading program outlined above. NSPS standards would help address smaller sources, which states would need to address under their SIP authority, as discussed above.

1. Wood Stoves

For example, the EPA currently regulates residential wood stove emissions under a NSPS standard that sets manufacturing design standards for new wood stoves.[522] Most wood stove fuel is harvested locally, either by the stove owner or within local, sometimes

520. *Id.*

521. *See*, e.g., 40 C.F.R. 60 Subpart AAA (2010). For example, the wood stove NSPS regulates an entire industry of mostly residential wood burning appliances. 42 U.S.C. § 7411(b)(1)(A) (2006) allows EPA to list source categories, without regard to the types of pollutants emitted from any specific category.

522. 40 C.F.R. §§ 60.530-539b (2010).

informal,[523] markets outside the reach of state or federal regulators. Therefore, upstream regulation of the fuel would not be practical. End-of-pipe regulation of wood stove emissions[524] where EPA would require individual owners to measure emission rates from individual wood stoves, would be impossible[525] given the number of stoves in service, the wide geographic distribution of these devices, and the small amount of emissions from a properly designed wood stove relative to other emissions sources the EPA regulates in the NSPS program. The EPA compensates for this inability to regulate actual emissions by regulating how wood stoves are built.[526] The emissions authorization for each new wood stove is a plate affixed to the side of each wood stove introduced to United States commerce.[527]

If the EPA uses NSPS authority for GHGs, it should follow its wood stove NSPS[528] approach for commonly marketed source categories, such as home and commercial heating units, boilers, and backup power generation engines. This approach would allow the EPA to set minimum design standards for common fuel using appliances, reducing GHG emissions to reasonably achievable levels without end user involvement. Because the EPA can only regulate transportation-related upstream activity in a trading system,[529] NSPS point of design standards would complement upstream trading by reducing, over time, fuel demand on a per unit basis. These reductions would help reduce total demand, easing end user burdens.

2. Solid Waste Landfills

Another significant source of GHG emissions that the economy wide trading system would miss is solid waste landfills.[530] These

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523. *Q&A About Firewood*, WOODHEAT.ORG, http://woodheat.org/qa-firewood.html (last visited May 20, 2011). Firewood sources include personal supplies, used pallets, or purchased firewood supplies.

524. 40 C.F.R. § 60.8 (2010).

525. *Id.*

526. 40 C.F.R. § 60.533 (2010).

527. 40 C.F.R. § 60.536(b) (2010). The Army Corps of Engineers and EPA use a similar approach in the "Nationwide" or General Permit program authorizing common wetlands construction under 33 C.F.R. § 330 (2010).

528. 40 C.F.R. §§ 60.530-539b (2010).

529. Stavins, *supra* note 369, at 312-14.

530. Nordhaus & Danish, *supra* note 406, at 129-30. These authors envision a trading program with only a few thousand sources.

have been identified as a substantial source of GHG emissions during, and long after, their service lives.[531] But most landfills emit less than 25,000 mTPY GHGs, and would likely fall outside any large source trading program.[532] The EPA operates an outreach program encouraging landfill owners and operators to install electricity generation units to consume landfill gas, reducing overall GHG emissions,[533] but GHG emissions from landfills remain substantial.

Some authors propose capturing these sources in offset programs, where interested parties control emissions from sources outside the regulatory system to obtain credits to emit GHGs from sources within the program.[534] Because many landfills are closed, and closed landfills emit GHGs long after closure,[535] an offset program could provide capital to unfunded or underfunded landfill owners to implement GHG reduction projects. However, the EPA should consider using its existing regulatory authority to manage GHG emissions from new or operating landfills subject to the existing landfill NSPS.[536] Using the existing NSPS to control GHGs would provide a design standard for landfill owners and operators to use when implementing GHG reduction projects. The EPA could implement both landfill offsets for closed landfills and landfill NSPS GHG regulations for operating landfills already complying with the landfill NSPS.

iii. New Source Review

The NSR system, regulating new and modified major sources of criteria pollutants, would continue in force under this proposal.[537] CAA Sections 165 and 169 require the EPA to continue to implement

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531. John Rather, *Tapping Power From Trash*, N.Y. TIMES, Sep. 14, 2008, at NJ3.

532. ENVTL. PROT. AGENCY, TECHNICAL SUPPORT DOCUMENT FOR THE LANDFILL SECTOR: PROPOSED RULE FOR MANDATORY REPORTING OF GREENHOUSE GASSES 6-8 (2009), *available at* http://www.epa.gov/climatechange/emissions/downloads/tsd/TSD Landfills_EPA_02 04 09_2.pdf.

533. *Landfill Methane Outreach Program*, ENVL. PROT. AGENCY, http://www.epa.gov/lmop/index.html (last visited May 17, 2011).

534. Nordhaus & Danish, *supra* note 406, at 113-14.

535. Rather, *supra* note 531.

536. 40 C.F.R. §§ 60.750-759 (2010).

537. 40 C.F.R. § 52.21 (2011).

the PSD and nonattainment NSR permitting programs for all regulated air pollutants, regardless of the presence or absence of an emissions trading program.[538] As part of any trading implementation program, the EPA should evaluate if a trading program can satisfy the BACT and/or LAER emission control requirements. The EPA should also consider if, under a declining emissions budget scenario, nonattainment emissions offsets would be necessary, or if offsets would be inherently incorporated into the trading program. New sources would be required to obtain allowances under the declining cap to cover new emissions, just like a facility seeking offsets in a nonattainment area must obtain emissions offsets today.[539]

iv. Refrigerants

GHG emissions from refrigerant leaks would also not be covered in the potential trading system identified above.[540] HCFCs, the most common refrigerants in use today, are GHGs and contribute to ozone degradation.[541] HFCs exhibit a very small, but calculated, ODP.[542] Millions of residential, commercial, industrial, and motor vehicles use small refrigeration appliances filled with a few pounds of refrigerant to cool indoor space or car cabins.[543] As HCFC refrigerants are phased out over the next decade due to the Montreal Protocol, HFC refrigerants will replace HCFCs in most refrigeration equipment.[544] Even with the large GWPs of common refrigerants, a typical home unit, charged with three to five pounds of R-134a, one

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538. 42 U.S.C. § 7475(a) (2006); 42 U.S.C.A. § 7479(1) (2006).

539. 42 U.S.C. § 7503(c) (2006).

540. *See* discussion *supra* Part I.H.

541. UNITED NATIONS FRAMEWORK CONVENTION FOR CLIMATE CHANGE (UNFCCC), METHODOLOGICAL ISSUES RELATING TO HYDROFLUOROCARBONS AND PERFLUOROCARBONS, http://unfccc.int/methods_and_science/other_methodological_issues/items/2311.php (last visited May 17, 2011).

542. A. R. Ravishankara et.al., *Do Hydrofluorocarbons Destroy Stratospheric Ozone?*, 263 SCI. 71, 75 (1994). The R-134a ODP was published at between 1 x 10^{-5} and 2 x 10^{-5}, where R-11 has an ODP value of 1.

543. *Recharging Your Car's Air Conditioner With Refrigerant*, ENVTL. PROT. AGENCY, http://www.epa.gov/ozone/title6/609/recharge.html (last visited May 20, 2011). Automobile refrigerant charges can vary between 1.8 and 2.2 pounds per vehicle.

544. Protection of Stratospheric Ozone: Ban on the Sale or Distribution of Pre-Charged Appliances, 74 Fed. Reg. 66,463 (proposed Dec. 15, 2009) (to be codified at 40 C.F.R. pt. 82).

of the HFC refrigerants replacing HCFC refrigerants in many applications,[545] would only potentially emit less than five tons of CO_2e if the entire refrigerant charge were lost.[546] No major source regulatory program can possibly reach hundreds of millions of these small appliances in service in almost every home, office, and car.

The Title VI upstream HCFC trading program could be used for trading a limited subset of GHGs. The EPA may have sufficient authority today, using its refrigerant replacement authority to partially regulate HFCs used as CFC and HCFC replacements in the refrigeration markets. The EPA has the authority to add to the Class II ODP list any compound "that the Administrator finds is known or may reasonably be anticipated to cause or contribute to harmful effects on the stratospheric ozone layer."[547] As CAA Title VI phases out the existing Class I and Class II compounds, compounds with lesser ODP values may become more important in managing the stratospheric ozone problem. Listing HFCs as Class II compounds, even with the expected very small ODP values, would allow the EPA to apply Class II authority, including the statutory trading system, to HFCs. This upstream component would allow the EPA to manage GHG emissions from the refrigeration and air conditioning market segments without unduly burdening end users.

d. Trading Program Implementation

By using the SIP stationary source and Section 211 fuels cap-and-trade approach, the EPA could essentially implement much of what Congress came close to enacting, but did not enact, in 2010.[548] The substantial difference between an EPA managed program and a Congressional program is that the EPA would be required, because of the five year NAAQS review, to periodically revisit and tailor its SIP based programs to address contemporary and emerging public health

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545. James M. Calm & Pitor A. Domanski, *R-22 Replacement Status*, 46 ASHRAE J. 29 (2004), *available at* http://www.fire.nist.gov/bfrlpubs/build04/PDF/b04049.pdf.

546. *Global Warming Potentials of ODS Substitutes*, ENVTL. PROT. AGENCY, http://www.epa.gov/ozone/geninfo/gwps.html (last visited Apr. 30, 2011). R-134a has a GWP of 1,300. A typical five pound charge in a home air conditioner has a GWP of 6,500 pounds CO2e, or three tons.

547. 42 U.S.C. § 7671a(b) (2006).

548. Hulse & Herszenhorn, *supra* note 10.

and welfare threats.[549] The 2009 cap-and-trade bills in Congress would have set statutory emissions caps for the next forty years.[550]

For existing criteria pollutants, Congress provided detailed guidance to the EPA for addressing NAAQS attainment.[551] Because no such detailed legislative guidance exists concerning implementing any GHG NAAQS, the EPA would act, absent further Congressional instruction, at its own discretion and under substantial judicial oversight. The EPA would need to exercise caution in choosing how it regulates GHGs within it is other programs.

If properly crafted, the EPA program could provide adequate flexibility to balance out the expected economic challenges that any transformative program must include.[552] The EPA could evaluate the ongoing technology forcing inherent in CAA regulations, and periodically adjust the regulatory programs to the available technology, emission reductions from other regulations, and international factors discussed below. Congress can always assert its authority if the EPA overreaches or doesn't achieve adequate emissions reductions over time.[553]

While this authority uses the inherent SIP program flexibility, it can only work if the EPA utilizes its authority to exclude international contributions to GHG nonattainment. Otherwise, the nonattainment sanctions continue until Congress amends the CAA. Absent sanctions avoided in this system, the EPA should be able to, with the states, design a workable NAAQS system to guide the country through the GHG emissions reductions process without causing the worst case scenarios envisioned by some.

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549. 42 U.S.C. § 7409(d)(1) (2006).

550. H.R. 2454, 111th Congress § 721(e)(1) (2009).

551. 42 U.S.C. §§ 7511-7515 (2006). Congress provided detailed NAAQS demonstration programs in the 1990 Amendments. These "Subpart 2" provisions are not binding on EPA except for the named pollutants, and often do not translate well from one pollutant to another. Consideration of Subpart 2 programs for GHGs is beyond the scope of this paper.

552. Several details concerning trading programs, such as allowance distribution systems, offsets, credits, and international trading, are beyond the scope of this paper.

553. Massachusetts v. Envtl. Prot. Agency, 415 F.3d 50, 81 (D.C. Cir. 2005), *rev'd* 549 U.S. 497 (2007).

CONCLUSION

The EPA likely remains vulnerable to a challenge from private organizations requesting promulgation of a GHG NAAQS. Precedent suggests that the EPA may have no discretion in setting a GHG NAAQS given the recent Section 202 endangerment finding and subsequent mobile source GHG regulation.[554] The EPA clearly has the authority today to set a GHG NAAQS, and should exercise that authority to begin the process of reducing GHG emissions to stabilize long term global mean temperatures over time.

The EPA would not likely be able to set a primary GHG NAAQS below current ambient CO_2 concentrations. However, because evidence of adverse impacts due to climate change may have already begun, the EPA could conceivably set a secondary GHG NAAQS at or below current ambient CO_2 concentrations. Were the primary NAAQS to reach a level where the entire United States would not attain the standard, the EPA has legal authority under Section 179B to approve SIPs where states, but for emissions emanating from other countries, would attain a NAAQS. While setting a primary NAAQS below current ambient levels would, in time, invoke automatic CAA sanctions, long term secondary NAAQS nonattainment would not involve such punitive sanctions.

As part of the NAAQS implementation process, the EPA would be able to use several existing authorities to limit GHG emissions from several sectors. The EPA could establish both downstream (stationary source) and upstream (mobile source) emissions budgeting and trading programs as part of the SIP process. The EPA already regulates mobile source GHGs from light duty vehicles, and could extend GHG regulation to other mobile sources. The NSPS program could limit GHG emissions from new stationary sources. The EPA could modify the ODS program to address HFC refrigerant emissions. In setting a GHG NAAQS, EPA would preclude GHG regulation in the MACT program. Barring judicial or legislative directives, GHG PSD will begin in 2011.

The proposed GHG regulatory program would honor Congressional precautionary intent to protect human health and welfare from adverse impacts of air pollution. This program, once

554. Natural Res. Def. Council, Inc. v. Train, 545 F.2d 320, 327-28 (2d Cir. 1976).

fully developed, would provide regulatory certainty in the long journey to stabilize long term planetary temperatures by reducing GHG emissions over the next century while providing flexibility to customize compliance strategies over time.