ENERGY LAW JOURNAL

Volume 33, No. 2 2012

MODERNIZING THE CLEAN AIR ACT: IS THERE LIFE AFTER 40?

*Robert R. Nordhaus**

Synopsis: The Clean Air Act (CAA or "the Act"), as it was fashioned in 1970 and revised in 1977 and 1990, was a major environmental law milestone that became the model, in whole or part, for virtually every subsequent federal environmental statute. It has clearly reduced emissions and improved air quality. There are, however, a number of fundamental design flaws and structural limitations in the original statutory scheme, its subsequent amendments, and its administration that have limited the CAA's effectiveness in protecting public health, driven up compliance costs, and spawned political controversy and litigation. These design issues include the "grandfathering" policies, over-reliance on state implementation plans to carry out much of the regulatory system, the Act's interstate transport provisions and the "layering" of overlapping regulatory requirements on the same source. This article reviews these design issues and suggests two alternatives that could make the regulatory system more effective, reduce the extent to which regulatory outcomes are dependent on litigation, and increase the cost-effectiveness of air quality regulation. The first alternative would refine and streamline the Act's multiple existing regulatory programs; the second would fundamentally restructure the statute to eliminate a number of overlapping or redundant regulatory requirements, clarify the respective roles of the EPA and the states, expand emissions trading authority, and accommodate greenhouse gas regulation.

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* Partner, Van Ness Feldman, LLP; Professorial Lecturer in Law, George Washington University Law School. Views expressed in this article are the author's and do not represent those of Van Ness Feldman or its clients. The author wishes to thank Stephen Fotis, Kyle Danish, Leroy Paddock, and Kaitlin Gregg for their thoughtful comments.

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I. INTRODUCTION

The fortieth anniversary of the enactment of the modern Clean Air Act[1] – 2010 – produced a blizzard of retrospective reviews of the Act focusing on its innovative design, its successful reduction in emissions and its improvements of air quality. The Act, as it was fashioned in 1970 and revised in 1977 and 1990, undeniably was a major environmental law milestone. It provided clear requirements for development and implementation of federal ambient air quality standards, new source performance standards, hazardous air pollutant regulation, and tailpipe standards for mobile sources. It also included statutory deadlines, publicly available monitoring reports, and provisions for citizens' suits, as well as far-reaching federal and state enforcement provisions. Its design became the model, in whole or part, for virtually every subsequent federal environmental statute[2] and it undeniably has reduced emissions and improved air quality.[3]

The 2010 mid-term congressional election and an ambitious Environmental Protection Agency (EPA) CAA rulemaking agenda (characterized as the "train wreck" by its electric utility opponents)[4] brought a less supportive reaction from Capitol Hill in 2011 and 2012. The House passed (and the Senate refused to consider) prohibitions on CAA regulation of greenhouse gas (GHG) emissions and on stiffer standards for fine particulate matter.[5] It also approved bills abrogating hazardous air pollution standards for industrial boilers,[6] cement kilns,[7] and electric generating units,[8] as well as legislation requiring consideration of costs in setting ambient air standards.[9] These actions were accompanied by a drumbeat of hearings, letters, and press releases sharply

1. Clean Air Act ("CAA" or "the Act") §§ 101-618, 42 U.S.C. §§ 7401-7671q (2006).

2. These statutes include the Clean Water Act, Safe Drinking Water Act, and the Solid Waste Disposal Act (as amended by the Resource Conservation and Recovery Act), among others. Clean Water Act, 33 U.S.C. §§ 1251–1387 (2012); Safe Drinking Water Act, 42 U.S.C §§ 300f-300j (2012); Solid Waste Disposal Act, 42 U.S.C. §§ 6901-6992k (2012).

3. *See, e.g.*, NAT'L RESEARCH COUNCIL, AIR QUALITY MANAGEMENT IN THE UNITED STATES 37-39 (Nat'l Acads. Press 2004), *available at* http://www.nap.edu/catalog/10728.html [hereinafter AIR QUALITY MANAGEMENT]; *Air Quality Trends*, U.S. EPA, http://www.epa.gov/airtrends/aqtrends.html (last visited Sept. 5, 2012).

4. Lindsay Morris, *TRAIN Act Attempts to Stop EPA "Train Wreck,"* POWER ENGINEERING (July 12, 2011), http://www.power-eng.com/articles/2011/07/train-act-attempts-to-stop-epa-train-wreck.html; JAMES E. MCCARTHY & CLAUDIA COPELAND, CONG. RESEARCH SERV., R41914, EPA'S REGULATION OF A COAL-FIRED POWER: IS A "TRAIN WRECK" COMING? (2011), *available at* http://www.lawandenvironment.com/uploads/file/CRS-EPA.pdf; THE HERITAGE FOUND., *Energy, in* ISSUES 2012: THE CANDIDATES BRIEFING BOOK 37, 39-40, *available at* http://www.candidatebriefing.com/energy-environment/?nomobile.

5. Full-Year Continuing Appropriations 2011, H.R. 1, 112th Cong. Div. B, §§ 1743, 4048 (2011); Energy Tax Prevention Act of 2011, H.R. 910, 112th Cong. § 2 (2011).

6. EPA Regulatory Relief Act of 2011, H.R. 2250, 112th Cong. (2011).

7. Cement Sector Regulatory Relief Act, H.R. 2681, 112th Cong. (2011).

8. Transparency in Regulatory Analysis of Impacts on the Nation Act, H.R. 2401, 112th Cong. § 5(b)(1) (2011).

9. *Id.* § 6 (requiring the Administrator to consider feasibility and costs in setting NAAQS).

questioning the EPA's authority and the policy basis for its proposed or final rules.[10]

Left unmentioned in 2010's congratulatory reviews, and the subsequent Capitol Hill political din, were a number of fundamental design flaws and structural limitations in the original statutory scheme, its subsequent amendments and its administration, which have limited the CAA's effectiveness, unnecessarily drove up compliance costs, spawned political controversy and seemingly endless litigation, and arguably retarded rather than advanced deployment of efficient, low emission technologies. These design issues include the "grandfathering" policies which were embedded in the 1970 Act and subsequent amendments, extensive reliance on state implementation plans to carry out much of the regulatory system, the Act's interstate transport provisions, and the "layering" of multiple (and sometimes redundant) regulatory requirements on the same source. The end result is a regulatory regime that achieves less than what the public needs and costs more than what it wants to pay.

This article reviews those design flaws and structural limitations – many of which have been the subject of extensive prior comment – and suggests several alternatives which could make the regulatory system more effective, reduce the extent to which regulatory outcomes are dependent on litigation, and increase the cost-effectiveness of air quality regulation.

II. OVERVIEW OF THE CAA

This section provides a brief summary of the major CAA provisions that are the subject of the remainder of this article. For the convenience of the reader, a table of acronyms appears as Appendix II.

A. Regulation of Criteria Pollutants

The EPA's most comprehensive authority[11] for controlling air pollution emissions under the CAA is its regulation of "criteria pollutants" under Title I of the Act.[12] Under this regime, the EPA issues criteria for pollutants emitted by numerous and diverse sources that spell out the pollutants' effects on public health and welfare (thus, the term "criteria pollutants").[13] For each criteria

10. In 2011, for example, the U.S. House Energy & Commerce Committee convened six hearings and sent numerous letters to officials in the Obama Administration, all criticizing its actions implementing the CAA. *See generally History*, HOUSE ENERGY & COMMERCE COMMITTEE ARCHIVES, http://archives.republicans.energycommerce.house.gov/hearings/default.aspx (last visited Sept. 20, 2012). Likewise, the House Committee on Oversight and Government Reform held four CAA hearings in 2011. *See generally Hearings*, COMMITTEE ON OVERSIGHT & GOV'T REFORM, http://oversight.house.gov/hearing/ (last visited Sept. 20, 2012).

11. Authorities under the CAA are vested by statute in the Administrator of the EPA, but for convenience of references the Administrator is referred to in this article as "EPA."

12. CAA §§ 171-193, 42 U.S.C. §§ 7501-7515 (2006).

13. Section 108 of the CAA directs the EPA to publish a list of air pollutants, emissions of which, from numerous or diverse mobile or stationary sources will, in the EPA's judgment, "cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare." CAA § 108(a)(1)(A), 42 U.S.C. § 7408(a)(1)(A). It directs the EPA to issue air quality criteria for these pollutants that reflect current

pollutant, the EPA sets a national ambient air quality standard (NAAQS) that is implemented on a state-by-state basis.[14] These standards specify the maximum permissible level of an air pollutant in the ambient air, usually in parts per million measured hourly, daily, monthly, or annually. Based on the criteria, the NAAQS are set at a level that is requisite to protect public health and public welfare, "allowing an adequate margin of safety."[15]

Once a NAAQS is set, each state is required by section 110 of the CAA to adopt and submit to the EPA a plan for attaining and maintaining the ambient standard within the state (State Implementation Plan or SIP).[16] The SIP must meet numerous statutory requirements for controlling emissions of the criteria pollutant (or its precursors) from sources within the state, as well as monitoring, enforcement, and related requirements.[17] In order for the SIP to be approved, the state must demonstrate through an emission inventory and modeling that the measures contained in the SIP are sufficient to attain and maintain compliance with the NAAQS.[18] If a state fails to submit a SIP that meets section 110's requirements, the EPA is directed to promulgate a federal implementation plan (FIP) that will be sufficient to bring the state into compliance.[19] Under section 116 of the Act, states may adopt and enforce ambient standards and stationary source emission standards that are more stringent than federal standards.[20]

If an area within a state fails to meet a NAAQS, then it is designated as a "non-attainment area."[21] The state is then required by Part D of Title I of the CAA to impose emission limitations and other measures respecting existing and new sources that will bring the area into attainment with the standard within the timeframes specified in the Act,[22] including emission control and offset requirements for new and modified sources of the pollutant.[23] "Attainment areas" (areas of the state that are in compliance with a particular NAAQS) are required to maintain their compliance with the NAAQS. In addition, under Part C of Title I, they must adopt emission limitations and other measures

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scientific knowledge "indicating the kind and extent of all identifiable effects [of the pollutant] on public health and welfare." CAA § 108(a)(2), 42 U.S.C. § 7408(a)(2).

14. CAA §§ 109–110, 42 U.S.C. §§ 7409-7410. Under section 109(b), the EPA establishes two types of ambient air quality standards: primary standards designed to protect public health, and secondary standards to protect public welfare. *Id.* § 7409(b).

15. CAA § 109(b)(1), 42 U.S.C. § 7409(b)(1).

16. 42 U.S.C. § 7410(1).

17. *Id.* § 7410(2). Certain criteria pollutants, like ozone, are formed from chemical reactions of precursor pollutants emitted by mobile or stationary sources. In these cases, SIPS also control emissions of the precursors. CAA § 302, 42 U.S.C. § 7602(g) (defining "air pollutant" to include precursors).

18. The National Research Council provides a detailed description of the procedures for attainment demonstration in AIR QUALITY MANAGEMENT, *supra* note 3, at 88-126.

19. CAA § 110, 42 U.S.C. § 7410(c)(1).

20. CAA § 116, 42 U.S.C. § 7416.

21. CAA § 107, 42 U.S.C. § 7407(d).

22. CAA §§ 172(a)(2), (c), 42 U.S.C. §§ 7502(a)(2), (c).

23. CAA § 173, 42 U.S.C. § 7503.

(principally applicable to new and modified stationary sources) to prevent significant deterioration of air quality ("PSD" measures).[24]

The Act also requires SIPs to include New Source Review (NSR) provisions which require major new and modified stationary sources in attainment areas to obtain pre-construction permits and to install Best Available Control Technology (BACT).[25] In the case of a new or modified source in a non-attainment area, the source must meet a more stringent Lowest Achievable Emission Rate (LAER) requirement.[26] Numerous requirements in addition to BACT and LAER apply under NSR.[27] NSR is described in greater detail, in section II.A, below.

A SIP must also contain "Regional Transport" provisions designed to prevent source emissions in the state from contributing significantly to a violation of a NAAQS in any other state.[28] Meeting this requirement is a condition of EPA approval of the SIP, and it may also be enforced by the EPA directly against a source on petition of a state.[29] The EPA has attempted in a series of rulemakings to control transport of ozone and fine particulate matter in the Eastern United States. The two most recent attempts – the Clean Air Interstate Rule (CAIR)[30] and the Cross State Air Pollution Rule (CSAPR)[31] – have been either remanded or vacated by the D.C. Circuit.

Finally, SIPs must also contain provisions designed to mitigate visibility impairment and regional haze from stationary sources, including Best Available Retrofit Technology (BART) requirements.[32]

B. Federal Performance Standards for New and Existing Stationary Sources under Sections 111 and 112

In addition to providing for EPA and state regulation of criteria pollutants through the NAAQS/SIP process (described above), the CAA also provides the

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24. CAA §§ 160–169B, 42 U.S.C. §§ 7470-7492.

25. CAA § 165, 42 U.S.C. § 7475.

26. CAA § 173(a)(2), 42 U.S.C. § 7503(a)(2).

27. These requirements are incorporated into parts C and D of Title I of the CAA. CAA, tit. I, pts. C & D, 42 U.S.C. §§ 7470-7515.

28. CAA, §§ 110(a)(2)(D), 126, 42 U.S.C. §§ 7410(a)(2)(D), 7426. The Act also establishes interstate transport commissions, and gives the EPA direct authority to order individual stationary sources to reduce emissions if they significantly contribute to non-attainment in another state. CAA § 176A, 42 U.S.C. § 7506a.

29. CAA §§ 110(a)(D)(ii), 176A, 42 U.S.C. §§ 7410(a)(D)(ii), 7506a.

30. Final Rulemaking, Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport Ozone, 63 Fed. Reg. 57,356 (Oct. 2, 1998) (codified at 40 C.F.R. pts. 51, 72, 75, 96); Final Rulemaking, 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 (May 12, 2005) (codified at 40 C.F.R. pts. 51, 72, 73, 74, 77, 78, and 96). *See also* North Carolina v. EPA, 531 F.3d 896 (D.C. Cir. 2008) (overturning CAIR), *on reh'g in part,* 550 F.3d 1176 (D.C. Cir. 2008).

31. Final Rulemaking, Federal Implementation Plans: Interstate Transport of Fine Particulate Matter and Ozone and Correction of SIP Approvals, 76 Fed. Reg. 48,208 (Aug. 8, 2011). This rule was vacated by the D.C. Circuit Court of Appeals on August 21, 2012. EME Homer City Generation, L.P. v. EPA, Nos. 11-1302 et al., 2012 WL 3570721 (D. C. Cir. Aug. 21, 2012), *reh'g filed*, No. 11-1302 (Oct. 5, 2012).

32. CAA §§ 169A, 169B, 42 U.S.C. §§ 7491, 7492.

EPA with authority to prescribe performance standards for large stationary sources. Section 111(b)(1)(A) directs the EPA to designate any category of stationary sources that "causes, or contributes significantly to, air pollution that may reasonably be anticipated to endanger public health or welfare."[33] Section 111(b)(1)(B) directs the EPA to prescribe standards of performance for new and modified sources within each such category.[34] These new source performance standards (NSPS) must reflect "the degree of emission limitation achievable [under] the best system of emission reduction" the Administrator determines has been "adequately demonstrated," taking into account the cost of achieving such reduction, among other factors.[35] Performance standards under section 111 are typically expressed in terms of emissions per unit of input or output (e.g., pounds per mmBtu) rather than emissions per period of time (e.g., tons per year).

Under section 111(d), the EPA has authority to require states to submit plans (similar to SIPs under section 110) to control emissions of non-criteria pollutants (i.e., pollutants not subject to ambient air quality standards) from existing, unmodified stationary sources in the categories designated under section 111(b).[36]

Section 112, as revised in the 1990 CAA amendments, establishes a detailed and highly prescriptive system for regulating stationary source emissions of hazardous air pollutants (HAPs), including provisions for National Emission Standards for Hazardous Air Pollutants (NESHAPs) that implement section 112's Maximum Available Control Technology (MACT) requirements.[37] Over the last 20 years the EPA has prescribed NESHAPs for a wide variety of stationary sources. In 2012, the EPA finalized its Mercury and Air Toxics (MATS) rule, which is applicable to HAP emissions from electric generating units.[38]

C. Other Major Stationary Source Provisions

Other key stationary source provisions of the CAA include (1) the acid deposition control program under Title IV of the Act, which established a highly successful national cap-and-trade program to control sulfur dioxide (SO_2) emissions from coal- and oil-fired power plants,[39] and (2) a national operating

33. CAA § 111(b)(1)(A), 42 U.S.C. § 7411(b)(1)(A).

34. CAA § 111(b)(1)(B), 42 U.S.C. § 7411(b)(1)(B).

35. CAA § 111(a)(1), 42 U.S.C. § 7411(a)(1).

36. CAA § 111(d), 42 U.S.C. § 7411(d). A further limitation in section 7411(d) excludes regulating certain hazardous pollutants under that section.

37. CAA § 112, 42 U.S.C. § 7412.

38. Final Rulemaking, National Emission Standards for Hazardous Air Pollutants from Coal and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units, 77 Fed. Reg. 9304 (Feb. 16, 2012) (codified at 40 C.F.R. pts. 60, 63).

39. CAA §§ 401-416, 42 U.S.C. §§ 7651-7651*o*. Title IV also included requirements for coal-fired generators to reduce NO_x emissions. CAA § 407, 42 U.S.C. § 7651f.

permit program for major stationary sources under Title V of the Act that is designed to incorporate all emissions limitations applicable to the source.[40]

D. Mobile Sources

Title II of the Act establishes emission standards for new motor vehicles and other mobile sources, as well as motor vehicle fuel standards.[41] Unlike Titles I and IV, Title II preempts state mobile source and fuel standards, except to the extent the EPA issues a waiver for more stringent California standards.[42]

E. GHG Regulation

The Supreme Court's decision in *Massachusetts v. EPA* made it clear that the EPA has authority under the CAA to regulate greenhouse gas (GHG) emissions, and that it may not decline to do so except on grounds specified in the statute.[43] In 2009, the EPA proposed GHG emission standards for light duty motor vehicles under section 202 of the Act.[44] These standards were finalized in 2010.[45] In 2010, the EPA issued a set of rules spelling out how the PSD rules would apply to major stationary sources' emissions of GHGs. In these rules, the EPA determined that new or modified major GHG emitting facilities were subject to BACT requirements for GHG emissions, effective January 2, 2011, and set GHG emission thresholds for determining whether sources were major emitting sources.[46] All of the EPA's final GHG rules were challenged in the United States Court of Appeals for the District of Columbia Circuit and, in June, 2012, were upheld in *Coalition for Responsible Regulation v. EPA*.[47] In 2012, the EPA acted under section 111(b) of the CAA to propose New Source

40. CAA §§ 501-507, 42 U.S.C. §§ 7661-7661f.

41. CAA §§ 202-219, 42 U.S.C. §§ 7521-7554.

42. CAA § 209, 42 U.S.C. § 7543. Section 209(b) of the CAA provides an exception to the CAA's general preemption of State mobile source emissions standards, by allowing EPA to grant a waiver to California's more stringent standards. 42 U.S.C. § 7543(b). Section 177 of the CAA allows other states to adopt the California standards. 42 U.S.C. § 7507.

43. Massachusetts v. EPA, 549 U.S. 497 (2007).

44. Proposed Rulemaking To Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, 74 Fed. Reg. 49,454 (proposed Sept. 28, 2009) (to be codified at 40 C.F.R. pts. 86, 600 and 49 C.F.R. pts. 531, 533, 537, 538).

45. Final Rulemaking, Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, 75 Fed. Reg. 25,324 (May 7, 2010). The rule was jointly issued by the EPA and the National Highway Traffic Safety Administration and contained parallel average fuel economy and GHG standards.

46. Final Rulemaking, Reconsideration of Interpretation of Regulations that Determine Pollutants Covered by Clean Air Act Permitting Programs, 75 Fed. Reg. 17,004, 17,020-21 (April 2, 2010) (codified at 40 C.F.R. pts. 50, 51, 70, 71); Final Rulemaking, Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule, 75 Fed. Reg. 31,514, 31,523 (June 3, 2010) (codified at 40 C.F.R. pts. 51, 52, 70, 71).

The latter rule set GHG thresholds at levels substantially higher than the statutory threshold under CAA section 169(*l*). 75 Fed. Reg. at 31,520.

47. Coalition for Responsible Regulation v. EPA, 684 F.3d 102, 116 (D.C. Cir. 2012). The U.S. Chamber of Commerce, several industry groups, and other interests have filed petitions for rehearing of this decision in the D.C. Circuit. Cathy Cash, *Industry Seeks Rehearing of Greenhouse Gas Decision that Favored US EPA*, PLATTS (Aug. 13, 2012), http://www.platts.com/RSSFeedDetailedNews/RSSFeed/ElectricPower/6555529.

Performance Standards for GHG emissions from new fossil-fuel-fired electric generators.[48]

III. KEY DESIGN ISSUES

A. Grandfathering

One of the principal, and most frequently cited, design flaws in the Act is the "grandfathering" policy of the 1970 statute and subsequent amendments.[49] The approach adopted in 1970 was to focus federal technology-based performance standards on new or "modified" facilities on the theory that advanced pollution control equipment could be most economically installed when the facility is constructed or is otherwise undergoing major changes.[50] For that reason, the 1970 new source performance standards applied only to new and modified stationary sources. Modification was defined as a physical or operational change that results in an increase in emissions.[51] Existing, unmodified sources were not subject to NSPS. Their emissions of criteria pollutants were to be regulated (if at all) under SIPs, and their emissions of non-criteria pollutants were to be regulated by the states under the rarely-used "SIP-like" process prescribed in section 111(d).[52] The presumption was that these facilities when retired at the end of their useful life would be replaced by new facilities fully subject to NSPS.[53]

The 1977 amendments carried the distinction between new (or modified) sources and unmodified existing sources forward into the newly established Prevention of Significant Deterioration (PSD) program.[54] That program – applicable to areas that were not in violation of a NAAQS – was supplemented by a new, stringent program for new and modified sources in non-attainment areas.[55] The two programs together are known as the New Source Review (NSR) program. The NSR program, which imposed preconstruction permit requirements on new or modified major stationary sources, required that sources apply BACT in areas subject to PSD.[56] In non-attainment areas, the more stringent LAER standard, as well as a number of other requirements, were

48. Proposed Rule, Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units, 77 Fed. Reg. 22,392 (proposed April 13, 2012). The proposed rule excludes simple cycle natural gas turbines. *Id.* at 22,398.

49. *See, e.g.*, Jonathan R. Nash & Richard L. Revesz, *Grandfathering and Environmental Regulation: The Law and Economics of New Source Review*, 101 NW. U. L. REV. 1677 (2007) [hereinafter *Grandfathering and Environmental Regulation*], and materials cited therein.

50. ARNOLD W. REITZE JR., STATIONARY SOURCE AIR POLLUTION LAW 161 (Envtl. L. Inst. 2005).

51. CAA §111(a)(4), 42 U.S.C. § 7411(a)(4) (defining modification as "any physical change in, or change in the method of operation of, a stationary source which increases the amount of any air pollutant emitted by such source or which results in the emission of any air pollutant not previously emitted").

52. CAA § 111(d), 42 U.S.C. § 7411(d).

53. REITZ, *supra* note 50, at 166.

54. Clean Air Act Amendments of 1977, Pub. L. No. 95-95, § 127, 91 Stat. 685 (codified as amended at 42 U.S.C. §§ 7470-7479).

55. *Id.* § 129 (codified as amended at §§ 7501-7507).

56. CAA, tit. I, pt. C, 42 U.S.C. §§ 7470-7479.

applicable.[57] Existing sources, however, remained free of NSPS, preconstruction permit requirements, BACT and LAER, and the other requirements of New Source Review, as long as they could successfully argue that no "modification" had occurred at the source. But, early in the implementation of the Act, it became clear that the original definition of "modification" – which remains unchanged to this day – raised numerous practical problems in its application.[58] "Physical change or change in method of operation" could, as the EPA pointed out "encompass the most mundane activities at an industrial facility (even the repair or replacement of a single leaky pipe or a change the way the pipe is utilized)."[59] As a result, the EPA provided exclusions for routine maintenance, repair, and replacement; increases in production rate or hours of operation; and use of alternative fuels, among other activities.[60]

The emission increase part of the "modification" definition has been equally troublesome. The agency struggled for decades to define what constituted an emissions increase, how to measure baseline (pre-modification) emissions, how to estimate future (post-modification) emissions, and whether to use hourly or annual emission rates.[61]

As a result of the fundamental conceptual difficulties with the definition of modification, decades of litigation ensued over what constituted "routine" maintenance, repair, and replacement, beginning with the *WEPCO* case in 1991.[62] In 1998, the EPA commenced its NSR "Enforcement Initiative" which is still ongoing.[63] After twenty years of NSR litigation, resulting in a mix of EPA wins and losses[64] and a number of company-specific settlements, there appears to be no clear, generally-applicable standard for what constitutes "routine maintenance, repair, and replacement." What has become clear is that the CAA's regulatory construct of "modification" is essentially unadministrable because of the difficulties in applying the routine maintenance and other exclusions, and the problems with defining what constitutes an emission

57. CAA, tit. I, pt. D, 42 U.S.C. §§ 7501-7515.

58. *See supra* note 51.

59. Final Rulemaking, Requirements for Preparation, Adoption and Submittal of Implementation Plans; Approval and Promulgation of Implementation Plans; Standards of Performance for New Stationary Sources, 57 Fed. Reg. 32,314, 32,316 (July 21, 1992) (codified at 40 C.F.R. pts. 51, 52, 60).

60. 40 C.F.R. § 60.14(e)(1)–(4). The EPA's 2002 attempts to liberalize these exclusions were largely rebuffed by the D.C. Circuit in *New York v. EPA*, 413 F.3d 3 (D.C. Cir. 2005).

61. *Grandfathering and Environmental Regulation*, *supra* note 49, at 1689-1707.

62. Wisconsin Elec. Power Co. v. Reilly (*WEPCO*), 893 F.2d 901 (7th Cir. 1990).

63. U.S. EPA, GUIDANCE ON THE APPROPRIATE INJUNCTIVE RELIEF FOR VIOLATIONS OF MAJOR NEW SOURCE REVIEW REQUIREMENTS (Nov. 17, 1998).

64. For example, one court agreed with the EPA that "routine" should be determined with respect to what is "routine" at the particular unit, United States v. Ohio Edison Co., 276 F. Supp. 2d 829, 855 (S.D. Ohio. 2003), while another court rejected the EPA's view, holding that "routine" should be evaluated against industry practices, United States v. Duke Energy Corp., 278 F. Supp. 2d 619, 632 (M.D.N.C. 2003). Courts have continued to divide on this issue, with some following the *Ohio Edison* view and others following the *Duke Energy* holding. *See, e.g.*, Bernard F. Hawkins Jr. & Mary Ellen Ternes, *The New Source Review Program*, *in* THE CLEAN AIR ACT HANDBOOK 125, 155 (Julie R. Domike & Alec C. Zacaroli eds., 3d ed.) (2011), *and* DANISH, ET AL., JUDICIAL REVIEW OF CLEAN AIR ACT REGULATIONS AFFECTING TO POWER SECTOR 12-13 (2012) (prepared for the Bipartisan Policy Center).

increase.[65] And, more importantly, the practical result of this aspect of the Act has been to provide strong disincentives for technological improvements at existing facilities.[66]

The routine maintenance exclusion permits the operator to maintain the facility as it was originally designed (though there are questions even as to this interpretation).[67] Upgrading a facility's original design clearly falls outside the ambit of routine maintenance, and requires the operator to show that no increase in emissions will result from the improvement.[68] Plant operators, concerned that design upgrades will trigger requirements to install costly BACT measures, have in many cases opted to forgo plant modernization; and, because new facilities (which must comply with NSPS and BACT/LAER) have much higher capital costs than the facilities they might replace, operators have strong incentives to keep the existing facilities running forever.[69]

The outcome of the Act's grandfathering policies can be seen most clearly in the electric power sector. Almost a third of the U.S. coal fleet continues to operate without modern pollution controls[70] (though the EPA's recent MATS and CSAPR rules, if they end up surviving judicial review, would require virtually all coal-fired power plants to upgrade controls).[71] Moreover, the policy has also retarded technological improvement in the industry. The average thermal efficiency of coal-fired power plants has actually decreased over the last four decades from 33.2% in 1970, to 32.7% in 2009,[72] even though modern coal plants can attain thermal efficiencies approaching 40%.[73]

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65. The National Academy of Public Administration (NAPA) has extensively reviewed the implementation of the NSR program, and identified a number of administrative difficulties in its application to existing sources. NAT'L ACAD. OF PUB. ADMIN., A BREATH OF FRESH AIR: REVIVING THE NEW SOURCE REVIEW PROGRAM (2003) [hereinafter FRESH AIR].

66. *See, e.g., Grandfathering and Environmental Regulation*, *supra* note 49, at 1707-18; Howard K. Gruenspecht & Robert N. Stavins, *New Source Review under the Clean Air Act: Ripe for Reform*, RESOURCES, Spring 2002, at 19, 21.

67. *WEPCO*, 893 F.2d at 910-13.

68. *Id.*

69. REITZE, *supra* note 50, at 161, 166-67; List, et al., *Unintended Disincentive in the Clean Air Act*, *in* 4 ADVANCES IN ECONOMIC ANALYSIS AND POLICY 1, 14 (2004).

70. BERNSTEIN RESEARCH, U.S. UTILITIES: COAL-FIRED GENERATION IS SQUEEZED IN THE VICE OF EPA REGULATION; WHO WINS AND WHO LOSES? 7-8 (Oct. 2010), *available at* http://207.114.134.6/coal/oh/downloads/bernstein-report.pdf. *See also*, U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-12-545R, AIR EMISSIONS AND ELECTRICITY GENERATION AT U. S. POWER PLANTS 3 (Apr. 18, 2012). GAO found that older less controlled units were responsible for a disproportionate share of SO_2, NO_x, and CO_2 emissions. *Id.* at 6.

71. CSAPR was vacated by the D.C. Circuit [but rehearing is pending] and the MATS rule is subject to ongoing judicial review proceedings. *See infra* text accompanying notes 119-122.

72. U.S. ENERGY INFORMATION ADMINISTRATION, ANNUAL ENERGY REVIEW 2009, 229 tbl. 8.2b, 240 tbl. 8.4b (2010), *available at* http://www.eia.gov/totalenergy/data/annual/archive/038409.pdf. Efficiencies are in terms of Lower Heat Value (LHV).

73. For example, Longview Power's advanced supercritical pulverized coal plant is projected to have a heat rate of 8728 btu/KWH (over 39% thermal efficiency). STEPHEN J. GOIDICH ET AL., FOSTER WHEELER, INNOVATION IN SUPERCRITICAL BOILER TECHNOLOGY – THE 750 MWE LONGVIEW POWER PROJECT 7 tbl.1 (2008), *available at* http://www.fwc.com/publications/tech_papers/files/TP_PC_08_01.pdf.

Thus, the 1970 grandfathering policies that exempted existing unmodified sources from NSPS and NSR remain largely unchanged to this day; although provisions of the 1977 and 1990 amendments (and the EPA's current rulemakings, if they to survive judicial review) mitigate grandfathering by imposing a raft of overlapping and uncoordinated regulatory requirements to regulate acid rain, regional transport, regional haze, and HAPs, as discussed in section II.E, below. For the electric sector, these grandfathering policies have been uniquely dysfunctional: They have failed to effectively control coal-fired power plants (30% of the coal-fleet lacks modern air pollution control equipment) and they have also locked in thermally-inefficient 1960s coal combustion technology.[74]

B. Ambient Standards and SIPs

Under the 1970 amendments, and continuing to this day, national ambient air quality standards have been the driver of state implementation plans. The SIP is the Act's principal regulatory mechanism – states are required to submit SIPs that are sufficient to attain public health-based ambient standards in each area of the state.[75] The SIP, once approved by the EPA, becomes enforceable by the EPA and under citizen suits as federal law.[76] Because this regime seemingly entitles everyone in the United States to healthy air, it has a strong attraction from a policy perspective. However, the apparent simplicity of the scheme masks a series of fundamental difficulties that the EPA and the states have never been able to surmount. These include how to set the NAAQS; how to translate the NAAQS, which is a level of concentration of the pollutant in the ambient air, into a set of emission limitations for a state's mobile and stationary sources that are sufficient to attain the ambient standard; and ultimately, how to ensure that the ambient standard is actually met, so that citizens of the state (and downwind states) can breathe healthy air. This article looks at each of these issues in turn:

1. Setting the NAAQS

Section 109(b)(1) of the CAA requires that primary (health-based) ambient standards be "ambient air quality standards, the attainment and maintenance of which in the judgment of the Administrator, based on [the section 108 air quality] criteria and allowing an adequate margin of safety, are requisite to

74. *See id.* and *supra* note 72. It is worth noting that, because of major technological advances in natural gas generation, natural gas generating capacity almost doubled between 2000-2012 (mostly highly efficient natural gas combined cycle units); however, this new gas generation did not significantly displace existing coal-fired generation until the dramatic decline in natural gas prices in 2009. U.S. ENERGY INFORMATION ADMINISTRATION, ELECTRIC POWER MONTHLY, 13 tbl.1.1 (June 2012), *available at* http://www.eia.gov/electricity/monthly/current_year/june2012.pdf; U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY REVIEW 2010, 205 tbl.6.7 (Oct. 2011), *available at* http://www.eia.gov/totalenergy/data/annual/pdf/aer.pdf.

75. CAA § 110, 42 U.S.C. § 7410. As explained above, the SIPs also implement secondary NAAQS (protective of public welfare), CAA § 110(a)(1), 42 U.S.C. § 7410(a)(1), and the EPA has authority to promulgate a FIP if the state fails to submit an approvable SIP. CAA § 110(c)(1), 42 U.S.C. § 7410(c)(1).

76. CAA §§ 113, 304, 42 U.S.C. §§ 7413, 7604.

protect the public health."[77] The Act provides a similar formulation for the secondary (public welfare) ambient standards.[78]

The statutory formulation has generated both scholarly comment and judicial elucidation – most recently by the Supreme Court in *Whitman* v. *American Trucking Ass'ns* where the Court – in affirming lower court opinions – held that "the CAA as a whole unambiguously bars cost considerations from the NAAQS-setting process."[79] However, the Supreme Court reversed the District of Columbia Circuit's holding that the CAA's statutory standard ("requisite to protect public health," etc.) failed to provide an "intelligible principle" to guide the EPA in setting the NAAQS, and that the statutory standard, as implemented by the EPA, was an unconstitutional delegation of legislative authority.[80]

The principle concern articulated by the D.C. Circuit panel was that the pollutants involved in the challenged NAAQS – ozone and particulate matter – were non-threshold pollutants.[81] The panel opinion described non-threshold pollutants as ones that have "some possibility of some adverse health impact (however slight) at any exposure level above zero."[82] The panel noted that, in the case of ozone, the EPA had stated that it did not seem possible to identify a concentration level "'at which it can be concluded with confidence that no 'adverse' effects are likely to occur.'"[83] The lower court could discern no intelligible principles in the statute, as implemented by the EPA, for setting the standard at a level above zero. For that reason, it remanded the rule to the EPA in order to provide the EPA with "an opportunity to extract a determinate standard on its own" suggesting the agency use a "quality of life years" approach.[84]

The Supreme Court reversed the D.C. Circuit's delegation holding and found that it "is not conclusive for delegation purposes" that –

> ozone and particulate matter are "non-threshold" pollutants that inflict a continuum of adverse health effects at any airborne concentration greater than zero, and hence require the EPA to make judgments of degree. A certain degree of discretion, and thus of lawmaking, inheres in most executive or judicial action. . . . Section 109(b)(1) of the CAA which . . . we interpret as requiring the EPA to set air quality standards at the level that is "requisite" [–] that is, not lower or higher than is necessary – to protect the public health with an adequate margin of safety, fits comfortably within the scope of discretion permitted by our precedent.[85]

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77. CAA § 109(b)(1), 42 U.S.C. § 7409(b)(1).

78. CAA § 109(b)(2), 42 U.S.C. § 7409(b)(2).

79. Whitman v. Am. Trucking Ass'ns, 531 U.S. 457, 471 (2001).

80. *Id*. at 472.

81. American Trucking Ass'n v. EPA, 175 F.3d 1027, 1034 (D.C. Cir. 1999), *reh'g granted in part and denied in part*, 195 F.3d 4 (D.C. Cir. 1999).

82. *Id.*

83. *Id.* (quoting National Ambient Air Quality Standards for Ozone, 62 Fed. Reg. 38,856, 38,863 (July 18, 1997) (codified at 40 C.F.R. pt. 50)).

84. *Id.* at 1038-39.

85. Whitman v. Am. Trucking Ass'ns, 531 U.S. at 475-76 (internal quotations and citations omitted).

While the *American Trucking* opinion disposed of the constitutional challenge to the NAAQS standard, it did not resolve the equally difficult practical issue of how to set the standard, particularly for non-threshold pollutants. As the National Research Council (NRC) pointed out in 2004:

> [T]he possibility that concentration thresholds may not exist for some pollutants raises serious questions about the technical feasibility of setting primary NAAQS that are consistent with the language in the CAA. In it, the EPA administrator is required to set primary NAAQS to protect public health with "an adequate margin of safety." Implicit in this instruction is the assumption that a NAAQS can be formulated by specifying a particular concentration below which the public health is protected from an adverse health effect of a pollutant. If a threshold does not exist, however, there might be no concentration below which the most susceptible members of the population are protected, raising the challenge for the administrator of how to arrive at an "adequate" margin of safety.[86]

How to set a NAAQS, and at what level, is not just a quaint academic dispute; it has substantial legal and economic consequences. For example, in the recent debate over the level of the ozone NAAQS, the differences between the Bush Administration's 0.075 ppm standard, and the most stringent of the alternatives considered by the EPA (0.060 ppm) in its aborted 2009-2011 efforts to strengthen the Bush Administration standard, are striking. Under the 2008 Bush standard, the EPA estimated that 322 counties in the United States would be in non-attainment for ozone and would have to submit SIPs to impose stringent new controls in NO_X and other emissions.[87] However, under the 0.060 ppm proposal, the number would have grown to 650 counties,[88] imposing $52-90 billion in control costs on the U.S. economy.[89]

Given the magnitude of these potential requirements on state and local governments and of the costs that may be imposed on the economy, the process for setting ambient air quality standards raises numerous questions, including—

- Whether and how to take costs into account.
- How to deal with non-threshold pollutants.
- The administrative process for setting the NAAQS (including the timing of required NAAQS revisions).

a. Consideration of Compliance Costs.

Under *American Trucking* and prior cases,[90] costs are not to be considered in setting a NAAQS.[91] But, while the EPA in theory does not consider cost in

86. AIR QUALITY MANAGEMENT, *supra* note 3, at 77-78.

87. *Proposed Revisions to Ozone National Standards*, U.S. EPA, Maps 1-2 (2010), http://www.epa.gov/air/ozonepollution/pdfs/20100104maps.pdf.

88. *Id*.

89. U.S. EPA, FACT SHEET: SUPPLEMENT TO THE REGULATORY IMPACT ANALYSIS FOR OZONE 2 (2010), *available at* http://www.epa.gov/groundlevelozone/pdfs/fs20100106ria.pdf.

90. Whitman v. Am. Trucking Ass'ns, 531 U.S. at 467-68 (citing Union Elec. Co. v. EPA, 427 U.S. 246, 257 & n.5 (1976); *Cf.* General Motors Corp. v. United States, 496 U.S. 530, 538, 541 (1990) ("refusing to infer in certain provisions of the CAA deadlines and enforcement limitations that had been expressly imposed elsewhere."). *See also* Lead Indus. Ass'n. v. EPA, 647 F.2d 1130, 1148-49 (D.C. Cir. 1980).

setting the NAAQS, the reality is quite different: the EPA has been required since the time of the Nixon Administration to perform a cost benefit analysis of every "major rule," which includes virtually all NAAQS rules.[92] It is apparent to most observers that this cost-benefit analysis is considered both by the EPA and the Office of Management and Budget in the NAAQS rulemaking process,[93] even though neither agency can acknowledge an explicit role for cost criteria in setting the NAAQS. Because the Act has no explicit mechanism for determining whether health benefits of a standard are worth the cost, this judgment is made *sub silentio* in setting the NAAQS, but without the benefit of public comment or explicit criteria for making the judgment.

Most of the impetus for consideration of costs in setting the NAAQS and other standards under the CAA has come from the business community and most of the opposition from environmental organizations. Ironically, recent economic studies indicate that for a number of industries, external costs from environmental damages are large, and that if those external costs were properly considered, the emission limits should be more, rather than less, stringent.[94] Under economic theory, regulation is efficient if marginal abatement costs equal marginal damages. One study found that equating marginal abatement costs with marginal environmental damages would lower allowable SO_2 emissions by 80%.[95] Another study indicated that, for the coal-fired generation sector, gross external damages (mortality, illness, and property damage) exceed the sector's value-added[96] by a wide-margin.[97] The sector had a negative net value-added of $29 billion annually based on 2002 output and emission levels, using a $6

91. The courts have pointed out that costs can be considered in formulating the SIPs that implement a NAAQS. *See, e.g.*, Whitman v. Am. Trucking Ass'ns, 531 U.S. 457, 469-70 (2001). However, cost considerations cannot be adequately accommodated in the SIP process either – both states and the EPA are bound by statutory SIP implementation deadlines which require the NAAQS to be attained by a date certain. Ozone, VOC and PM_{10} deadlines can be only extended for limited periods on grounds specified in the statute. CAA §§ 181(a), 186(a), 188(c), 42 U.S.C. §§ 7511(a), 7512(a), 7513(c). Excessive cost is not a general ground to waive an otherwise applicable statutory attainment deadline. CAA § 188(f), 42 U.S.C. 7513(f).

92. LINDA-JO SCHIEROW, CONG. RESEARCH SERV., 94-916 ENR, RISK ANALYSIS AND COST-BENEFIT ANALYSIS OF ENVIRONMENTAL REGULATIONS (1994) (discussing cost-benefit analysis requirements since the Nixon Administration, including Executive Orders from Presidents Reagan and Clinton).

93. Gary Coglianese & Gary Marchant, *Shifting Sands: The Limits of Science in Setting Risk Standards*, 152 U. PA. L. REV. 1255, 1337, 1340-41 (2004) [hereinafter *Shifting Sands*]. Typically, the EPA highlights favorable cost/benefit ratios when it promulgates a NAAQS, and OMB reviews cost/benefit analyses in clearing EPA rules.

94. Nicholas Muller, Robert Mendelson, & William Nordhaus, *Environmental Accounting for Pollution in the United States Economy*, 101 AM. ECONOMIC REV. 1649 (2011) [hereinafter *Environmental Accounting*]; Nicholas Z. Muller & Robert Mendelson, *Efficient Pollution Regulations: Getting the Prices Right* 99 AM. ECONOMIC REV. 1714 (2009) [hereinafter *Efficient Pollution Regulation*]. Neither this study nor *Environmental Accounting, supra* note 94, took into account the CAIR, CAMR, MATS or CSAPR rules, which post-dated the data used in the studies and could lead to different results, to the extent they survive judicial review. *See infra* notes 119-122.

95. *Efficient Pollution Regulation*, *supra* note 94.

96. Value-added by an industry is the total market value of the goods and services it produces, less the market value of the labor, goods, and services it uses to produce its output. U.S. DEPT. OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS: CONCEPTS AND METHODS OF THE U.S. NATIONAL INCOME AND PRODUCT ACCOUNTS 2-10 (2009).

97. *Environmental Accounting*, *supra* note 94, at 1651, 1665.

million value per life.[98] (The sector's net value-added could be turned positive by decreasing the value per life by 2/3, but would be $19 billion per year more negative if GHG damages were also included.)[99]

These studies indicate not only that cost considerations can be a double-edged sword for the business community (depending on what damages are considered and how human life is valued), but also that cost-benefit analysis is not likely to provide a definitive answer to the question of where to set the NAAQS, since both costs and benefits (i.e., avoided damages) require a series of contestable judgments as to how to measure costs and value damages. Estimates of compliance costs for a broad-based regulatory measure, like a NAAQS, are difficult. Monetary estimates of the value of health benefits are even more difficult because of disputes over valuation of human life and over dose/response relationships at low pollutant concentrations, among other reasons.

b. Non-Threshold Pollutants.

As we note above, much heat and little light has been shed on how to set the NAAQS for non-threshold pollutants: the Supreme Court has essentially left it to the EPA's judgment. In economic theory, the standard should be set at a level where marginal compliance costs equal marginal health and welfare benefits to the public. As noted in the prior section, this type of analysis is not likely to provide a definitive answer, since there is little agreement on the inputs that drive the calculation.[100]

Another question the existence of non-threshold pollutants raises is whether a uniform ambient air standard applicable to all geographic areas continues to make sense, or whether the stringency of the standard should increase with population density (i.e., ambient concentrations should decrease with population density). If, for example, the annual mortality associated with ambient air quality standards' concentration level is 1 in 100,000, the standard may be adequately protective in an area with a population of 50,000 (where we would expect one death every two years). But in a metropolitan area of 20 million (where we might expect 200 deaths per year), a more protective standard may be advisable.

2. Translating the NAAQS into Source-Specific Emission Limitations

Once an ambient air quality standard is established, the CAA then requires each state to submit a SIP that will attain and maintain the standard in every area of the state.[101] The essential function of the SIP is to translate a limit on concentration of a pollutant in the ambient air into enforceable emission

98. *See infra* Appendix I.

99. *Id.*

100. *See supra* Section III.B.1. The D.C. Circuit, in *American Trucking Ass'ns v. EPA*, 175 F.3d 1027, 1039 (D.C. Cir. 1999), discusses, but does not explain, an alternative approach based on "Quality-Adjusted Life Years."

101. CAA § 110, 42 U.S.C. § 7410. Specific provision is made for Indian tribes or the EPA to implement. CAA §110(*o*), 42 U.S.C. § 7410(*o*) (in areas of a state not subject to state jurisdiction).

limitations (potentially applicable to thousands of individual sources) that are sufficient to meet the standard. This is no simple task: the state must first determine what sources emit the pollutant in question (or its precursors) and in what amount (the "emission inventory"). Next, the state must determine the emission reductions necessary to meet the standard, and then determine the sources from which the emission reductions will be required. The state's task is complicated by incomplete or incorrect data on current emissions, imperfect modeling tools, emission sectors over which the state has little control (such as motor vehicle emission rates and sources in upwind states) and inability to predict intensity of use (e.g., vehicle miles traveled for mobile source emissions, or facility utilization levels for stationary sources).[102]

This already awkward process is further complicated by the CAA's requirement for periodic (five year) review of each NAAQS.[103] Each revision of a NAAQS throws new areas into non-attainment and triggers wholesale revisions of SIPs by states, many of which are already struggling to implement the prior version of the NAAQS.

3. Ensuring Protection of Public Health

While the current system for setting NAAQS and developing SIPs has resulted in improvement of air quality nationwide,[104] it is – according to the National Research Council – an "overly bureaucratic process"[105] that overemphasizes attainment demonstration when the SIP is submitted[106] rather than ensuring that the NAAQS is actually met on the attainment date years later.[107] That critique is borne out by EPA and State agency data. Large segments of the U.S. population are exposed to concentration levels of criteria pollutants far in excess of the health-based standards. In 2010, over 124 million people lived in areas that failed to meet one or more NAAQS.[108] In the nation's second largest metropolitan area, Los Angeles, for example, the current ozone "8-hour" ozone standard was exceeded on 109 days in 2010.[109] Thirty years after it was promulgated, the 1979 "1-hour" ozone standard was exceeded on

102. See AIR QUALITY MANAGEMENT, *supra* note 3, at 88-133 for more detailed description of the SIP process.

103. CAA § 109(d)(1), 42 U.S.C. § 7409(d)(1).

104. *Air Quality Trends*, U.S. EPA, http://www.epa.gov/airtrends/aqtrends.html (last updated July 24, 2012).

105. AIR QUALITY MANAGEMENT, *supra* note 3, at 128. "The SIP process now mandates extensive amounts of local, state, and federal agency time and resources in a legalistic, and often frustrating, proposal and review process, which focuses primarily on compliance with intermediate process steps." *Id.*

106. *Id.* at 130. "However, the use of the attainment demonstration as a one-time robust prediction of how air quality in a given area will evolve over a multiple-year to a decadal time scale does not take into account the significant modeling, socioeconomic, and control-technology uncertainties implicit in such a process, and thus improperly applies the scientific and technical tools used in the demonstration." *Id.*

107. *Id.* at 128-30.

108. *Air Quality Trends*, U.S. EPA, http://www.epa.gov/airtrends/aqtrends.html (last updated July 24, 2012).

109. *Historic Ozone Air Quality Trends*, S. COAST AIR QUALITY MGMT. DIST., http://www.aqmd.gov/smog/o3trend.html (last updated June 9, 2011).

seven days in that year.[110] Ozone concentrations were as much as 60% above the level specified in the current "8-hour" standard.[111]

The populations in our major metropolitan areas are exposed to criteria pollutant concentrations well in excess of the current standards, even as the EPA continues to prescribe more stringent revised ambient standards in accordance with the Act's five year review schedule. The principal near-term impact of those revisions is not to better protect populations in non-attainment areas, but rather to push many areas meeting the current standards into non-attainment. This may argue for less frequent revisions of each NAAQS and giving priority to bringing high population-density areas into compliance with current health based standards. Continually raising the NAAQS bar diverts into SIP revisions the EPA and State resources that might be better used to protect public health in high exposure areas.

In sum, the questions respecting how to set the NAAQS and how to translate it into source specific emission limitations, as well as the inability of the current SIP process to meet the Act's public health objectives, all argue for a serious review of the NAAQS/SIP framework of existing law.

C. Interstate Transport

The 1970 design for regulation of stationary sources had two principal components: (1) federal performance standards for new and modified large stationary sources, and emissions limits for hazardous air pollutants; and (2) state implementation plans containing control measures sufficient to bring each state's air quality up to minimum federal ambient air quality standards.[112] Air pollution, however, does not respect state boundaries, and any federal air pollution control regime must address interstate transport of pollutants.

The 1970 amendments attempted to address the transport issue by requiring each SIP to include measures to ensure that emissions from sources within the state do not interfere with attainment or maintenance of the NAAQS outside the state.[113] This provision, as amended in 1977 and 1990, provides the principal basis for regulating interstate transport of air pollutants.[114] It presented, and still presents, a number of fundamental issues. The first and most difficult is the need to establish a causal connection between emissions in an upwind state and a NAAQS violation in a downwind state. Second, once such connection is established, the EPA must show that the remedial action it orders is sufficient to mitigate the upwind state's contributions to the downwind state's non-attainment

110. *Id.*

111. *Id.*

112. *History of the Clean Air Act*, U.S. EPA, http://www.epa.gov/air/caa/caa_history.html (last updated Feb. 17, 2012).

113. Clean Air Act Amendments of 1977, Pub. L. No. 95-95, § 126, 91 Stat. 685 (1977).

114. CAA § 110 (a)(2)(D)(i) requires SIPs to contain adequate provisions to prohibit emissions within the state that "contribute significantly to non-attainment in, or interfere with maintenance by, any other State with respect to any such [NAAQS]." 42 U.S.C. § 7410(a)(2)(D)(i).

of the NAAQS and that the mitigation burdens are apportioned among states in accordance with the statute.[115]

These showings are difficult because emissions from numerous stationary and mobile sources in multiple upwind states can contribute to a downwind state's non-attainment, depending on factors such as wind direction, meteorological conditions, and the magnitude of upwind emissions. Any given state can be both an upwind contributor and a downwind victim. Showing which emitters contribute to downwind non-attainment, determining what emission reductions both in upwind and downwind states need to be imposed to cure the NAAQS violation, and allocating the reduction burden among states is a daunting task, fraught with legal and methodological pitfalls, which litigants have tried with considerable success to exploit. The EPA's two most recent attempts to deal with interstate transport in the Eastern United States – CAIR and CSAPR – have both been turned back by the D.C. Circuit on various grounds.

CAIR, issued in 2005, addressed the interstate transport of SO_2 and NO_x emissions in the Eastern United States.[116] It established SO_2 and NO_x emission "budgets" for twenty-eight eastern states (and the District of Columbia), and required the states to meet their budgets over two phases with compliance deadlines of 2010 and 2015 for SO_2 and 2009 and 2015 for NO_x. CAIR also gave covered states the option of participating in interstate "cap-and-trade" programs. In addition, CAIR required submission of additional acid rain SO_2 allowances (in a 2:1 or 3:1 ratio to SO_2 emission) to achieve the required SO_2 reductions. The D.C. Circuit reversed and ultimately remanded CAIR, finding, *inter alia,* that (1) the EPA failed to explain how an interstate trading program – in which sources in covered states could buy and sell rights to emit – would ensure that the emissions from each upwind state would not "significantly contribute" to nonattainment in each downwind state; (2) CAIR's 2015 compliance deadline did not ensure that upwind states would reduce their emissions soon enough for downwind states to attain the NAAQS; and (3) the EPA could not require submission of the additional acid rain allowances to

115. Another issue is that not all harmful interstate transport results in a violation of an ambient air quality standard. The best example of this issue is acid-deposition. SO_2 and NOx emissions from coal-fired power plants and other sources in upwind states produce acid rain and other acid deposition in downwind states, even though there may be no violations of any ambient air quality standard in the downwind state. The existing Act did not have a ready mechanism for dealing with this type of pollution problem directly. The solution required a departure from the Act's general approach. Rather than requiring the EPA to show that individual sources or sources in specific states contributed to acid deposition in downwind states, Congress dealt with acid deposition in 1990 by enacting a national cap-and-trade program for all coal-fired power plants, as well as NOx emission limitations. CAA §§ 401-416, 42 U.S.C. § 7651-7651*o*.

116. Final Rulemaking, 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 (May 12, 2005) (codified at 40 C.F.R. pts. 51, 72, 73, 74, 77, 78, and 96).

comply with CAIR.[117] The court allowed CAIR to remain in effect until a replacement rule was promulgated and took effect.[118]

CSAPR was intended as the replacement for CAIR. In CSAPR, the EPA used a two-step methodology to determine the extent to which upwind states were significantly contributing to nonattainment of NAAQS in downwind states.[119] The EPA used air quality measurements to determine which states were significant contributors to downwind states' nonattainment. The EPA then established NO_x and SO_2 emission budgets for those states, based on calculations of NO_x and SO_2 reductions achievable at a given cost per ton. Simultaneously with these determinations, CSAPR imposed a FIP on each covered state to implement these obligations. In December 2011, the D.C. Circuit stayed CSAPR pending resolution of the legal challenges, and in August 2012, a divided panel vacated the rule and directed the EPA to continue CAIR in its stead pending revision of the rule.[120] The majority decision found that two elements of CSAPR exceeded the EPA's authority under the Clean Air Act: (1) the EPA's two-step methodology could result in a state being required to reduce power plant emissions by more than the state's own significant contribution to downwind nonattainment; and (2) the EPA's simultaneous determination of the states' emission reduction obligations and issuance of FIPs imposing those obligations deprived the upwind states of a reasonable opportunity under the Act to develop their own transport SIPs.[121] The EPA has sought en banc rehearing of the decision.[122]

These two decisions have left the EPA, states, and emitters in a state of near-total uncertainty as to when, where, and how the Act's interstate transport rules will be implemented.

D. GHG Regulation

The EPA's attempts to regulate GHGs under the CAA have been challenging, in part because of the need to adapt a statute designed to control conventional pollutants to the regulation of GHGs, which are more ubiquitous and are emitted in far greater volumes than conventional pollutants.[123] As noted above, in section II.E., the EPA has established GHG emissions standards for light duty motor vehicles, has applied PSD permitting requirements to large

117. North Carolina v. EPA, 531 F.3d 896 (D.C. Cir. 2008) (overturning CAIR), *on rehearing in part*, 550 F.3d 1176 (D.C. Cir. 2008). *See also* Michigan v. EPA, 213 F.3d 663 (D.C. Cir. 2000) (upholding EPA's NOx SIP call), *cert. denied*, 532 U.S. 903 (2001).

118. North Carolina v. EPA, 550 F.3d at 1178.

119. Final Rulemaking, Federal Implementation Plans: Interstate Transport of Fine Particulate Matter and Ozone and Correction of SIP Approvals, 76 Fed. Reg. 48,208 (Aug. 8, 2011).

120. EME Homer City Generation, L.P. v. EPA, No. 11-1302 (D.C. Cir. Dec. 30, 2011) (order granting stay of the final rule). EME Homer City Generation, L.P. v. EPA, Nos. 11-1302 et al., 2012 WL 3570721 (Aug. 21, 2012) *reh'g filed*, No. 11-1302 (Oct. 5, 2012).

121. EME Homer City Generation, L.P. v. EPA, Nos. 11-1302 et al., 2012 WL 3570721, at *10, *15 (Aug. 21, 2012), *reh'g filed*, No. 11-1302 (Oct. 5, 2012).

122. Petition for Rehearing En Banc, *EME Homer City Generation*, 2012 WL 357021 (No. 11-1302) (D.C. Cir. Oct. 5, 2012).

123. Coalition for Responsible Regulation v. EPA, 684 F.3d 102, 115-16 (D.C. Cir. 2012).

GHG stationary sources, and has also taken initial steps to set a GHG NSPS for new large stationary sources with its proposed NSPS rule for new fossil-fuel fired generating units.[124] The Agency also has as yet unexercised authority under section 111(d) to require performance standards for existing sources of GHGs.[125] But, while the Act can in theory cover most large stationary sources and new mobile sources, it is ill-suited to controlling GHG emissions from millions of smaller stationary sources (such as residential, commercial and institutional sources).[126] The combination of gaps in coverage of GHG emissions and the EPA's uncertain authority to use market-based instruments are major impediments to establishing an economy-wide cap-and-trade system.[127] In addition, the Act does not provide the EPA with tools to deal with motor vehicle emissions other than through emissions standards for new vehicles.[128] These limitations render the CAA regulatory program significantly less effective and more costly than a statute specifically tailored to GHGs, such as an economy-wide cap-and-trade program or a carbon tax.[129]

Moreover, applying the existing CAA tools to GHG regulation has required considerable ingenuity (and legal risk) in adapting the CAA to GHG regulation. The EPA's Tailoring Rule was necessary to deal with the PSD program's volumetric thresholds in the definition of major emitting source.[130] Similarly, the EPA, in its proposed NSPS for EGU GHG emissions, had to sidestep the statutory direction that NSPS cover both modified and existing sources and facilities, construction of which commences after publication of the proposed NSPS.[131] As the EPA proceeds to flesh out its regime for controlling GHGs under the Act, we can anticipate continuing further challenges in adapting the statute to GHG regulation.

E. Overlapping and Uncoordinated Regulatory Requirements

The Clean Air Act has some of the characteristics of Scripture – chapters are added but none are ever deleted. The statute has grown by accretion since its

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124. *See supra* notes 43-48 and accompanying text; Proposed Rulemaking, Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units, 77 Fed. Reg. 22,392, 22,428-29 (proposed Apr. 13, 2012) (to be codified at 40 C.F.R. pt. 60).

125. CAA § 111(d)(1), 42 U.S.C. § 7411(d)(1). *See also supra* section II.B for further description.

126. *See, e.g.*, Robert 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, 65 (2007) [hereinafter *New Wine*]. *See also* Robert Nordhaus, *Today's CAA a Blunt Instrument for GHG Control*, ENVTL. FORUM, March/April 2009, at 54.

127. *Id.* at 71. See *infra* section IV.B.2 for further discussion on use of trading and other market-based regulation.

128. *Id.* at 72.

129. *New Wine*, *supra* note 126, at 72.

130. Final Rulemaking, Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule, 75 Fed. Reg. 31,514 (June 3, 2010). That rule was upheld in *Coalition for Responsible Regulation v. EPA*, 684 F.3d 102 (D.C. Cir. 2012).

131. Proposed Rulemaking, Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources; Electric Utility Generating Units, 77 Fed. Reg. 22,392, 22,420-27 (proposed April 13, 2012) (addressing the Agency's decision not to set standards for modifications or "transitional sources"); CAA § 111(a)(2), 42 U.S.C. § 7411(a)(2).

enactment in 1970, as new regulatory requirements were enacted to remedy flaws or gaps in the original scheme. The 1977 amendments added the Prevention of Significant Deterioration (PSD) program to codify a judicial decision requiring the EPA to protect air quality in attainment areas;[132] the New Source Review program, requiring BACT for major new and modified stationary sources; a program designed to protect visibility in National Parks and similar sites (including a requirement to install Best Available Retrofit Technology (BART) on certain large stationary sources); and specific provisions to deal with interstate transport of criteria pollutants.[133]

The 1990 amendments expanded on the 1977 provisions and added a series of new programs. These included the Acid Rain program under Title IV of the CAA, amendments to section 112 that established today's stringent, highly prescriptive hazardous air pollutant program (including requirements to install Maximum Available Control Technology (MACT)), and a national operating permit program for major stationary sources.[134] These amendments also strengthened the visibility and regional haze programs and the interstate transport provisions.[135]

But, what is remarkable is that while these layers of new requirements were added, the existing substructure of regulation was left in place. Thus, a large stationary source, such as a power plant, is subject to the following limits:

(1) From the 1970 Act: New Source Performance Standards (both for original construction and modifications), limitations on emissions of non-criteria pollutants under section 111(d), and state regulation of criteria pollutants under a SIP;[136]

(2) Added by the 1977 amendments: PSD limits, NSR requirements (including BACT or LAER), and visibility and regional haze requirements (including BART requirements);[137] and

(3) Added by the 1990 amendments: allowance surrender requirements for SO_2 emissions and NO_x emission limitations under the Acid Rain program, regulation of SO_2 and NO_x emissions under regional transport programs, NESHAP and MACT requirements under section 112 (if the EPA makes an "appropriate and necessary" finding) and enhanced requirements under the regional haze program.[138]

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132. Sierra Club v. Ruckelshaus, 344 F. Supp. 253, 256 (D.D.C. 1972), *aff'd*, Civ. No. 72-1528 (D.C. Cir. 1972), *aff'd by an equally divided Court sub nom.* Fri v. Sierra Club, 412 U.S. 541 (1973).

133. Clean Air Act Amendments of 1977, Pub. L. No. 95-95, §§ 106, 127, 160, 165, 91 Stat. 685.

134. Clean Air Act Amendments of 1990, Pub. L. No. 101-549, §§ 301, 401-13, 104 Stat. 2399 (1990).

135. *Id.* §§ 109, 816.

136. CAA §§ 110, 111, 42 U.S.C. §§ 7410, 7411.

137. CAA §§ 160-169, 169A-B, 171-179B, 42 U.S.C. §§ 7470-7479, 7491-7492, 7501-7509a.

138. CAA §§ 112, 401-416, 169B, 42 U.S.C. §§ 7412, 7651-7651*o*, 7491-7492. Under CAA section 112(n)(1), as added by the 1990 amendments, the EPA was required to regulate EGU HAPs if it determined such regulation was "appropriate and necessary." 42 U.S.C. § 7412(n)(1). EPA made that finding in 2000 and reinforced it in 2012 in the MATS rule. Regulatory Finding on the Emissions of Hazardous Air Pollutants from Electric Utility Steam Generating Units, 65 Fed. Reg. 79,825 (Dec. 20, 2000).

A number of the later layers make earlier layers redundant: for example, BACT/LAER in application is almost always more stringent than NSPS,[139] but both standards – with different measures of compliance[140] – must be met. And current interstate transport requirements applicable to SO_2 under the CAIR and CSAPR[141] are so much more stringent than the Acid Rain program's limits that the Acid Rain program is no longer a binding constraint on SO_2 emissions, even though sources subject to the program must continue to surrender Acid Rain program allowances to cover their emissions.[142] Sources subject to the stringent SO_2 and NO_x limitations under the CAIR and CSAPR rules may also be subject to even more stringent emission limitations under the regional haze program's BART requirements, and MACT requirements for HAPs under section 112 may require control technologies in addition to those required above.

The regulatory scheme is also uncoordinated. Most of the CAA's regulatory programs have their own internal timetables, which set effective dates of regulations which are inconsistent even when applied to the same source. Thus, an existing power plant that is subject to CSAPR (or CAIR), MACT, and BART might have to meet each of these sets of requirements on differing dates, making it difficult to coordinate installation of control technologies and running the danger of stranding early investments in plant retrofits if later, more costly requirements dictate closing the facility. Because of technical differences among various regulatory requirements, the EPA has difficulty coordinating its different cap-and-trade programs, resulting in different allowance "currencies" and illiquid allowance markets.

Much of the complexity and redundancy of the CAA regulatory structure can be laid to attempts to remedy gaps in the original scheme: the acid rain program, NSR, BART, and the current transport rules (CAIR and CSAPR) are all attempts to remedy the CAA's original grandfathering policy, to deal with the limitations on authority to regulate interstate transport, or to prevent significant deterioration of air quality in clean (attainment) areas. The options for reform of the CAA, discussed below, look at giving the EPA more general authority to regulate existing sources to achieve the Act's various policy goals, paring back the host of separate regulatory programs that apply to an individual source, and coordinating the application of those that remain.

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139. NSPS sets the floor for BACT. REITZ, *supra* note 50, at 197.

140. For example, NSPS for fossil-fuel fired electric generating units is in terms of pounds/MMBTU or MWH; BACT for those units is in terms of tons/year.

141. CAIR was remanded to the EPA by the D.C. Circuit in 2008, but allowed to remain in effect until replaced by a new rule on remand. North Carolina v. EPA, 531 F.3d 896 (D.C. Cir. 2008); Federal Implementation Plans: Interstate Transport of Fine Particulate Matter and Ozone and Correction of SIP Approvals, 76 Fed. Reg. 48,208 (August 8, 2011). CSAPR has been vacated by the D.C. Circuit leaving CAIR in place until a replacement rule is finalized. EME Homer City Generation L.P. v. EPA, Nos. 11-1302 et al., 2012 WL 3570721 (Aug. 21, 2012), *reh'g filed*, No. 11-1302 (Oct. 5, 2012).

142. Federal Implementation Plans To Reduce Interstate Transport of Fine Particulate Matter and Ozone, 75 Fed. Reg. 45,210, 45,340 (proposed Aug. 2, 2010).

IV. OPTIONS FOR REFORM

As we review the options to reform the CAA, there are two fundamental approaches. The first alternative retains the plethora of individual regulatory instruments, but refines their terms and better coordinates them. The second, more ambitious alternative, would remedy the underlying design flaws in the Act and eliminate prospectively much of the regulatory complexity of the current system.

A. Refine Existing Regulation (Option A)

Under this option, Congress would take the existing regulatory programs as largely given, and focus on making them more workable and better coordinated. Examples of how this approach might be implemented follow:

1. Grandfathering and New Source Review

Grandfathering and the CAA's New Source Review provisions have triggered extensive commentary, including recommendations to phase out grandfathering[143] or to phase out NSR as pollutants are covered by cap-and-trade programs.[144] In both Bush Administrations, attempts were made through rulemakings to clarify and streamline NSR.[145] These attempts met with varying success in the courts.[146]

2. National Ambient Air Quality Standards

Proposals respecting the NAAQS-setting process include providing an explicit role for cost-benefit analysis (which is required by Executive Order for any NAAQS proposal, but which is not acknowledged as a factor in setting the standard).[147] Another proposal suggests providing more explicit guidance to the

143. Brian H. Potts, *Trading Grandfathered Air – A New, Simpler Approach*, 31 HARV. ENVTL. L. REV. 115, 148-50 (2007); VICTOR B. FLATT & KIM DIANA CONNOLLY, CENTER FOR PROGRESSIVE REGULATION, "GRANDFATHERED" POLLUTION SOURCES AND POLLUTION CONTROL: NEW SOURCE REVIEW UNDER THE CLEAN AIR ACT 9 (2005); FRESH AIR, *supra* note 65, at 133.

144. *See, e.g.*, Gregory Gottswald, Note, *Cap-and-Trade Systems, With or Without New Source Review? An Analysis of the Proper Statutory Framework for Future Electric Utility Air Pollution Regulation*, 28 VT. L. REV. 425 (2004); Howard K. Gruenspecht & Robert N. Stavins, *New Source Review Under the Clean Air Act: Ripe for Reform*, 147 RESOURCES 19, 22 (2002).

145. Final Rulemaking, Requirements for Preparation, Adoption and Submittal of Implementation Plans; Approval and Promulgation of Implementation Plans; Standards of Performance for New Stationary Sources, 57 Fed. Reg. 32,314 (July 21, 1992) (codified at 40 C.F.R. pts. 51, 52, 60); *see also* Final Rulemaking, Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NSR): Baseline Emissions Determination, Actual-to-Future Methodology, Plantwide Applicability Limitations, Clean Units, Pollution Control Projects, 67 Fed. Reg. 80,185 (Dec. 31, 2002) (codified at 40 C.F.R. pts. 51, 52); Final Rulemaking, Prevention of Significant Deterioration (PSD) and Non-Attainment New Source Review (NSR): Equipment Replacement Provision of the Routine Maintenance, Repair and Replacement Exclusion, 68 Fed. Reg. 61,248 (Oct. 27, 2003) (codified at 40 C.F.R. pts. 51, 52).

146. *See, e.g.,* New York v. EPA, 413 F.3d 3, 10 (D.C. Cir. 2005) (upholding in part and vacating in part the 2002 rule); New York v. EPA, 443 F.3d 880, 883 (D.C. Cir. 2006) (vacating the 2003 rule).

147. Whitman v. Am. Trucking Ass'ns, 531 U.S. 457, 470-71 (2001); *see also Shifting Sands*, *supra* note 93, at 1344.

EPA in setting the standard for non-threshold pollutants.[148] One commenter proposes establishing the "NAAQS as a set of idealized goals, [where] states would determine their own attainment schedules and control measures."[149]

3. SIP Process

Recommendations for reform of the SIP process range from transitioning to a performance-based system (i.e., one that relies on monitoring air quality after a SIP is in effect, in addition to predicting its effectiveness based on modeling its proposed emission reductions)[150] to essentially abandoning the SIP process we know today in favor of broad EPA authority to set emissions standards for large sources, supplemented by state regulation of smaller sources and backstops to prevent "hot spots."[151]

4. Interstate Transport

Proposals for improving regulation of interstate transport of air pollutants focus on giving the EPA greater authority to use cap-and-trade systems[152] and to directly regulate major emission sources.[153]

5. Hazardous Air Pollutants

The EPA's recent efforts under section 112 to impose NESHAPs on electric generation units and non-utility boilers have resulted in political controversy and litigation respecting these rules.[154] The HAP program has also drawn significant scholarly attention.[155]

6. Recent Legislative Proposals

Numerous legislative proposals to amend the CAA have been offered in the House and Senate in the two decades since the enactment of the 1990 amendments to the Act. These proposals have focused on a number of discrete

148. *Shifting Sands*, *supra* note 93, at 1358-60.

149. Indur M. Goklany, *Empirical Evidence Regarding the Role of Nationalization in Improving U.S. Air Quality*, *in* THE COMMON LAW AND THE ENVIRONMENT: RETHINKING THE STATUTORY BASIS FOR MODERN ENVIRONMENTAL LAW 27, 50 (ROGER E. MEINERS & ANDREW P. MORRIS, eds. 2000).

150. AIR QUALITY MANAGEMENT, *supra* note 3, at 299-300.

151. David Schoenbrod & Melissa Witte, *Rescuing the Clean Air Act from Obsolescence*, ENERGY AND ENVIRONMENT OUTLOOK 6 (No. 2, March 2011), *available at* http://www.aei.org/files/2011/03/01/EEO-2011-03-No-2-g2.pdf; DAVID SHOENBROD ET AL., BREAKING THE LOGJAM 98 (2010) [hereinafter BREAKING THE LOGJAM].

152. AIR QUALITY MANAGEMENT, *supra* note 3, at 294.

153. BREAKING THE LOGJAM, *supra* note 151, at 87.

154. *See generally* Transparency in Regulatory Analysis of Impacts on the Nation Act of 2011, H.R. 2401, 112th Cong. (2011); EPA Regulatory Relief Act of 2011, H.R. 2250, 112th Cong. (2011); White Stallion Energy Center v. EPA, No. 12-1100 (D.C. Cir. filed February 16, 2012) (challenging the NESHAP for electric utility generating units); U.S. Sugar Corp. v. EPA, No. 11-1108 (D.C. Cir. filed April 14, 2011) (challenging the NESHAP for industrial boilers).

155. FLATT & CONNOLY, *supra* note 143; Patricia R. McCubbin, *Amending the Clean Air Act to Establish Democratic Legitimacy for the Residual Risk Program*, 22 VA. ENVTL. L.J. 1 (2003).

areas – economy-wide GHG regulation;[156] the Bush Administration's Clear Skies Act, which would have established a national cap-and-trade program for power sector SO_2, NO_x, and mercury emissions;[157] various counterproposals to the Clear Skies Act that would add a cap-and-trade program for power sector GHG emissions;[158] proposals to reinstate the CAIR program after its remand in *North Carolina*;[159] and the spate of recent bills considered in the House of Representatives in response to Obama Administration EPA rules.[160] However, none of these legislative proposals has addressed the fundamental structural issues described above in section III.

In summary, proposals for reform of individual CAA regulatory programs provide ample grist for the legislative mill, although it should be noted that not many of these proposals have been formulated in enough detail to provide the basis for specific legislative proposals. To the extent proposals have been translated into legislation, those proposals have dealt with issues of current concerns to legislators, but have not addressed the major structural issues with the Act.

B. CAA Restructuring Option (Option B)

This section lays out the parameters of a more ambitious approach to restructuring the Act which, in broad outline, would have the following elements:

- Phase Out Grandfathering (and NSR) for Existing Sources, Establish Existing Source Performance Standards, and Streamline Regulation of Existing Stationary Sources. NSR for existing sources would be replaced with a requirement for periodic emission reductions to meet an Existing Source Performance Standard (ESPS). The ESPS would displace most of the CAA's individual stationary source regulatory requirements (see IV.B.1.c. below). A two-tier operating permit program, linked to the ESPS, would provide a platform for trading and market-based regulation, while protecting local air quality.
- Expand EPA Authority To Use Market-Based Regulation While Protecting Local Air Quality. The EPA would be given general authority to use trading and other market-based instruments across all CAA programs, subject to the "two-tier" permit program and other limitations to ensure protection of public health and local air quality.

156. American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. (2009) ("Waxman/Markey"); Clean Energy Jobs and American Power Act, S. 1733, 111th Cong. (2009) ("Kerry/Lieberman"); and Climate Stewardship and Innovation Act of 2007, S. 280, 110th Cong. (2007) ("McCain/Lieberman") are the most well-known of the climate proposals.

157. Clear Skies Act of 2005, S. 131, 109th Cong. (2005).

158. Clean Air Planning Act of 2005, H.R. 1873, 109th Cong. (2005).

159. Clean Air Act Amendments of 2010, S. 2995, 111th Cong. (2010); North Carolina v. EPA, 531 F.3d 896 (D.C. Cir. 2008).

160. These proposals are described at section II.E, above.

- Give the EPA Effective Tools to Deal with Interstate Transport by using the new ESPS authorities to control interstate transport, and by providing a supplemental role for states under their SIPs.
- Retain the Current NAAQS Process but revise the NAAQS less frequently.
- Reform the SIP Process by recognizing a principal role for the EPA in regulating mobile and large stationary sources and a supplemental role for states in controlling smaller sources and protecting local air quality.
- Accommodate GHG Regulation through the NSR, trading and regional transport reforms discussed above.

1. Phase Out Grandfathering (and NSR) for Existing Sources, Establish ESPS, and Streamline Regulation of Existing Sources

The 1970 CAA gave the EPA very limited tools to regulate otherwise-grandfathered existing stationary sources. As a result, Congress and the EPA have struggled for decades to fill this regulatory gap, and have developed complex and heavily-litigated programs to deal with discrete air quality problems as they have arisen. Thus, we have an alphabet soup of regulatory requirements – PSD, NSR, BACT, LAER, NESHAPs, and BART – in addition to a number of programs (mercifully) not yet reduced to acronyms: acid rain, interstate transport, and the EPA enforcement initiative. One approach to reducing complexity and increasing the effectiveness of stationary source regulation would be to consolidate these various regulatory regimes prospectively into a single "existing source performance standard" (ESPS) program. The ESPS program would be analogous to the current new source performance standards, and would set and periodically revise performance standards for classes of existing large stationary sources (whether or not modified) in much the same way such standards are set for new sources.[161] The ESPS program would be paired with a revised operating permit program under Title V (described below), which would deal with the need for location-specific emission limitations. The ESPS, combined with the revised permit program, would be designed to meet a set of objectives that encompass the goals of the separate existing regulatory programs for stationary sources, including—

- Interstate transport of criteria pollutants;
- Acid deposition;
- Control of HAP emissions;
- Visibility and regional haze; and
- NSR for both attainment and non-attainment areas.

161. An analogous process for setting effluent guidelines is provided under section 304(b) of the Clean Water Act, 33 U.S.C. § 1314(b).

a. Establishment of ESPS Program and Elimination of Existing Source NSR

Existing source performance standards could be set on a national (or regional, if necessary) basis. The ESPS would replace – and in large part incorporate – the substantive standards for NSPS, BACT, and LAER for modified existing sources.[162] The ESPS would also replace the section 111(d) program, much of the interstate transport program, as well as BART and NESHAPs for existing sources.

For example, in the case of coal-fired EGUs, the ESPS would include: (1) limits for SO_2 and NO_x that reflect a combination of NSPS and BACT statutory criteria; (2) standards for mercury and air toxics that reflect current NESHAP requirements (plus any changes made necessary by new HAP listings or residual risk determinations); and (3) a GHG standard that would replace BACT and NSPS for GHG emissions from modified existing EGUs. Section 111(d) performance standards for existing unmodified EGUs would be unnecessary. Any more stringent limitations required to meet regional haze and interstate transport objectives would be imposed through lowering the cap under the applicable cap-and-trade program (see section B.2, below). The two-tier operating permits (described in section B.1, below) would be issued to sources subject to ESPS.

Once an ESPS is prescribed for a source category and a two-tier permit is issued to sources in that category, existing source NSR (and the entire concept of "modification") would be eliminated for that category.[163] The ESPS would apply whether or not a modification had occurred. However, an existing source would not be required to upgrade pollution control facilities or reduce emissions to meet ESPS more often than once every ten years, and at the end of the ten-year period would be required to comply with the then-current ESPS.[164] This approach would thus permit coordinated upgrades for all pollutants emitted by a source (or its retirement) on a fixed date.[165] In combination with the trading and permit programs discussed below, it would also provide sources significant flexibility in their compliance strategies.

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162. For example, the ESPS might be defined as an emissions limitation that reflects the application of the best systems of emission reduction which (taking into account energy, environmental, and economic impacts and other costs) the EPA determines has been adequately demonstrated, except that in the case of a hazardous air pollutant such standard shall be prescribed in accordance with section 112. The standard could also incorporate requirements to phase down emissions over a period of years, and could include appropriate credit for retirement of facilities.

163. See *infra* section IV.B.2. for an exception for increase of emissions above source-specific limits in a two-tier permit.

164. The ESPS system would need to build in a reasonable lag period between promulgation of a revised ESPS and the requirement to comply – for example, at the ten year point the source would have to comply with ESPS provisions that had been in effect for at least four years. In addition, the EPA could be authorized to set a longer or shorter period for particular industries.

165. The National Academy of Public Administration (NAPA) suggests requiring major existing sources to upgrade to BACT or LAER within ten years and requiring certain other sources to upgrade to BACT or LAER every five years. FRESH AIR, *supra* note 65, at 133-35.

b. Two-Tier Operating Permits

In connection with the transition to the ESPS for a class of sources, the operating permits under Title V of the CAA for sources in that class would be restructured to provide for a "two-tier" permit system that would accommodate both the technology-based ESPS (ESPS tier) and any necessary location-based limitations (source-specific tier). The ESPS tier would reflect the generally applicable emission limitations imposed by the ESPS (other than the NESHAP which would be in the source-specific tier). The source-specific tier would include limitations necessary for local compliance with the NAAQS (including control of "hot spots")[166] and with emissions of HAPs. For regional transport, visibility, and regional haze, the principal reliance would be on the ESPS; however, the source-specific tier could include additional targeted emission reductions that are determined to be necessary to deal with interstate transport that contributes to non-attainment in specific downwind areas, and other emission limitations that may be specific to the source and its location, including compliance with PSD increments under section 163.[167]

Using the EGU example, the two-tier permit would incorporate the technology-based ESPS limits for each pollutant in the technology tier, and a separate source-specific tier that would impose emission limitations necessary for local compliance with the NAAQS, and other location-specific limitations.[168] The ESPS tier, because it reflects national or regional technology-based standards, could be either higher or lower than the level necessary to protect local air quality.

The new permits would be issued and revised for a source category on the same schedule as the ESPS, so that each source would have a single decadal requirement for pollution control upgrades.[169] This permit regime would also provide the platform for the expanded CAA trading regime discussed in section IV.B.2, below. Specifically, the technology based ESPS could be met either through installation of controls or through allowance purchases under a trading system, subject to any source specific limitations in the permit.

c. Streamlining Existing Regulatory Programs

Once an ESPS and two-tier permit program are established for a class of existing sources, most of the current regulatory programs for existing sources in that category would be modified or eliminated – prospectively. The EPA would no longer be setting, revising, or approving SIPs that set new emission limitations under the Act's interstate transport or regional haze provisions, nor would states (or the EPA) determine BACT, LAER, or BART for existing sources. To the extent emission limitations for existing sources were needed to

166. Hot spots are localized areas where high ambient concentrations of a pollutant occur. AIR QUALITY MANAGEMENT, *supra* note 3, at 17 n.7.

167. CAA § 163, 42 U.S.C. § 7473.

168. Thus, the ESPS SO_2 limit might be 0.005 lbs/MWH and a source-specific limit for SO_2 (necessary to ensure compliance with the SO_2 and PM 2.5 NAAQS) might be 0.002 per MWH.

169. Provision would need to be made for intra-decadal upgrades, upon a strong public health showing.

deal with transport, regional haze, HAPs, or to reflect current emissions technologies, they would be set as part of the ESPS. However, existing operating permits, NESHAPs, NSPS, BACT, LAER, and BART determinations would continue to apply and would be incorporated into any revised Title V operating permits, unless superseded by more stringent ESPS requirements. Moreover, in order to protect local air quality, NSR provisions relating to preconstruction permits, offsets, and air quality modeling[170] (but not BACT or LAER) would be retained for existing sources that proposed to increase emissions (for any reason) significantly above source-specific levels specified in applicable operating permits under Title V of the CAA.

The effect of these changes would be essentially to end both NSR for existing sources and the original grandfathering policy that was embedded in the 1970 CAA, to vastly simplify the regulation of existing sources by prospectively eliminating or simplifying a plethora of individual regulatory programs, and to replace them with a periodically updated ESPS for each source category. The new approach would also replace NSR's inflexible and ineffective requirement to upgrade pollution controls only when equipment is modified (the requirement to upgrade would not be linked to a "modification"). Additionally, because it would be linked with a trading program, it would provide both the flexibility and the economic incentives for cost-effective controls that are inherent in a cap-and-trade system.

d. New Sources

Under the regime proposed here, new sources (but not modified existing sources) would remain subject to most of the existing regulatory structure, except, potentially, for a change in the Act to omit the overlap between NSPS and BACT/LAER.

2. Expand EPA Authority to Use Market-Based Regulation While Protecting Local Air Quality

a. Expansion of Authority

In connection with ESPS and the two-tier permit programs, the EPA's authority to use market-based regulation would be clarified and expanded. Existing law (outside of the acid rain program) provides limited and unclear authority to use market-based regulation. SIPs may "include[e] economic incentives such as fees, marketable permits, and auctions of emission rights."[171] However, this authority, by its terms, is limited to SIPs and does not explicitly extend to other regulatory programs under the CAA, such as NSPS under section 111(b)[172] or mobile source regulation under Title II,[173] and has questionable

170. CAA § 173, 42 U.S.C. § 7503.

171. CAA § 110(a)(2)(A), 42 U.S.C. § 7410(a)(2)(A).

172. CAA § 111(b), 42 U.S.C. § 7411(b). Section 111(d) (performance standards for existing sources) arguably incorporates section 111(a)(2)(A) by reference because it contemplates a process similar to that provided in section 110. CAA § 111(d)(1), 42 U.S.C. § 7411(d)(1).

application to BACT, LAER, and BART.[174] Moreover, even in the SIP context, its relationship to other provisions of section 110 is unclear. For example, in *North Carolina* the court remanded the CAIR program in part because the interstate trading regime did not ensure that each upwind state's emissions reductions sufficiently reduced its contribution to each downwind state's non-attainment.[175]

The EPA needs to be given clear authority to use market-based instruments across all of its regulatory programs (potentially including mobile sources). This authority should include cap-and-trade mechanisms, emission averaging (either at the facility level or over a wide geographic area), emission offsets, banking, emission fees, and allowance auctions.

b. Protecting Local and Downwind Air Quality

Market-based regulation, to be successful, has to be carefully executed. If market-based authority is expanded, the EPA needs to be given the direction (and authority) to ensure air quality meets applicable requirements, both regionally and locally. Trading and offset policies work well if the need for the emission limitation is not location-specific. (GHG emission control is an example of an emission limitation that is not location-specific.) If a location-specific emission limitation is required, the problem is more complicated because a trading program, unless otherwise constrained, allows a source unlimited emissions so long as the requisite number of allowances are surrendered to the regulator. As a result, regulators may be unable to predict or control the quantity of emissions by individual sources, even though with a cap they can predict the overall volume of emissions. For this reason, regulators and the public can have legitimate concerns, both in the local air quality context (including "hot spots") and in the context of interstate transport, that a trading program by itself may not be sufficient to meet air quality requirements and protect public health. A cap-and-trade system does not guarantee a particular level of air quality everywhere it operates.

The air quality issues associated with trading can be dealt with administratively through properly drafted operating permits, trading ratios, and other tools. The "two-tier" permit regime described above, which sets a technology-based "ESPS tier" and a "source-specific tier," would be a key safeguard in this respect. Trading policy would allow the ESPS tier to be exceeded using the trading mechanism (for example, by purchase of allowances from other sources who are reducing their emissions) up to an absolute limit on emissions (the "source-specific level") that is set at a level necessary to ensure local air quality, and if necessary, to meet interstate transport objectives. The way trading would work under a two-tier trading system is as follows:

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173. CAA §§ 202-250, 42 U.S.C. §§ 7521-7590.

174. Kyle Danish, et al., *The Clean Air Act and Global Climate Change*, *in* CLEAN AIR HANDBOOK 538-60 (Julie R. Domike & Alec C. Zacaroli eds., 3d ed.) (2011).

175. North Carolina v. EPA, 531 F.3d 896, 907 (D.C. Cir. 2008).

- ESPS Tier More Stringent Than Source-Specific Tier—If the source has an ESPS tier that is more stringent than its source-specific tier, then it may purchase allowances to cover any increase of emissions up to the source specific level. For example, an EGU in an attainment area may be required by ESPS to reduce emissions far below the level required to meet local air quality requirements. In that case, the EGU could comply with the ESPS either by installing additional emission controls or by purchase of allowances. (We assume in this example that allowance allocations would not exceed ESPS levels; see below for conditions under which allowances would be reduced to deal with regional transport.)
- Source-Specific Tier More Stringent Than ESPS Tier—In cases where the source-specific tier is more stringent than the ESPS tier (for example, where the source was in an extreme non-attainment area and was required to meet a level of control more stringent than ESPS), the source could not increase emissions above the source-specific level, but to the extent its allowance allocation under a trading program gave it surplus allowances, they would be available for sale to sources whose ESPS was more stringent than their source-specific tier.

If a cap-and-trade program were implemented, the level of cap would in the first instance be equal to the sum of NSPS/ESPS limits applicable to covered sources;[176] however, caps could be lowered to deal with regional transport as explained in section IV.B.3, below.

In addition to the two-tier permit program, the EPA's regulatory tools to deal with air quality issues arising in the context of market-based regulation could also include trading ratios (when sources in high exposure areas would need to surrender more allowances per ton of pollutants than sources in sparsely populated areas),[177] zonal trading (where trading between geographic areas would be restricted), emission averaging and facility-wide emission limits, as well as requirements to purchase offsets within a local air shed to protect local air quality.

To make market-based regulation work effectively, the EPA needs both legal authority and monitoring tools to fine tune permit requirements and trading system design as experience shows whether the flexibility afforded sources under trading programs contributes to nonattainment either locally or in downwind areas.[178]

176. In this circumstance, the ESPS in essence becomes an allowance allocation formula.

177. More specifically, local health impacts of a source's emissions depend on the density of other sources in the area and population density. Requiring higher surrender ratios for high-exposure areas provides significant economic incentives to shift emissions to low-exposure areas. The two tier permit program would be designed to ensure that this shifting would not endanger public health by setting firm limits on emissions by sources in the low-exposure area.

178. Trading programs also present technical market design issues. Trading programs where each covered source has an absolute annual or other periodic mass emission limit (such as tons per year) are relatively straightforward to implement (the acid rain program under Title IV of the CAA is a model). CAA §§ 401-416, 42 U.S.C. §§ 7641-7651*o*. On the other hand, programs involving covered sources subject to "rate

In sum, the EPA can, and should, be provided with expanded market-based regulatory authority, but its authority needs to be coupled with clear direction and authority to protect local and regional air quality.

3. Give the EPA Effective Tools to Control Regional Transport

Several studies have recommended making regulation of interstate transport primarily a federal responsibility, rather than trying to address the problem through the cumbersome and time-consuming SIP process.[179] This suggestion makes sense. The principle tool for dealing with interstate transport should be federal NSPS and ESPS requirements for large sources, supplemented by more stringent regional NSPS and ESPS requirement as necessary to lower criteria pollutant emissions so that states in a region may attain the NAAQS. If more is required, the EPA should have explicit authority to prescribe supplemental state emissions caps that would be met through SIP revisions. A state, in revising its SIP, could provide for controls on sources not subject to NSPS/ESPS, more stringent controls on NSPS/ESPS sources, or mobile source controls under section 177 of the Act.[180] This new regional transport authority would eliminate much of the complexity that has repeatedly tripped the EPA up in the courts, by modifying the current "significant contribution" test,[181] permitting the EPA to set regional caps, establishing trading programs, and imposing limits on trading (zones, tier permits, variable surrender ratios) as necessary to carry out the program. Because the EPA would have initial responsibility for controlling interstate transport through its NSPS and ESPS authorities, disputes over whether the EPA could act by FIP in advance of State SIPs would largely be mooted.

4. Retain the Current NAAQS Process with Less Frequent Revisions

As discussed above, administrative lawyers and some judges have raised concerns about what they regard as an essentially standard-less process for setting the NAAQS. The Supreme Court has upheld the constitutionality of the current statutory formula for setting the NAAQS, has held that the formula does not permit consideration of compliance costs, and has left to the EPA the task of

based" standards (such as pounds of SO_2 per MWH) are more complicated. An individual source's allowable emissions can increase as output or fuel input increases, making it difficult to predict overall emissions of the regulated pollutant.

Offset programs also present significant difficulties unless the source selling the offset is subject to enforceable emission limits. A particular concern relates to allowing offsets for emission reductions from otherwise unregulated sources, because of the difficulty in determining what the source's emissions would have been but for participation in the program. Accordingly, the EPA and state agencies must proceed carefully if sources in a market-based program have rate-based emission limitations, or none at all. Rate-based limitations can be accommodated if permits have a limitation on maximum output or fuel input. Offset programs that apply to unregulated sources require labor-intensive calculations of a baseline emission scenario.

179. *See, e.g.*, BREAKING THE LOGJAM, *supra* note 151, at 87, 90-92; AIR QUALITY MANAGEMENT, *supra* note 3, at 292.

180. *See supra* note 42.

181. *See supra* notes 28-29 and accompanying text.

applying the formula.[182] One approach to providing more congressional guidance to the EPA in setting the NAAQS would be to amend the Act to explicitly permit consideration of cost in setting the NAAQS. The politics of this approach may be daunting, given the long-standing position of the environmental community on this issue.[183] More importantly, as highlighted above in section III.B.1, cost benefit analysis involves a series of highly contestable judgments as to future compliance costs and the value of future health benefits. Thus, even if Congress could be persuaded to build it into the NAAQS statutory standard, cost benefit analysis would be unlikely to provide the touchstone for setting the NAAQS.

Another approach might be to leave well enough alone – that is, to live with the present process. Existing practice entails a scientific assessment of the public health risks associated with exposure to a particular pollutant, an extra-statutory review of the costs associated with compliance with a proposed NAAQS, input from the public and other federal agencies, and ultimately a decision by the Office of Information and Regulatory Affairs and the White House[184] on the level of the NAAQS. One could argue that this decision is not a technocratic exercise for economists and epidemiologists, but rather a social and political judgment involving trade-offs between public health and welfare on the one hand, and costs to industry, burden on states, and consumer impacts on the other hand. For that reason, it is one that should be made by, or under the supervision of, elected officials. While Congress can provide general guidance on the NAAQS, setting the standard is a social judgment that the President, and executive branch officials reporting to the President, are best-equipped to make.

One legislative change that Congress should consider is to modify the current schedule for revision of the NAAQS, which requires a review at least every five years.[185] That period could be lengthened to ten or twelve years, so as to avoid pancaking successively more stringent compliance requirements on state agencies.[186]

5. Reform the SIP Process

Much recent commentary has focused on the cumbersome federal-state SIP partnership, arguing that it focuses too much on trying to predict through modeling whether a SIP will attain its NAAQS and not enough on whether the

182. *See supra* section III.B.1.

183. *See, e.g.*, Howard Fox, *A Supremely Sweet Victory for Clean Air and Public Health*, EM FORUM, June 2001, at 24 (reviewing the Supreme Court's holding in *Whitman v. American Trucking Ass'ns.* that the EPA is not permitted to use cost in determining NAAQS levels).

184. Exec. Order No. 12,866, 58 Fed. Reg. 51,735 (Sept. 30, 1993); Exec. Order No. 13,563, 76 Fed. Reg. 3821 (Jan. 18, 2011).

185. CAA § 109(d)(1), 42 U.S.C. § 7409(d)(1).

186. Because the review period is a maximum period, the EPA is always free to conduct more frequent reviews if dictated by public health considerations or technology changes. CAA § 109(d)(1), 42 U.S.C. § 7409(d)(1) (noting that "[t]he Administrator may review and revise criteria or promulgate new standards earlier or more frequently than required under this paragraph").

air quality standard is actually met years later, or on how to remedy failure to attain the standard when it occurs.

Both the National Research Council (NRC) and the authors of *Breaking The Logjam* recommend significant changes to the current SIP process. The NRC recommends changing the focus of the process from reviewing compliance with regulatory requirements at the time of submission of the SIP, to reviewing the SIP's actual attainment of the NAAQS at the scheduled compliance date.[187] *Breaking The Logjam* recommends a more fundamental change in the current model:

> - Adopt direct federal controls on all important sources of criteria pollutants, including large stationary sources, fuels, and new vehicles.
>
> * * * *
>
> - Establish backstops to remedy any failure of the federal cap-and-trade system to perform as expected; any backsliding by states or harmful interstate spillovers; hot spots; or shortfalls in achieving National Ambient Air Quality Standards.
> - Require EPA to provide the states and localities with guidelines for regulating the small sources of predominantly intrastate pollution left to their control and to provide the public with candid rankings of states' and localities' performance in reducing emissions and improving air quality.[188]

Both studies' proposals have useful elements. First, it is important to retain the federal primary NAAQS as a minimum public health benchmark to determine whether the Act's program is meeting its objectives. At the same time, states should be allowed (as under present law) to impose more stringent standards to protect large populations or for other reasons. Second, the federal NSPS and ESPS limits, and mobile source controls under Title II would be recognized as the basic control tools for large stationary sources and mobile sources. Current SIPs would remain in place (with revisions to conform to the recommendations discussed above), unless monitoring showed that the SIPs (plus NSPS and ESPS) were insufficient to attain federal ambient standards, at which point states would be required to revise their SIPs. States would have the option of imposing more stringent controls on large sources already subject to NSPS and ESPS,[189] to reduce emissions from smaller sources, to adopt mobile source controls under section 177, or any combination of the foregoing. As necessary, the EPA would prescribe more stringent regional NSPS/ESPS requirements to deal with large sources' contributions to the state's non-attainment, applicable both to in-state and upwind sources.[190]

To effectuate this transition to this new SIP model, two further changes should be considered: (1) a significant enhancement of the current ambient air monitoring network, and (2) a more effective set of sanctions if a state fails to

187. AIR QUALITY MANAGEMENT, *supra* note 3, at 128-30, 296-300.

188. BREAKING THE LOGJAM, *supra* note 151, at 97.

189. Under the trading and two-tier permit system suggested above this would be implemented by making the source specific tier more stringent.

190. *See supra* section IV.B.3 (discussing regional transport).

carry out measures that may be necessary, in addition to federal NSPS/ESPS and mobile source controls, to bring the state into attainment. One such sanction could be emission fees that apply automatically to large sources in the state that contribute to its non-attainment, similar in concept to the emissions penalties that apply to major VOC sources in severe and extreme ozone non-attainment areas that miss their compliance deadlines.[191] The fees would be imposed and collected by the state; if the state failed to impose fees, the EPA would collect the fees for the U.S. Treasury.

6. Accommodate GHG Regulation

From the standpoint of coverage, cost-effectiveness, and relative administrative simplicity, an economy-wide cap-and-trade or carbon tax remains the best choice for a domestic GHG regulatory regime.[192] The CAA, even with the structural changes described in the preceding sections, will incompletely regulate mobile sources[193] and will not accommodate regulation of emissions from small stationary sources that is necessary for economy-wide GHG regulation.[194] However, the structural changes recommended above will permit a more streamlined and cost-effective regulation of the sectors subject to GHG regulation under the current Act – large stationary sources and new motor vehicles. Specifically, the new authority for market-based regulation, including emission trading and offsets, will permit a national GHG cap-and-trade program for stationary sources subject to NSPS/ESPS, as well as offset programs reaching other stationary source sectors. Incorporation of mobile sources (which are regulated through emission standards for new vehicles) into a cap-and-trade program is also possible, but complicated.[195] A CAA program of the type described above could reach an estimated 70-80% of U.S. CO_2 emissions (59-67% of U.S. GHG emissions).[196]

The streamlining changes discussed in section IV.A above, would eliminate NSR and BACT/LAER for most existing sources, largely resolving the statutory NSR threshold issue (100/250 tons per year) that the EPA and the courts wrestled with in *Coalition For Responsible Regulation*.[197] The ESPS and expanded trading regime will also give the EPA a much more direct route to control GHG emissions from existing stationary sources through a national cap-and-trade program.

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191. CAA § 185, 42 U.S.C. § 7511d.

192. *New Wine*, *supra* note 126, at 72.

193. Under Title II of the CAA, regulation of mobile sources is limited to setting emission rates for new vehicles and other transport (in terms of emissions per mile); the EPA cannot regulate the intensity of use of vehicles (i.e., vehicles miles traveled). 42 U.S.C. §§ 7521-7590.

194. Robert Nordhaus & Kyle Danish, *Assessing the Options for Designing a Mandatory U.S. Greenhouse Gas Reduction Program*, 32 B.C. ENVTL AFF. L. REV., 127-33 (2005) [hereinafter *Assessing the Options*]; *New Wine, supra* note 126, at 65-66.

195. *Assessing the Options*, *supra* note 194, at 154.

196. *New Wine*, *supra* note 126, at 70.

197. Coalition for Responsible Regulation v. EPA, 684 F.3d 102, 116 (D.C. Cir. 2012).

Thus, the structural changes recommended for the Act's regulation of conventional pollutants would significantly streamline the EPA's regulation of GHG, permitting a national GHG cap-and-trade program for large stationary sources, an offset program potentially linking to GHG standards for new motor vehicles with those for stationary sources, and potentially covering up to 80% of U.S. GHG emissions.

7. Transition

Moving from the current CAA to a restructured regime requires careful planning to ensure that the air quality gains made so far under the Act are not dissipated. To control backsliding, current Title V operating permit emission limitations would remain in effect except to the extent superseded by more stringent limitations under the two-tier permit system. Similarly, emission limitations under SIPs, FIPs, and rules in effect at the transition point would remain in effect until modified in accordance with the restructured Act. Transition provisions would need to include anti-backsliding guidelines for the EPA's approval of revised SIPs and its revisions of its own rules.

V. CONCLUSION

The Clean Air Act pioneered a system of environmental regulation that in its early years was remarkably successful in improving air quality, protecting public health, and dealing with acid rain at socially acceptable costs. The question for Congress, NGOs, and the business community is whether the Act as currently configured can continue to produce this stream of benefits. This article argues that the Act requires major changes in order to continue to provide its public health and other benefits at acceptable cost. Absent structural change to the Act, we may also risk loss of political consensus that has sustained the Act over the last four decades.

At this writing (Fall 2012), it is unclear what appetite, if any, Congress, industry, or the environmental community have for major (or even minor) changes in the Clean Air Act. Much will depend on the outcome of the 2012 election and of pending litigation over the EPA's recent rules. Option A offers a menu of individual changes to the Act which can be taken up separately or as a package. Option B is a set of interrelated changes to the Act which are likely to be more effective in increasing its effectiveness and decreasing compliance costs, but which may be more difficult for an already balky Congress to consider. But, absent some form of major change, it is not clear how the United States can continue cost-effectively to pursue the Act's public health objectives or whether the nation can maintain the political will to do so.

APPENDIX I[198]
ENVIRONMENTAL EXTERNALITIES
COAL v. NATURAL GAS
(before CAIR, CSAPR, CAMR, MATS)

Fuel	Value Added (billions/yr)	Gross Environmental Damage (GED) (billions/yr)	Net Value Added (billions/yr)	GED Cost/KWH (¢)
Coal Generation				
• Base Case ($6m/life; CO2 excluded)	$24B	$53B	-$29B	2.8¢
• CO2 included	$24B	$69B	-$45B	3.6¢
• $2M/life	$24B	$19B	+$5B	1.0¢
Natural Gas Generation				
• Base Case	$3B	$0.9B	+$2.1B	0.9¢
• CO2 included	$3B	$3.4B	-$0.4B	1.5¢
• $2M/life	$3B	$0.3B	+$2.7B	0.3¢

Notes:
$/life = value per saved life
CO_2 included = CO_2 damages @$27 / ton CO_2

198. Derived from *Environmental Accounting, supra* note 94, at 1670.

APPENDIX II

Glossary of Terms

BACT	Best Available Control Technology
BART	Best Available Retrofit Technology
CAA	Clean Air Act
CSAPR	Cross-State Air Pollution Rule
EGU	Electric Generating Unit
EPA	Environmental Protection Agency
ESPS	Existing Source Performance Standard
FIP	Federal Implementation Plan
GHG	Greenhouse Gas
HAP	Hazardous Air Pollutant
LAER	Lowest Achievable Emission Rate
MACT	Maximum Available Control Technology
MATS	Mercury and Air Toxics
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standards for Hazardous Air Pollutant
NRC	National Research Council
NSR	New Source Review
NSPS	New Source Performance Standards
PSD	Prevention of Significant Deterioration
SIP	State Implementation Plan