Strong Law, Timid Implementation. How the EPA Can Apply the Full Force of the Clean Air Act to Address the Climate Crisis

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I.
INTRODUCTION

Dangerous climate change is upon us. Reports of stronger storms, longer droughts, heat waves, crop failures, melting sea ice, and species declines are now ubiquitous. These and other impacts of climate change are certain to worsen in the coming years. As NASA's James Hansen and his colleagues warned in 2008, atmospheric carbon dioxide (CO_2) levels are already unsafe. Without deep and rapid emission reductions, changes to the Earth's climate and ecosystems will render our planet unrecognizable:

> If humanity wishes to preserve a planet similar to that on which civilization developed and to which life on Earth is adapted, paleoclimate evidence and ongoing climate change suggest that CO_2 will need to be reduced from its current 385 ppm [parts per million] to at most 350 ppm, but likely less than that.[1]

Despite similarly urgent warnings from scientists around the world, greenhouse gas emissions continue largely unabated. At the end of 2011, atmospheric CO_2 was at 390 ppm and rising.[2]

The 2008 election of Barack Obama, who pledged to reduce greenhouse emissions, created expectations that the United States government would finally heed scientific warnings about the urgency of climate change. However, any sense of momentum towards meaningfully addressing the climate crisis stalled with the defeat of economy-wide climate legislation in the 111th Congress, the concurrent failure of international climate negotiations in Copenhagen in late 2009, and the 2010 election of a new Congress openly hostile to any form of greenhouse regulation.

1. James Hansen et al., *Target Atmospheric CO_2: Where Should Humanity Aim?*, 2 OPEN ATMOSPHERIC SCI. J. 217, 217 (2008).

2. *Earth's CO_2 Home Page*, CO_2NOW.ORG, http://co2now.org (last visited Feb. 17, 2012).

Consequently, the leading effort to tackle greenhouse emissions on a national level has been the Environmental Protection Agency's (EPA) nascent regulation of CO_2 and other greenhouse gases as "pollutants" under the forty-year-old Clean Air Act (CAA or Act).

Despite legal challenges and legislative attacks by greenhouse polluters and their defenders in Congress, the EPA's implementation of several provisions of the CAA is now underway. Greenhouse gas-limiting rules for automobiles are finally in place, and emissions limitations now apply to CO_2 from some of the largest smokestack sources. Nevertheless, the EPA's efforts to date have failed to reduce the United States' overall greenhouse gas emissions. In fact, under provisions for regulating tailpipe emissions from cars and trucks, total annual CO_2 emissions from the vehicle sector will still *increase* beyond current levels. Similarly, new greenhouse gas-constrained permits for coal-fired power plants have provided little or no CO_2 reductions. In short, while the EPA's early greenhouse gas regulations will reduce the rate at which United States greenhouse gas emissions would rise absent such regulation, they *have not yet reduced or even stabilized* emissions at current levels, much less reduced them to the degree recommended by scientists to avert dangerous climate change.

Detractors of the EPA's authority to regulate greenhouse gases might argue that the CAA has to date been ineffective because the statue is "ill-suited" to the regulation of greenhouse pollution. The real problem is something else entirely. The agency has moved forward with greenhouse gas regulation only tentatively, construing standards in a manner that fails to meaningfully reduce emissions. As Lisa Heinzerling, a former high-level EPA official during the first two years of the Obama administration, said recently of the CAA's new source review program for greenhouse gases, "the implementation of that program could be criticized, but not because it's too extreme—if anything, because it's too modest."[3] The EPA has also simply ignored important provisions of the CAA that would require the setting of science-based emissions limitations.

In this article we make the case for full implementation of the CAA for greenhouse gases. We advocate for designating greenhouse gases as "criteria air pollutants" and establishing a na-

3. Robin Bravender, *EPA Rules May be too Weak, Ex-official Says*, POLITICO PRO, May 5, 2011.

tional ambient air quality standard (NAAQS), or maximum ambient concentrations, for CO_2. Sections 108 through 110 of the CAA require the EPA to identify criteria air pollutants and set a NAAQS for each criteria pollutant to protect the public health and welfare, and require states to develop and implement state implementation plans (SIPs) to meet the NAAQS. The EPA's successful regulation of "conventional" criteria air pollutants over the past four decades has achieved dramatic emissions reductions for each of the six listed pollutants, all while the country's population, economy, and energy use have grown substantially. There is no reason why the agency could not do the same with greenhouse gases.

II.
GREENHOUSE REDUCTION BY THE NUMBERS: SCIENCE VS. POLICY

The signs of climate change are everywhere, yet a sharp disconnect remains between the emissions reductions needed to address the problem and what is actually being accomplished on the ground and in the political arena. Observed climate impacts from anthropogenic emissions to date include a 0.8°C global average increase in surface temperature, a thirty percent rise in ocean acidity, more frequent floods, droughts and other extreme weather events, hundreds of thousands of climate-related deaths each year, declines and extirpations of numerous animal and plant populations, widespread coral bleaching, an approximately fifty percent decline in Arctic summer sea-ice extent and thickness from the 1950s to 1970s, the near-global retreat of alpine glaciers, and the accelerating loss of the Greenland and west Antarctic ice sheets.[4] Further impacts from current CO_2 concentrations are now unavoidable due to inertia in the climate system.[5]

4. Rachel Warren, *Impacts of Global Climate Change at Different Annual Mean Global Temperature Increases*, *in* AVOIDING DANGEROUS CLIMATE CHANGE 93 (H.J. Schellnhuber et al. eds. 2006); Camille Parmesan, *Ecological and Evolutionary Responses to Recent Climate Change*, 37 ANN. REV. OF ECOLOGY EVOLUTION & SYSTEMATICS 637 (2006); Julienne Stroeve et al., *Arctic Sea Ice Extent Plummets in 2007*, 89 EOS, TRANSACTIONS, AM. GEOPHYSICAL UNION 13 (2008); Ron Kwok & David A. Rothrock, *Decline in Arctic Sea Ice Thickness from Submarine and ICESat Records: 1958–2008*, 36 GEOPHYSICAL RES. LETTERS L15501 at 5 (2009); Hansen, *supra* note 1, at 218; Global Humanitarian Forum, Anatomy of a Silent Crisis 9–12 (2009), *available at* http://www.ghf-ge.org/human-impact-report.pdf.

5. Gerald A. Meehl et al., *Global Climate Projections*, *in* Climate Change 2007: The Physical Science Basis, Contribution of Working Group I to the Fourth Assess-

Yet it is not too late to avoid the very worst of what climate change may bring. Reducing atmospheric concentrations of CO_2 to 350 ppm by the end of this century provides a reasonable chance of limiting temperature rise to 1.5°C above preindustrial levels[6] and avoiding profound devastation for people and the planet.[7] To reach this goal, however, total global emissions must peak as soon as possible and decline rapidly thereafter. We are now in the "critical decade."[8] Actions taken (or not taken) in the next few years will have profound consequences. According to one analysis, delaying the global emissions peak from 2011 to 2015 will require a *doubling* of annual emission reductions thereafter to meet the same temperature target.[9]

There is a stark disconnect between what science requires and what domestic and international political processes have produced. For example, reaching a 350 ppm target will require U.S.

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ment Report of the Intergovernmental Panel on Climate Change 747, 763 fig.10.5 (Susan Solomon et al. eds. 2007); Veerabhadran Ramanathan & Yan Feng, *On Avoiding Dangerous Anthropogenic Interference with the Climate System*, 105 PROC. NAT'L ACAD. SCI. 14245, 14247 (2008); Hansen, *supra* note 1, at 226.

6. Hansen, *supra* note 1, at 226; FRANK ACKERMAN ET AL., ECON. FOR EQUITY & THE ENV'T, THE ECONOMICS OF 350: THE BENEFITS AND COSTS OF CLIMATE STABILIZATION 41–42 figs. B2 & B3 (2009), *available at* http://www .e3network.org/papers/Economics_of_350.pdf (change in temperature translated from 1990 levels to change from pre-industrial levels by adding 0.6°C).

7. While limiting global average temperature rise to 2°C was once characterized as the threshold between acceptable and "dangerous" climate change, the latest assessments finding an increase in the severity of impacts from a 2°C rise in temperature now more accurately put the 2°C target as the threshold between dangerous and "extremely dangerous" climate change. Joel B. Smith et al., *Assessing Dangerous Climate Change Though an Update of the Intergovernmental Panel on Climate Change (IPCC) "Reasons for Concern,"* 106 PROC. NAT'L ACAD. SCI. 4133, 4134 fig.1 (2009), *available at* http://www.pnas.org/content/106/11/4133.abstract; Kevin Anderson & Alice Bows, *Beyond 'Dangerous' Climate Change: Emission Scenarios for a New World*, 369 PHIL. TRANSACTIONS ROYAL SOC'Y 20, 23 (2011).

8. AUSTL. DEP'T OF CLIMATE CHANGE AND ENERGY EFFICIENCY, THE CRITICAL DECADE: CLIMATE SCIENCE, RISKS AND RESPONSES 55 (May 2011), *available at* http://climatecommission.gov.au/wp-content/uploads/4108-CC-Science-WEB_3-June.pdf.

9. PAUL BAER ET AL., 350 PPM EMERGENCY PATHWAY 4 (2009), *available at* http://www.gdrights.org/wp-content/uploads/2009/11/a-350-ppm-emergency-pathway-v2.pdf. A recent assessment by the International Energy Agency similarly concluded that unless stringent emissions reduction measures are in place by 2017, the world's entire budget of emissions through 2035 will be effectively locked in, and the cost of building future low-carbon infrastructure will rise dramatically. INT'L ENERGY AGENCY, WORLD ENERGY OUTLOOK 2011 EXECUTIVE SUMMARY 2 (2011), *available at* http://www.iea.org/weo/docs/weo2011/executive_summary.pdf. Indeed, the IEA characterized delayed action as a "false economy," with each dollar of avoided investment in the power sector by 2020 requiring an additional $4.30 to be spent thereafter. *Id.*

emissions reductions of greater than forty percent below 1990 levels by 2020 and to levels approaching zero by 2050.[10] Yet even at the high point of recent U.S. attention to the climate crisis—the conclusion of the 2009 United Nations Climate Change Conference in Copenhagen—the U.S. offered no more than a non-binding pledge to reduce emissions by seventeen percent below 2005 levels by 2020 (or less than four percent below 1990 levels).[11] While others like the European Union have pledged deeper reductions, the pledges announced by various nations in the wake of Copenhagen leave the world on track toward CO_2 concentrations of more than 650 ppm by the end of this century,[12] leading scientists to characterize the Copenhagen Accord as "paltry."[13] The Copenhagen "pledge and review" framework, still championed by the U.S. in ongoing international negotiations, would thus commit us to climate damage of a magnitude difficult to comprehend.[14]

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10. See BAER ET AL., *supra* note 9.

11. U.N. Framework on Climate Change, 15th Sess. of the Conf. of the Parties, Copenhagen, Den., December 7–18, 2009, *Report of the Conference of the Parties* 5–7, U.N. Doc. FCCC/CP/2009/11/Add.1 (Mar. 30, 2010), *available at* http://unfccc.int/resource/docs/2009/cop15/eng/11a01.pdf; U.S. Inscription of the Copenhagen Accord, letter from Todd Stern, U.S. Special Envoy for Climate Change, to Yvo de Boer, Exec. Sec'y, U.N. Framework Convention on Climate Change (Jan. 28, 2010) (on file with author), *available at* http://unfccc.int/files/meetings/cop_15/copenhagen_accord/application/pdf/unitedstatescphaccord_app.1.pdf.

12. CLAUDINE CHEN ET AL., CANCUN CLIMATE TALKS: KEEPING OPTIONS OPEN TO CLOSE THE GAP 9 (Jan. 2011), *available at* http://www.climateactiontracker.org/briefing_paper_cancun.pdf; UNITED NATIONS ENV'T PROGRAMME, THE EMISSIONS GAP REPORT: ARE THE COPENHAGEN ACCORD PLEDGES SUFFICIENT TO LIMIT GLOBAL WARMING TO 2°C OR 1.5°C? A PRELIMINARY ASSESSMENT (Advance Copy Nov. 2010) 15. *See also* Smith et al., *supra* note 7; Anderson & Bows, *supra* note 7, at 40.

13. Joeri Rogelj et al., *Copenhagen Accord Pledges are Paltry*, 464 NATURE 1126 (2010).

14. The Royal Society recently devoted an entire issue of its journal to exploring the consequences of 4°C warming by 2100, the high end of the temperature range predicted (2.6–4°C) if atmospheric CO_2 concentrations reach 650 ppm. *See* Mark New et al., *Four Degrees and Beyond: The Potential for a Global Temperature Increase of Four Degrees and its Implications*, 369 PHIL. TRANSACTIONS ROYAL SOC'Y 6 (2011). Although site-specific, long-term effects are difficult to predict, a 4°C world could be marked by massive population shifts from cities and low-lying areas inundated by a meter or more of sea level rise, frequent crop failures and even agricultural collapse in areas such as Sub-Saharan Africa, increased water stress and food security issues, the permanent loss of summer sea ice in the Arctic, and the possible triggering of feedback mechanisms (for example, methane releases from permafrost melting and the collapse of the Greenland and West Antarctica ice sheets) that could magnify climate impacts even further. *Id.* at 10.

III.
A BRIEF SURVEY OF CLEAN AIR ACT REGULATION TO DATE FOR GREENHOUSE GASES: VAST POTENTIAL BUT LITTLE PROGRESS

Under President Obama, the EPA finally began to use the CAA to reduce greenhouse pollution. Yet the tentative steps taken by the EPA thus far are insufficient to achieve even the nation's modest Copenhagen pledge, much less the ambitious reductions consistent with a pathway to 350 ppm. At fault is not the Act itself, but the EPA's failure to use it to its full extent.

Four decades of implementation demonstrate that the CAA works. In 2010 alone, reduced pollution resulting from the CAA is estimated to have saved more than 160,000 lives, avoided more than 100,000 hospital visits, enhanced productivity by preventing 13 million lost workdays, and kept kids healthy and in school, avoiding 3.2 million lost school days due to respiratory illness and other diseases caused or exacerbated by air pollution.[15] The Act has been particularly effective at reducing emissions of the six criteria air pollutants: sulfur oxides, nitrogen oxides, particulate matter, carbon monoxide, ozone, and lead. Between 1970 and 1990, sulfur oxides declined by forty percent, nitrogen oxides thirty percent, carbon monoxide fifty percent, particulate matter seventy-five percent, ozone fifteen percent, and lead ninety-nine percent compared to likely emissions without the CAA. During the same period, the economy grew by seventy percent and population grew by twenty-two percent.[16] Between 1990 and 2008, these pollution reductions continued, with a further forty-one percent reduction in the aggregate emissions of the six criteria air pollutants. These reductions occurred while the United States saw a sixty-four percent increase in gross domestic production, twenty-two percent increase in population, nineteen percent increase in energy use, and twenty percent increase in greenhouse

15. ENVTL. PROT. AGENCY, THE BENEFITS AND COSTS OF THE CLEAN AIR ACT: 1990 TO 2020 5-25 tbl. 5-6 (2010), *available at* http://www.epa.g ov/oar/sect812/feb11/fullreport.pdf. Moreover, the economic value of the Act's public health, ecological, and other benefits far outweigh the costs of the regulations. Over the period of 1990 to 2020, the economic value of the Act's benefits is projected to exceed the cost of compliance by a factor of more than 30 to 1. *Id.* at 7-1.

16. ENVTL. PROT. AGENCY, THE BENEFITS AND COSTS OF THE CLEAN AIR ACT: 1970 TO 1990 ES-3 (1997).

gas emissions (which were not subject to controls during this time period).[17]

Despite the Act's success in reducing pollution and its proven cost-effectiveness, the EPA has been slow to apply the Act to greenhouse gases. Ten years elapsed between the EPA's receipt in 1999 of a citizen petition to regulate greenhouse emissions from automobiles pursuant to section 202 of the CAA and the agency's conclusion that emissions from automobiles contribute to greenhouse pollution that endangers public health and welfare (the so-called "Endangerment Finding").[18] The EPA has since issued greenhouse gas reduction rules for passenger cars, light trucks, and medium- and heavy-duty trucks, and has agreed to finalize nationally applicable emission performance standards for power plants and oil refineries. Additionally, as of January, 2011, the EPA has begun to require consideration of greenhouse gas

17. ENVTL. PROT. AGENCY, OUR NATION'S AIR: STATUS AND TRENDS THROUGH 2008 7 fig. 3 (2010), *available at* http://www.epa.gov/airtrends/2010/report/fullreport.pdf.

18. Endangerment and Cause or Contribute Findings for Greenhouse Gases Under section 202(a) of the Clean Air Act, 74 Fed. Reg. 66,496, 66,497–99 (Dec. 15, 2009) (to be codified at 40 C.F.R. ch. 1) [hereinafter EPA Endangerment Finding]. Citizen groups first petitioned EPA to regulate greenhouse gases from automobiles pursuant to section 202 of the Act in 1999. Massachusetts v. Envtl. Prot. Agency, 549 U.S. 497, 510 (2007). In 2003 the EPA refused to do so, arguing, among other things, that greenhouse gases did not qualify as "air pollutants" despite the Act's broad definition. *See* Control of Emissions from New Highway Vehicles and Engines, 68 Fed. Reg. 52,922, 52,925 (Sept. 8, 2003). For a general definition of "air pollutants," see the Clean Air Act § 202(a)(1), 42 U.S.C. § 7521(a)(1) (2006). In 2007, the Supreme Court ruled that greenhouse gases do indeed meet the definition of "air pollutants" under the CAA and must be regulated if EPA determines that greenhouse gases "may reasonably be anticipated to endanger public health or welfare." *Mass. v. EPA*, 549 U.S. at 532–33; *see* § 202(a)(1), 42 U.S.C. § 7521(a)(1). The Supreme Court remanded so that EPA could make this determination, known as an "endangerment finding," for greenhouse gases from automobiles, and "ground its reasons for action or inaction in the statute." *Mass. v. EPA*, 549 U.S. at 535. More than two years later, the agency finally issued the endangerment finding on the eve of the Copenhagen climate conference. EPA Endangerment Finding, 74 Fed. Reg. at 66,496. The endangerment finding found compelling scientific evidence to conclude that "greenhouse gases in the atmosphere may reasonably be anticipated both to endanger public health and to endanger public welfare" and that emissions from the transportation sector contribute to this endangerment. *Id.* at 66,497–99. While an endangerment finding for emissions from automobiles is not a prerequisite for action under other sections of the Act, it was widely viewed as the trigger for more comprehensive pollution reductions, and has in fact presaged action under other programs.

emissions in pre-construction permits for large new stationary sources.[19]

While these actions are certainly an improvement after a decade of inaction, they fall far short of the Act's full potential. As discussed below, the rules issued to date are relatively weak, and the EPA has not fully or even partially implemented other CAA programs that could further reduce pollution.

A. *Mobile Sources of Pollution*

Several CAA programs regulate "mobile" sources of air pollution, including cars, trucks, airplanes, ships, and other non-road engines.[20]

1. Section 202 Standards for Automobiles and for Medium- and Heavy-Duty Trucks

The Act addresses greenhouse emissions from cars and trucks, while the Energy Policy and Conservation Act (EPCA) mandates closely related fuel economy standards.[21] Since 2009, the EPA and the National Highway Transportation Safety Administration (NHTSA), the agency in charge of EPCA rulemaking, have promulgated joint rules for both automobiles (cars and light-duty trucks) and medium- and heavy-duty trucks.[22]

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19. *Clean Air Act Permitting for Greenhouse Gases*, ENVTL. PROT. AGENCY, http://www.epa.gov/nsr/ghgpermitting.html (last updated Jan. 20, 2012).

20. The transportation sector accounted for thirty-three percent of overall U.S. CO_2 emissions in 2009. ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990–2009 ES-8 (2011), *available at* http://epa.gov/climatechange/emissions/downloads11/US-GHG-Inventory-2011-Complete_Report.pdf [Hereinafter EPA INVENTORY OF GHGs]. Transportation sector emissions are in turn comprised of passenger vehicles (sixty-five percent), medium- and heavy-duty trucks (twenty percent), aircraft (eight percent), ships and boats (two percent), rail (two percent), and other sources (three percent). *Id.* at 2-22 tbl.2-15.

21. *Compare* Clean Air Act § 202(a)(1), 42 U.S.C. § 7521(a)(1) (2006), *with* Energy Policy and Conservation Act of 1975, 49 U.S.C. § 32902 (2006).

22. The CAA and EPCA work in tandem, although one statute focuses on emissions and the other on fuel efficiency. Section 202 of the Act requires the EPA Administrator, upon making an endangerment finding for a pollutant, to prescribe "standards applicable to the emission of [that] air pollutant from any class or classes of new motor vehicles or new motor vehicle engines." § 202(a)(1); 42 U.S.C. § 7521(a)(1). The Administrator also may establish similar standards for heavy-duty vehicles and engines (such as large trucks). § 202(a)(3)(B)(i), 42 U.S.C. § 7521(a)(3)(B)(i). EPCA, in turn, requires that NHTSA set fleet fuel economy standards sufficient to reach an average of 35 mpg by 2020 and the "maximum feasible" average fuel economy for 2021–2030. 49 U.S.C. § 32902(b)(2)(A), (B) (2009); *see also* 49 U.S.C. § 32902(f) (2006) (describing factors agency must consider in de-

The EPA and NHTSA have taken three basic steps toward reducing greenhouse gas emissions and improving fuel economy. First, the agencies finalized the first-ever combined greenhouse gas and fuel economy automobile standards for model years 2012–2016.[23] The rule will increase the combined average fuel economy of new cars, SUVs, and light pick-up trucks from its current level of 25.3 mpg to a maximum of 35.5 mpg.[24] While the rule achieves the greatest increase in fuel economy from U.S. automobiles in more than three decades, the agencies rejected more ambitious but technically feasible alternatives. As a result, U.S. fuel economy in 2016 will still be far lower than the European, Japanese, South Korean and Chinese standards (at 48.6, 47, 40 and 36.9 mpg, respectively) for 2015.[25] Total greenhouse emissions from U.S. automobiles will continue to increase (albeit at a lower rate than without the rule) as more vehicles are driven more miles in the future.[26]

Second, the EPA and NHTSA proposed standards for automobile model years 2017–2025 in December 2011.[27] The proposal

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termining "maximum feasible" fuel economy). NHTSA must also implement regulations to achieve "the maximum feasible improvement" in fuel economy for medium- and heavy-duty trucks. 49 U.S.C. § 32902(k)(2), (3) (2006).

23. *See* Light-Duty Vehicle Greenhouse Gas Emission Standard and Corporate Average Fuel Economy Standards; Final Rule, 75 Fed. Reg. 25324 (May 7, 2010) (to be codified at 40 C.F.R. pts. 85, 86, 600 and 49 C.F.R. pts. 531, 533, 536–38).

24. *Id.* at 25,330 tbl.I.B.2-1. In practice, the standard is reduced to 34.1 mpg once allowances for the improvement of vehicle air conditioning systems and use of flexible-fuel vehicles are included. *See id.* at 25,330; *see also* Int'l Council on Clean Transp., *Global Light-Duty Vehicles: Fuel Economy and Greenhouse Gas Emissions Standards* 2–3 (Apr. 2011) (summarizing the EPA and DOT's finalized joint regulation regarding greenhouse gas emissions and fuel economy standards).

25. *Global Comparison of Light-Duty Vehicle Fuel Economy/GHG Emissions Standards Update: August 2011 Datasheet*, THEICCT.ORG, http://www.theicct.org/sites/default/files/GlobalPVStd_Aug2011_datasheet_web.xls (last updated Jan. 30, 2012).

26. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., FINAL ENVIRONMENTAL IMPACT STATEMENT, CORPORATE AVERAGE FUEL ECONOMY STANDARDS, PASSENGER CARS AND LIGHT TRUCKS, MODEL YEARS 2012–2016 2-32 fig.2.6-1, 2-33 (2010), *available at* http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/MY2012-2016_FEIS.pdf.

27. *See* 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards, 76 Fed. Reg. 74,854 (proposed Dec. 1, 2011) (to be codified at 40 C.F.R. pts. 85, 86, 600 and 49 C.F.R. pts. 523, 531, 533, 536–37). NHTSA's proposal is for a combined fleet average fuel economy of 49.6 mpg in 2025 without regard to any greenhouse gas emissions from air conditioning systems. *Id.* at 74,866. EPA's proposed standard, expressed in grams of CO_2 per mile driven, also includes emission reductions achieved through air conditioning system efficiency improvements and the use of alternative refrigerants, and translates to 54.5 mpg *if* it were achieved through fuel efficiency alone. *Id.* at 74,865.

asserts it will increase the U.S. combined fleet average fuel efficiency to 49.6 mpg in 2025.[28] While this standard represents another incremental improvement, the agencies again rejected clearly feasible alternatives that would have achieved far greater results, leaving the U.S. far behind what the European Union, Japan and China will achieve five years earlier.[29] Notably, total greenhouse emissions from the sector will continue to increase under the proposed standards, because an increase in vehicle miles travelled will outweigh the efficiency improvements; the agencies considered but have not proposed to adopt a more ambitious alternative that would result in a modest decrease in total emissions in the future.[30]

Third, the agencies adopted standards for trucks and other large vehicles, known colloquially as the "truck rule."[31] While the new standards are an improvement compared to doing nothing,

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The agencies concede that manufacturers' reliance on a number of "flexibilities," including credits and penalty payments, will reduce the achieved fleet average mileage to 47.0 mpg. *Id.* at 74,867.

28. *Id.* at 74,866. Reliance by manufacturers on various "flexibilities" and credits will, however, reduce that number to no more than 47 mpg in practice. *See id.* at 74,867 tbl. I-2.

29. The proposed U.S. standard of 38.8 mpg in 2020 and 49.6 mpg in 2025 compares to proposed standards in 2020 of 64.8 mpg in the European Union, 55.1 mpg in Japan, and 50.1 mpg in China. *Id.* at 74,866. As a result, the U.S. auto industry will continue to be outperformed by its international competitors. Significantly, the most stringent technological alternative examined by NHTSA would have achieved a 2025 fuel efficiency standard of 69 mpg. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., DEP'T OF TRANSP., DOCKET NO. NHTSA-2011-0056, DRAFT ENVIRONMENTAL IMPACT STATEMENT STATEMENT SUMMARY FOR CORPORATE AVERAGE FUEL ECONOMY STANDARDS, PASSENGER CARS AND LIGHT TRUCKS MODEL YEARS 2017–2025 S-4 tbl.S-1 (Nov. 2011), *available at* http://www.nhtsas.gov/staticfiles/rulemaking/pdf/cafe/2017-25_CAFE_Draft_EIS.pdf [Hereinafter NHTSA 2017–2025 DEIS SUMMARY].

30. NHTSA 2017–2025 DEIS SUMMARY, *supra* note 29, at S-22 to S-23.

31. Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles, 76 Fed. Reg. 57,106 (Sept. 15, 2011) (to be codified at 40 C.F.R. pts. 85, 86, 600, 1033, 1036, 1037, 1039, 1065, 1066, and 1068). The on-road medium- and heavy-duty vehicle category includes the largest pick-up trucks, semi-trucks, buses and vocational vehicles and accounts for six percent of total U.S. greenhouse gas emissions. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., DEP'T OF TRANSP., FINAL ENVIRONMENTAL IMPACT STATEMENT FOR MEDIUM- AND HEAVY-DUTY FUEL EFFICIENCY IMPROVEMENT PROGRAM 17 (June 2011), *available at* http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/FEIS=Med HD-summary.pdf [hereinafter NHTSA MEDIUM- AND HEAVY-DUTY FEIS SUMMARY]. Because fuel economy for trucks varies depending on the type of load carried, the standards are expressed with a metric that accounts for the weight of the load, e.g. "gallons per thousand ton-mile." Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles, 76 Fed. Reg. at 57,138.

they will reduce the fuel consumption of the regulated vehicles in 2018 by less than ten percent compared to likely consumption without the rule.[32] Total greenhouse emissions from this sector will continue to increase over time, from 517 million metric tons of carbon dioxide ($MMTCO_2$) in 2005 to 587 $MMTCO_2$ in 2020.[33] The most ambitious alternative analyzed, but ultimately rejected, would have cut emissions by an additional 22 $MMTCO_2$ in 2020.

All three of these efforts fall short of what the CAA and EPCA could and should achieve. Both statutes require ambitious "technology forcing" standards that encourage innovation in the field rather than mere reliance on existing technologies.[34] Despite this strong statutory language, the standards promulgated are premised nearly exclusively on the wider adoption of existing technology, and leave clearly feasible additional improvements and greenhouse gas reductions unrealized.[35]

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32. NHTSA MEDIUM- AND HEAVY-DUTY FEIS SUMMARY, *supra* note 31, at 8. NHSTA and EPA again rejected plainly feasible alternatives, based on currently available and in-use technologies that were recommended for adoption by the National Academy of Sciences. *See* NAT'L RESEARCH COUNCIL, TECHNOLOGIES AND APPROACHES TO REDUCING THE FUEL CONSUMPTION OF MEDIUM- AND HEAVY-DUTY VEHICLES (The National Academies Press 2010).

33. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., DEP'T OF TRANSP., FINAL ENVIRONMENTAL IMPACT STATEMENT FOR MEDIUM-AND HEAVY-DUTY FUEL EFFICIENCY PROGRAM 3-93, 3-94 fig.3.4.4-3 (June 2011), *available at* http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/FEIS-MedHD.pdf [Hereinafter NHTSA MEDIUM- AND HEAVY-DUTY FEIS].

34. *See* Clean Air Act § 202(a)(2), 42 U.S.C. § 7521(a)(2) (2006) (allowing lead time after promulgation of standards "to permit the development and application of the requisite technology"); Whitman v. Am. Trucking Ass'n, 531 U.S. 457, 491 (2001); *see generally* 116 Cong. Rec. 32901–02 (1970), *reprinted in* STAFF OF LIBRARY OF CONG. FOR S. COMM. ON PUB. WORKS, 93D CONG., Legislative History of the Clean Air Amendments of 1970 at 277 (Comm. Print 1974) (indicating that the primary purpose of the Act was not "to be limited by what is or appears to be technologically or economically feasible"). EPCA likewise is intended to be technology-forcing. *See, e.g.*, Ctr. for Auto Safety v. Thomas, 847 F.2d 843, 870 (D.C. Cir. 1988) (overruled on other grounds) ("The experience of a decade leaves little doubt that the congressional scheme in fact induced manufacturers to achieve major technological breakthroughs as they advanced towards the mandated goal."); Green Mt. Chrysler Plymouth Dodge Jeep v. Crombie, 508 F. Supp. 2d 295, 358–59 (D.Vt. 2007) (discussing technology-forcing character of EPCA and the use of increased fuel efficiency to augment performance rather than mileage).

35. NHTSA MEDIUM- AND HEAVY-DUTY FEIS, *supra* note 33, at 3-164 to 3-165; *see generally* NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., DEP'T OF TRANSP., PRELIMINARY REGULATORY IMPACTS ANALYSIS, CORPORATE AVERAGE FUEL ECONOMY FOR MY 2017–MY2025 PASSENGER CARS AND LIGHT TRUCKS 154-399 (Nov. 2011), *available at* http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/2017-25_CAFE_PRIA_final.pdf (examining various new and emerging technologies); NHTSA 2017–2025 DEIS SUMMARY, *supra* note 29, at S-6.

Indeed, the transportation sector standards established thus far will not help the U.S. meet even its lackluster Copenhagen commitments, much less drive toward the steeper reductions scientists say are urgently necessary. In fact, the final rules allow total emissions from the sector to *increase* over time. The agencies responded nonchalantly to this failure, stating only that the President's Copenhagen pledge "does not specify that every emitting sector of the economy must contribute equally proportional emission reductions."[36] The agencies did not indicate which sectors of the economy will be required to make up the difference.

2. Section 231 Standards for Aircraft and Section 213 Standards for Other Mobile Sources

Sections 213 and 231 of the CAA govern endangerment findings and emissions standards for pollutants emitted from nonroad engines (such as marine engines) and aircraft.[37] Environmental groups and state governments petitioned the EPA to regulate greenhouse gas pollution from these mobile sources in 2007 and 2008. When the EPA did not respond substantively, some of the petitioners brought suit in June 2010 to compel a response.[38] They are currently seeking deadlines for the EPA to make an endangerment determination for aircraft emissions and to respond to the petitions for marine and non-road engine standards.[39] In sum, the EPA has clear authority to act swiftly and

36. NTSA MEDIUM- AND HEAVY-DUTY FEIS, *supra* note 33 at 3-93 to 3-94. The agencies provided this information for the first time in the Environmental Impact Statement for the truck rule. *Id.* Even with the rule, emissions from the sector will increase between 9.2–14.1 percent above 2005 levels by 2020, as compared to the Obama administration's goal of reducing emissions seventeen percent below 2005 levels (less than four percent below 1990 levels) by 2020. *Id.* at 3-93.

37. § 213(a)(4), 42 U.S.C. § 7547(a)(4) (providing that where EPA finds that emissions from non-road engines contribute significantly to pollution that endangers public health and welfare, the EPA "may promulgate . . . such regulations as the [EPA] Administrator deems appropriate containing standards applicable to emissions from those classes or categories of new nonroad engines and new nonroad vehicles which in the Administrator's judgment cause, or contribute to, such air pollution"); § 231(a)(2)(A), 42 U.S.C. § 7571(a)(2)(A) (providing that EPA "shall, from time to time, issue proposed emission standards applicable to the emission of any air pollutant from any class or classes of aircraft engines which in his judgment causes, or contributes to, air pollution which may reasonably be anticipated to endanger public health or welfare").

38. Ctr. for Biological Diversity v. Envtl. Prot. Agency, 794 F. Supp. 2d 151 (D.D.C. July 5, 2011).

39. Petitioners challenged the agency's unreasonable delay in both responding to the petitions (claim one) and in making endangerment findings under sections 231 and 213 for the petitioned sources (claims two through four). *Id.* at 152. EPA filed a

decisively to reduce greenhouse pollution from these important sources, yet the agency is currently fighting efforts to compel even a reasonable schedule for using that authority.

B. *Stationary Sources of Pollution*

Stationary sources of greenhouse pollution, including power plants and industrial facilities, produce about two-thirds of U.S. greenhouse emissions.[40] Under the new source performance standards (NSPS) program, the EPA sets minimum nationwide pollution standards for various types of industrial facilities. The new source review (NSR) program complements these industry-wide rules by requiring individual major sources of pollution to evaluate and adopt site-specific pollution control measures before beginning construction.[41]

The regulation of greenhouse gases through the NSPS and NSR programs holds tremendous promise, in part due to their ability to broaden the use of promising emissions control strategies among the largest sources of greenhouse pollution.[42] Thus far, however, the EPA has not put these programs on track to achieve substantial greenhouse emissions reductions.

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motion to dismiss claims two through four, arguing that whether to make an endangerment finding in the first instance under both sections is entirely within the agency's discretion. *Id.* The district court denied EPA's motion as to aircraft, holding that the mandatory language of section 231 creates an affirmative duty to make an endangerment finding (and issue regulations in the event of a positive finding). *Id.* at 158–62. The Court granted EPA's motion as to ships and off-road engines, but noted:

> the dismissal of these claims does not grant EPA unfettered discretion to avoid regulating nonroad and marine emissions. . . . [and that] plaintiffs' claim that EPA has unduly delayed its response to those petitions will remain before this Court. If plaintiffs prevail on that claim, the Court will be empowered to order EPA to act on plaintiffs' petitions.

Id. at 158, n.3.

40. NHTSA MEDIUM- AND HEAVY-DUTY FEIS SUMMARY, *supra* note 31, at 17 fig. S-11.

41. Pollution reduction requirements under NSR may be more, but never less, stringent than an existing NSPS for the source type. *See, e.g.*, § 169(3); 42 U.S.C. § 7479(3).

42. EPA estimates that sixty-seven percent of stationary source emissions come from sources that emit more than 100,000 tons of CO_2e per year, seventy percent from sources that emit more than 50,000 tons per year, seventy-five percent from sources that emit more than 25,000 tons per year, and seventy-eight percent from sources that emit greater than 250 tons per year. Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule, Final Rule, 75 Fed. Reg. 31514, 31540 (June 3, 2010) (to be codified at 40 C.F.R. pts. 51, 52, 70, 71) [Hereinafter Tailoring Rule].

1. New Source Performance Standards

The NSPS program requires industry-wide standards for both new and existing pollution sources.[43] The EPA must review and revise each NSPS as needed, and in no event less than once every eight years.[44] The EPA must set standards at the level achievable through the use of the "best demonstrated technology."[45] The NSPS program is also technology-forcing, in that it "looks toward what may fairly be projected for the regulated future, rather than the state of the art at present."[46] To date, the EPA has issued NSPSs for various pollutants emitted from about eighty categories of industrial sources.[47] The largest stationary sources of greenhouse pollution are thus already covered by existing NSPS for other pollutants, and are familiar with compliance requirements. The "best demonstrated technology" standard enables the EPA to significantly reduce pollution immediately and to achieve increasingly deep reductions over time. The program can also be implemented quickly, both for new and existing sources.

Despite these widely recognized advantages,[48] the EPA has hesitated to issue NSPS for greenhouse gases. Fossil-fuel power plant electric generating units (EGUs) produce more greenhouse emissions than any other NSPS category, and oil refineries and cement plants are among the other largest sources.[49] Substantial

43. § 111(b); 42 U.S.C. § 7411(b) (requiring EPA Administrator to establish categories of emissions sources and set standards applicable to new sources within each category); § 111(d), 42 U.S.C. § 7411(d) (requiring EPA Administrator to prescribe regulations requiring states to submit plans establishing standards for emissions of non-criteria, non-hazardous pollutants from existing sources).

44. § 111(b)(1)(B), 42 U.S.C. § 7411(b)(1)(B).

45. "Best demonstrated technology" is shorthand for the "best" system of emissions reduction that has been "adequately demonstrated." § 111(a)(1), 42 U.S.C. § 7411(a)(1).

46. Nat'l Asphalt Pavement Ass'n v. Train, 539 F.2d 775, 785–86 (D.C. Cir. 1976) (quoting Portland Cement Ass'n v. Ruckelshaus, 486 F.2d 375, 391 (D.C. Cir. 1973), *cert. denied*, 417 U.S. 921 (1974)).

47. *See* Standards of Performance Standards for New Stationary Sources, 40 C.F.R. § 60 (2011). These standards are generally expressed as an emissions reduction level, but sometimes take the form of a design or work practice if EPA determines that a numerical standard is not possible. §111(h)(1); 42 U.S.C. § 7411(h)(1).

48. *See, e.g.*, JAMEEL ALSALAM, CENTER FOR CLEAN AIR POLICY, A PRAGMATIC APPROACH TO REGULATING GREENHOUSE GASES UNDER THE CLEAN AIR ACT 8 (2009) (stating "section 111 authorities could be workably applied to GHGs"); Brigham Daniels et al., *Regulating Climate: What Role for the Clean Air Act?*, 39 ENVTL. L. REP. 10837, 10839 (2009) (Speakers were "more optimistic about the returns of EPA employing the NSPS approach.").

49. *Compare* 40 C.F.R. § 60 (listing existing New Source Pollution Standards), *with* EPA INVENTORY OF GHGS, *supra* note 20, at Annex I at A-3 tbl. A-1.

reductions are possible for each, yet litigation has been necessary to spur the EPA to action even on these critically important sources.

In 2006, the State of New York and others challenged the EPA's failure to include greenhouse gases in the revised power plant NSPS.[50] In 2008, these parties brought a similar challenge to the EPA's failure to include greenhouse gases in the revised oil refinery NSPS.[51] A December 2010 settlement of both cases requires the EPA to develop final standards for power plants by May 2012 and for refineries by November 2012.[52]

These rules will almost certainly be the first, and arguably the most important, NSPSs for greenhouse gases. Troublingly, however, the agency has delayed release of both proposed rules multiple times, and as this article goes to press it is still not clear when the proposals will see the light of day, although release of the power plant rule has been reported as imminent. Moreover, while the agency has not released details of either proposal as of this writing, the agency's guidance on NSR permitting for these sources has fueled speculation that the agency intends to propose lax standards that would forego readily available pollution reductions.[53]

The EPA has continued to delay incorporating greenhouse gases into other NSPS. For example, in 2010 the EPA finalized a revised NSPS for Portland cement, which acknowledged both that cement plants are a significant source of greenhouse emissions and that cost-effective control technologies to reduce the emissions are available.[54] The EPA nonetheless declined to in-

50. New York v. Envtl. Prot. Agency, No. 06-1322 (D.C. Cir. filed Sept. 13, 2006).

51. New York v. Envtl. Prot. Agency, No. 08-1279 (D.C. Cir. filed Aug. 25, 2008) [hereinafter New York v. EPA II]. The plaintiffs challenged the EPA's failure to issue standards for greenhouse gases in its final rule. Standards of Performance for Petroleum Refineries, 73 Fed. Reg. 35,838, 35,860 (June 24, 2008) (to be codified at 40 C.F.R. pt. 60, subpt. J). In the final rule, the EPA rejected multiple requests to issue performance standards for greenhouse gases, despite acknowledging that petroleum refining operations are a significant source of greenhouse gases. *Id.* at 35,858.

52. Proposed Settlement Agreement, Clean Air Act Citizen Suit, 75 Fed. Reg. 82,392 (proposed Dec. 30, 2010).

53. *See infra* Part III.B.2. In particular, EPA's NSR guidance focuses primarily on efficiency improvements at the expense of more ambitious technologies and fuel-switching approaches to emissions reduction. If the agency's greenhouse gas standards under NSPS reflect the same cautious approach, the overall emissions reductions achieved could be relatively small.

54. National Emission Standards for Hazardous Air Pollutants From the Portland Cement Manufacturing Industry and Standards of Performance for Portland Cement

corporate greenhouse gases into the NSPS, stating only that it was "working towards" such a proposal.[55] In litigation brought by environmental petitioners to challenge the standard for its omission of greenhouse gases, the D.C. Circuit held that "there was nothing 'final' in the EPA's decision to collect additional information before proposing greenhouse emissions standards"; that the rule therefore was not final agency action as to greenhouse gases; and that the court thus lacked jurisdiction to hear the case.[56] While this decision is extremely fact-specific,[57] it is an unfortunate example of judicial tolerance for agency delay, even with critically important health and environmental consequences at stake.

The EPA also recently failed to include standards for methane, a potent greenhouse gas, in the proposed NSPS for natural gas production, transmission, and distribution—despite the availability of cost-effective control measures for addressing the tremendous emissions from this sector.[58] The EPA has also not acted on

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Plants, 75 Fed. Reg. 54,970, 54,997 (Sept. 9, 2010) (to be codified at 40 C.F.R. pts. 60, 63).

55. *Id.*

56. Portland Cement Ass'n v. Envtl. Prot. Agency, No. 10-1358, 2011 U.S. App. LEXIS 24577 at *12 (D.C. Cir. Dec. 9, 2011).

57. *See, e.g., id.* at *37–38 ("This might be a different case if EPA had stated that it was deferring consideration of greenhouse gas emissions standards until its next mandatory NSPS review. But EPA did no such thing. Instead, it reviewed the information it had, decided its data was insufficient, and continued 'working towards a proposal for [greenhouse gas] standards from Portland cement facilities.'" (quoting 75 Fed. Reg. 54,970, 54,997 (Sept. 9, 2010))).

58. Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews, 76 Fed. Reg. 52,738, 52,756 (proposed Aug. 23, 2011) (to be codified at 40 C.F.R. pts. 60, 63). Methane has warmed the planet more than any other greenhouse gas besides carbon dioxide, and reducing methane emissions is an important part of the overall climate mitigation effort. *See, e.g.*, Drew T. Shindell et al., *Improved Attribution of Climate Forcing to Emissions*, 326 Sci. 716, 717 (2009). The production and transportation of oil and natural gas is the single largest source of anthropogenic methane emissions in the United States, responsible for 328 million metric tons (mmt) of CO_2e per year, or about five percent of all U.S. emissions. *Id.* Yet EPA declined to use the oil and gas sector NSPS to address this problem directly. While the agency estimates that the measures taken to achieve the required reductions of other pollutants will also reduce methane emissions as a co-benefit by 62 mmt of CO_2e per year, or twenty-six percent of total emissions from this sector, the agency gives no comprehensible rationale for refusing to include enforceable standards for methane or failing to analyze whether greater reductions should be required, stating only that

> [a]lthough this proposed rule does not include standards for regulating the greenhouse gas emissions discussed above, we continue to assess these significant emissions and evaluate appropriate actions for addressing these concerns. Because many of the proposed requirements for control of volatile organic compound

petitions to establish new NSPS for other important sources of greenhouse pollution, including coal mines and concentrated animal feeding operations.[59] In short, the EPA has yet to promulgate a single NSPS for greenhouse gases from any group of industrial sources, despite the enormous promise that the program holds for achieving efficient and rapid pollution reductions.

2. New Source Review

The NSR program requires preconstruction review and permitting of any new or modified major stationary pollution source.[60] NSR consists of two sub-programs. The Prevention of Significant Deterioration (PSD) program applies in areas where air quality meets standards established for criteria pollutants, while nonattainment NSR (NNSR) applies in those areas that have not attained the standards.[61] Because greenhouse gases are now subject to regulation under other sections of the Act they fall under the PSD program. This program requires that any new "major emitting facility" obtain a permit prior to construction that defines and requires adoption of the "best available pollution control technology" (BACT) "for each pollutant subject to regulation" under the Act.[62]

(VOC) emissions also control methane emissions as a co-benefit, the proposed VOC standards would also achieve significant reduction of methane emissions.

Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews, 76 Fed. Reg. at 52,756. This is particularly puzzling given the extreme "win-win" nature of this particular rulemaking: In addition to the methane reductions, EPA estimates that the rule will reduce hundreds of thousands of tons per year of other pollutants at a net cost *savings* to the industry of $45 million annually. *Id.* at 52,795. The rule results in a net cost savings to industry primarily due to the economic value of the natural gas that will be retained in the system and ultimately sold, rather than allowed to escape into the atmosphere. *Id.* at 52,797.

59. *See, e.g.*, Petition from Edward B. Zukoski, Att'y WildEarth Guardians, to Lisa P. Jackson, Adm'r Envtl. Prot. Agency (June 16, 2010), *available at* http://www.wildearthguardians.org/support_docs/Petition_Coal_Mine_6_16_10.pdf, and Petition from Tarah Heinzen, Att'y Envtl. Integrity Project, to Lisa P. Jackson, Adm'r Envtl. Prot. Agency, *available at* http://www.environmentalintegrity.org/documents/PetitiontoListAmmoniaasaCleanAirActCriteriaPollutant.pdf.

60. *See* Clean Air Act §§ 160–169, 42 U.S.C. §§ 7470–7479 (2006) (describing the PSD program); §§ 172(c)(5), 173, 42 U.S.C. §§ 7502(c)(5), 7503 (describing the NNSR program). EPA has also recognized that the Act's Title V operating permit program, §§ 501–507, 42 U.S.C. §§ 7661–7661(f), must address greenhouse gas emissions. *See generally* Tailoring Rule, *supra* note 42.

61. §§ 160–169, 172(c)(5), 173, 42 U.S.C. §§ 7470–7479, 7502(c)(5), 7503.

62. *See* § 165(a), (a)(4), 42 U.S.C. § 7475(a), (a)(4).

The Act defines a "major emitting facility" to include certain categories of sources with the potential to emit more than 100 tons per year of any air pollutant, and all other sources that potentially emit more than 250 tons per year of any air pollutant.[63] Because CO_2 is typically emitted in far greater volume than other pollutants, the EPA's long-overdue recognition of CO_2 as a pollutant subject to regulation under the Act could bring many additional sources within the purview of the new source review program. Based on its fear that expanding the program to all sources of more than 100 or 250 tons per year of CO_2 could cause long permitting delays and require a large number of relatively small pollution sources to obtain permits, the EPA adopted a "Tailoring Rule" that initially limits permitting to very large sources of carbon pollution and expands the program's coverage in phases.[64]

Industry groups and several states have challenged the Tailoring Rule and other associated CAA greenhouse rules, attempting to block even this limited application of the NSR program to greenhouse gas emitters. These petitioners sought a stay of the Tailoring Rule and associated actions from the D.C. Circuit Court of Appeals, claiming that the program would create a "construction ban."[65] The court denied the stay motions, holding that the petitioners had failed to show they were harmed by the

63. § 169(1), 42 U.S.C. § 7479(1).

64. Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule, 75 Fed. Reg. 31,514 (June 3, 2010) (to be codified at 40 C.F.R. pts. 51, 52, 70, 71). Under the Tailoring Rule's phased approach, as of January 2, 2011, the PSD permitting program applies only to newly constructed sources that (a) already need a permit due to emissions of other pollutants, and (b) have the potential to emit 75,000 tons of CO_2e per year. *Id.* at 31,516. On July 1, 2011, greenhouse gas permitting began to cover newly constructed sources that have the potential to emit at least 100,000 tons of CO_2e per year, regardless of whether they also require a PSD permit because of their emission of other pollutants. *Id.* In addition, existing sources that emit or have the potential to emit at least 100,000 tons per year of CO_2e and that undertake a modification increasing their net emissions of greenhouse gases by at least 75,000 tons CO_2e per year are also now subject to PSD requirements. *Id.* EPA also committed to complete an additional rulemaking by July 1, 2012 to consider the phase-in of PSD permitting for additional sources emitting lesser amounts of CO_2e, beginning by July 1, 2013. *Id.* The Tailoring Rule, however, also provides that PSD greenhouse gas permitting will not apply to sources emitting less than 50,000 tons of CO_2e per year until at least April 30, 2016 under any circumstances. *Id.*

65. *See, e.g.*, Petitioners' Motion for Partial Stay of EPA's Greenhouse Gas Regulations Document #1266109 at 12, N. Am. Mfrs. et al. v. Envtl. Prot. Agency, (D.C. Cir. Aug. 6, 2010) (No. 10-1131) ("Movants request the Court stay the effects of the Tailpipe Rule, Tailoring Rule, and PSD Interpretive Rule on stationary sources, such that GHG emissions are not subject to PSD and Title V pending this appeal."); Petitioners' Motion for Stay, No. 1266048 at 62, Coal. for Responsible Regulation v.

rules.[66] Accordingly, the EPA began NSR for greenhouse gases under the first phase of the Tailoring Rule in January 2011.

Contrary to industry's objections, the problem with NSR for greenhouse gases is not that the EPA is doing too much to reduce greenhouse emissions, but that the EPA is doing too little. For example, the EPA recently adopted a three-year exemption from PSD permitting requirements for CO_2 emissions resulting from combustion of biomass and other "biogenic" materials, an expansive category that includes everything from old-growth trees to the rubber in old tires.[67] During this three-year regulatory hiatus, the biomass and forest products industries are free to emit CO_2 without permits or controls, while the EPA purportedly examines the available science and decides what to do. Astonishingly, the EPA claims this exemption from regulation of *all* biogenic CO_2 is necessary because the agency *might* one day determine that *some* biomass burning has a negligible effect on the climate.[68]

The EPA also has issued guidance for permitting agencies to use in their evaluation of BACT for greenhouse gases that does little to encourage ambitious and science-based greenhouse re-

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Envtl. Prot. Agency (D.C. Cir. Sept. 15, 2010) (No. 10-1073) (stating that EPA's NSR rules have "in effect" created a "construction ban").

66. Court's Order, No. 1282558 at 3, Coal. for Responsible Regulation v. Envtl. Prot. Agency (D.C. Cir. Dec. 10, 2009) (No. 09-1322) (denying motions to stay).

67. Deferral for CO_2 Emissions From Bioenergy and Other Biogenic Sources Under the Prevention of Significant Deterioration (PSD) and Title V Programs, 76 Fed. Reg. 43,490 (July 20, 2011) (to be codified at 40 C.F.R. pts. 51, 52, 70, 71) [hereinafter Biomass Exemption Rule]. The rationale for the exemption derives from the myth that burning biogenic material is "carbon neutral," that is, that combusting the material for energy does not result in a net increase in CO_2 levels because the material would eventually have decomposed and produced the same amount of CO_2 anyway. *See, e.g.*, Letter from Jonathan Lewis, Clean Air Task Force, to U.S. Senate (Nov. 18, 2011), *available at* http://environmentalpaper.org/documents/letter-to-senate-EPA-biomass-emissions-nov18.pdf. In fact, recent studies have concluded that burning biomass for energy results in more CO_2 emissions than burning coal, at least for the next several decades—precisely the period during which scientists tell us emissions must peak and fall dramatically. *See e.g.*, MANOMET CENTER FOR CONSERVATION SCIENCES BIOMASS SUSTAINABILITY AND CARBON POLICY STUDY: REPORT TO THE COMMONWEALTH OF MASS. DEP'T OF ENERGY RES. 7–8 (2010), *available at* http://www.manomet.org/sites/manomet.org/files/Manomet_Biomass_Report_Full_LoRez.pdf. Large-scale biomass burning also threatens other environmental damage, such as the increased logging of whole trees to fuel wood-burning power plants. MARY S. BOOTH WITH RICHARD WILES, CLEARCUT DISASTER: CARBON LOOPHOLE THREATENS U.S. FORESTS 12–21 (2010), *available at* http://www.ewg.org/clear cut-disaster.

68. *See* Biomass Exemption Rule, 76 Fed. Reg. at 43,498–99. Several conservation organizations have challenged the rule as an abuse of the agency's authority in *Center for Biological Diversity v. EPA*. Consolidated Case Nos. 11-1101, 11-1285, 11-1328, 11-1336 (D.C. Cir. Apr. 7, 2011).

ductions.[69] For example, the EPA's guidance asserts that in "most cases," applicants need not consider avoiding greenhouse gas emissions by switching to less carbon-intensive fuels.[70] The EPA asserts that fuel-switching is usually an example of "redefining the source" in a manner that "change[s] the fundamental scope of [the] project" and thus need not be required as BACT.[71] The EPA's misguided approach to this issue threatens to create an exception that swallows the BACT rule; if one defines a project narrowly enough, all available pollution controls could be excluded as "redefining the source," a result clearly at odds with statutory language and intent.[72]

Unsurprisingly, given the EPA's weak guidance, permit applicants have avoided the imposition of common-sense pollution reduction measures by defining the most polluting projects like coal fired power plants in the narrowest possible terms.[73] In other cases, permitting agencies have approved—and the EPA has thus far failed to object to—greenhouse gas BACT determinations that fail to incorporate *any* technology for reducing greenhouse emissions beyond that already proposed for controlling other pollutants.[74] For all of these reasons, application of the

69. OFFICE OF AIR QUALITY PLANNING AND STANDARDS, ENVTL .PROT. AGENCY, EPA-457/B-11-001, PSD AND TITLE V PERMITTING GUIDANCE FOR GREENHOUSE GASES (2011), *available at* http://www.epa.gov/nsr/ghgdocs/ghgpermittingguidance.pdf.

70. *See id.* at 27.

71. *See id.*

72. *See, e.g.*, Sierra Club v. Envtl. Prot. Agency, 499 F.3d 653, 657 (7th Cir. 2007) (upholding EPA's determination that requiring a "mine-mouth" coal fired power plant to consider burning cleaner coal would "redefine" the applicant's intent to build a "mine-mouth" plant burning dirty coal from one particular mine). Although this case is of limited precedential value due to its fact-specific nature and procedural context, it is frequently cited by project applicants and permitting agencies to justify expansive use of the "redefining the source" limitation on BACT.

73. *See, e.g.*, MICH. DEP'T OF ENVTL. QUALITY AIR QUALITY DIV., PERMIT TO INSTALL 317-07 ISSUED TO WOLVERINE POWER SUPPLY COOP., INC. (2011), *available at* http://www.deq.state.mi.us/aps/downloads/permits/PubNotice/317-07/Remand/317-07AplLtr.pdf (approving a 600 MW coal fired power plant in Michigan); *see also* WOLVERINE POWER SUPPLY COOP., INC. RESPONSE TO COMMENTS Document for Permit No. 317-07, 98 (2011), *available at* http://www.deq.state.mi.us/aps/downloads/permits/PubNotice/31707/Remand/317-07RTC.pdf (citing Sierra Club v. Envtl. Prot. Agency, 499 F.3d 653 (7th Cir. 2007)) (relying on the redefining-the-source loophole for the agency's refusal to require Wolverine to evaluate multiple available pollution reduction technologies, including natural gas combined cycle, pulverized coal, super critical CFB boilers, Integrated Coal Gasification Combined Cycle, and biomass gasification).

74. *See* Petition Requesting the Administrator to Object to Title V Operating Permits Nos. 2560-00281-V1 and 3086-V0 Issued to Consolidated Environmental Management, Inc./Nucor Steel Louisiana, In the Matter of Title V Air Operating

NSR program to greenhouse gases has not yet yielded the kinds of emissions reductions that would signal progress toward scientifically necessary goals.

IV.
CRITERIA AIR POLLUTANT DESIGNATION, NATIONAL AMBIENT AIR QUALITY STANDARDS, AND STATE IMPLEMENTATION PLANS FOR GREENHOUSE GASES

The criteria air pollutant program is in many ways the heart of the modern CAA. It is designed to unify and leverage pollution reductions under other CAA programs as well as state pollution reduction activities. The program requires the EPA to list air pollutants emitted by numerous and diverse sources that cause or contribute to air pollution problems, and to set NAAQS for each such "criteria pollutant" as necessary to protect the public health and welfare.[75] It also requires the states to develop and implement SIPs to meet the NAAQS.[76] Other programs, including the mobile source, NSPS and NSR programs discussed above, aid the states in meeting the NAAQS with complementary pollution reduction measures.

A. *The NAAQS Process*

The initial trigger for designating criteria air pollutants is an endangerment finding nearly identical to the finding the EPA adopted for automobiles under section 202. A criteria pollutant is one that (a) may reasonably be anticipated to endanger public health or welfare, (b) is emitted from numerous sources, and (c) for which the EPA plans to issue air quality criteria.[77] Longstanding case law holds that when the provisions of subparts (a) and (b) have been met, listing the pollutant and proceeding with the additional requirements of sections 108–110 are mandatory.[78]

Following criteria air pollutant designation, the agency is required, within twelve months, to issue "air quality criteria" that

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Permits and Prevention of Significant Deterioration Permit for Consol. Envtl. Mgmt., Inc./Nucor Steel, La. (May 23, 2011), *available at* http://www.eenews.net/assets/2011/05/04/document_pm_03.pdf (petitioning the Administrator of EPA to challenge an NSR permit for failing to include BACT for greenhouse gases).

75. Clean Air Act §§ 108, 109, 42 U.S.C. §§ 7408, 7409 (2006).

76. § 110, 42 U.S.C. § 7410.

77. § 108(a)(1), 42 U.S.C. § 7408(a)(1).

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

specify all of a pollutant's known effects on the public health and welfare. Such criteria "shall accurately reflect the latest scientific knowledge" useful in elucidating health and welfare impacts.[79] The EPA must then establish both primary NAAQS for criteria air pollutants which, "allowing for an adequate margin of safety, are requisite to protect the public health," and secondary NAAQS that are "requisite to protect the public welfare from any known or anticipated adverse effects associated with the presence of such air pollutant in the ambient air."[80] The EPA must review each NAAQS at least every five years, and update the standards as necessary to protect health and welfare in light of the latest scientific knowledge.[81]

Once the EPA sets a NAAQS, states typically have three years to develop a SIP.[82] A SIP is a comprehensive strategy devised by a state to achieve or maintain the NAAQS. In the case of traditional air pollutants, the SIP process generally begins with an inventory of the state's emission sources for each pollutant and is followed by the selection of a suite of measures to obtain or maintain the designated standards. A SIP includes emissions limitations, monitoring requirements, enforcement mechanisms, and schedules for compliance, with each state able to choose the combination of measures most beneficial given its particular circumstances.[83] Public comment and involvement are built into the SIP process, and the final product must then be approved by the EPA.[84]

Once the EPA approves the SIPs, conformity programs require federal agencies to ensure that their actions conform to the SIP requirements for each NAAQS pollutant and promote actual pollutant reductions.[85] Given that federal actions touch on every

79. § 108(a)(2), 42 U.S.C. § 7408(a)(2).

80. § 109(b), 42 U.S.C. § 7409(b). EPA has already found that greenhouse gas emissions from automobiles threaten both public health and welfare. EPA Endangerment Finding, *supra* note 18, at 66,497–99. The science and the law therefore call for the establishment of both primary and secondary NAAQS for greenhouse gases.

81. § 109(d)(1), 42 U.S.C. § 7409(d)(1).

82. § 110 (a)(1), 42 U.S.C. § 7410(a)(1).

83. § 110(a)(2), 42 U.S.C. § 7410(a)(2).

84. *See* § 110(a)(1), 42 U.S.C. § 7410(a)(1). If a state fails to submit a SIP that demonstrates attainment or maintenance of the NAAQS, EPA applies a variety of means to encourage compliance, culminating in the preparation of a Federal Implementation Plan (FIP) in extreme cases where states have yet to comply two years after the original deadline. *See, e.g.*, §§ 179, 110(c), 302(y), 42 U.S.C. §§ 7509, 7410(c), 7602(y).

85. *See, e.g.*, § 176, 42 U.S.C. § 7506.

aspect of our carbon-based economy, this mechanism allows the integration of the NAAQS target into many important aspects of federal decisionmaking.

B. *Benefits of a NAAQS for Greenhouse Gases*

Academic debate over a greenhouse gas NAAQS has focused particularly on whether the EPA *must* list greenhouse gases as criteria pollutants following its finding that these gases endanger public health and welfare.[86] The EPA has suggested that section 108(a)(1)(C) provides "discretion to decide whether to list" greenhouse pollutants as criteria pollutants.[87] As discussed briefly below, we agree with commentators who explain why this suggestion is contrary to the Act. We also believe that the program's unique strengths and scientific focus indicate that the EPA *should* designate greenhouse gases as criteria pollutants on its own accord, regardless of whether *NRDC v. Train* or any

86. The basic question currently under debate in the academic literature is whether *Chevron v. Natural Resources Defense Council*, 467 U.S. 837 (1984), would permit an EPA inclined to evade a greenhouse gas NAAQS to ignore the Second Circuit's earlier holding in *Natural Resources Defense Council, Inc. v. Train*, 545 F.2d 320 (2d Cir. 1976). Commentators are split on this question. *Compare, e.g.*, Nathan Richardson, *Greenhouse Gas Regulation Under the Clean Air Act: Does Chevron Set the EPA Free?*, 29 STAN. ENVTL. L.J. 283, 299–318 (2010) (concluding that a contemporary court would likely reach the same result as *NRDC v. Train* under *Chevron* Step One analysis), *and* Patricia Ross McCubbin, *EPA's Endangerment Finding for Greenhouse Gases and the Potential Duty to Adopt to Address Global Climate Change, National Ambient Air Quality Standards* 33 S. ILL. UNIV. L.J. 437, 440 (2010) (concluding that EPA's claimed discretion results from a "scrivener's error" and that listing of greenhouse gases as criteria pollutants is mandatory), *with* Craig N. Oren, *Is the Clean Air Act at a Crossroads?*, 40 ENVTL. L. 1231, 1249–54 (2010) (rejecting the "scrivener's error" theory and concluding that *NRDC v. Train* has limited precedential value after *Chevron*) *and* INIMAI M. CHETTIAR & JASON A. SCHWARTZ, INST. FOR POLICY INTEGRITY N.Y. UNIV. SCH. OF LAW, THE ROAD AHEAD: EPA'S OPTIONS AND OBLIGATIONS FOR REGULATING GREENHOUSE GASES 34–39 (2009) (concluding that EPA can advance a persuasive argument for discretion on the authority of *Chevron* and post-*NRDC v. Train* statutory amendments, but describing this strategy as "risky"). Other commentators have concluded that once EPA makes an endangerment finding for greenhouse gases, criteria pollutant designation becomes mandatory; these commentators, however, have not addressed the potential effect of *Chevron* deference. *See, e.g.*, Thomas D. Peterson et al., *Developing a Comprehensive Approach to Climate Change Policy in the United States: Integrating Levels of Government and Economic Sectors*, 26 VA. ENVTL. L. J. 227, 227–28 (2008); Janine Maney, *Carbon Dioxide Emissions, Climate Change, and the Clean Air Act: An Analysis of Whether Carbon Dioxide Should Be Listed as a Criteria Pollutant*, 13 N.Y.U. ENVTL. L.J. 298, 328 (2005).

87. Regulating Greenhouse Gas Emissions Under the Clean Air Act; Advance Notice of Proposed Rulemaking, 73 Fed. Reg. 44,354, 44,477, n.229 (July 30, 2008) (to be codified at 40 C.F.R. pt. 1).

other decision compels this result. A petition asking the EPA to designate greenhouse gases as criteria air pollutants and to issue NAAQS for CO_2 of no more than 350 ppm is currently pending before the agency.[88] The EPA should grant that petition.

A plain reading of the statutory language, structure, and intent compels the conclusion that the EPA *must* designate greenhouse gases as criteria pollutants. In *NRDC v. Train*, the Second Circuit held that once the EPA had found airborne lead to be a dangerous pollutant, and further concluded that lead was emitted by diverse and numerous sources, the agency lacked discretion to refuse criteria pollutant designation.[89] *NRDC v. Train* holds that once the requirements of section 108(a)(1)(A) and (B) are satisfied, the EPA cannot avoid criteria designation simply by claiming under section 108(a)(1)(C) that it has no "plans" to list the pollutants. Here, the EPA has already found that greenhouse gases endanger the public health and welfare. There can be no dispute that greenhouse gases are emitted from numerous and diverse sources. Accordingly, under *NRDC v. Train*, the EPA cannot avoid designating greenhouse gases as criteria pollutants even if it has no "plans" to do so.

It is true that *NRDC v. Train*, as a Second Circuit decision, is not binding precedent in the D.C. Circuit. It is also true that the case was decided before *Chevron v. NRDC*, under which courts have accorded greater deference to agency interpretations of "ambiguous" statues. These factors, however, do not deprive *NRDC v. Train* of its force. By virtue of having stood unchallenged for thirty-five years as the definitive holding on this question, the case must command judicial respect, and it will not be cast aside lightly. The case reached its conclusion based on longstanding maxims of statutory construction and close examination of the statutory text, its structure, and the relevant legislative history.[90] These are the traditional tools of *Chevron* Step One analysis, where deference to agency interpretation sometimes shown at Step Two is unavailable.[91] Although the Second Circuit ob-

88. *See* Ctr. for Biological Diversity & 350.org, Petition to Establish National Pollutant Limits for Greenhouse Gases Pursuant to the Clean Air Act at i (Dec. 2, 2009), *available at* http://www.biologicaldiversity.org/programs/climate_law_institute/global_warming_litigation/clean_air_act/pdfs/Petition_GHG_pollution_cap_12-2-2009.pdf. EPA has not formally responded to the petition.

89. Natural Res. Def. Council, Inc. v. Train, 545 F.2d at 328.

90. *Id.* at 324–27.

91. *See* Richardson, *supra* note 86, at 310–11; Chevron U.S.A., Inc. v. Natural Res. Def. Council, Inc., 467 U.S. 837, 843 n.9 (1984) ("If a court, employing tradi-

served that the "literal language" of the statute is "somewhat ambiguous,"[92] it found congressional intent—the true touchstone of *Chevron* Step One analysis—to be very clear. Congress could not have intended to give the EPA complete, unfettered discretion over whether to invoke the Act's most central program by burying a circular reference to the Administrator's "plans" in a subparagraph.

The case for designating greenhouse gases as criteria pollutants is even stronger than was the case for designating lead in the days of *NRDC v. Train*. Although lead was emitted by diverse and numerous sources, the primary source of atmospheric lead pollution at the time was the combustion of leaded gasoline, which the EPA had already begun to regulate under section 211 of the Act.[93] Greenhouse gas pollution, in contrast, comes from a far more diverse and numerous range of sources, and effective control of these emissions will require an approach that makes use of all of the Act's powerful tools. As previously discussed, the EPA's partial implementation of selected mobile and stationary source programs thus far has not reduced greenhouse gas emissions at anywhere near the scale that climate science indicates is needed.

Indeed, the key advantage and real power of a greenhouse gas NAAQS is that the law requires this standard to be based on science and grounded in physical reality. Air quality criteria for climate-forcing air pollutants would have to reflect the latest scientific knowledge. Consistent with this scientific focus, maximum concentrations of greenhouse gases could not exceed a level requisite to protect public health and welfare from dangerous climate change. Once a standard is adopted, both federal and state governments would be required to engage in concerted action and use all of the regulatory, policy, and planning tools at their disposal to move toward attainment. Standards based on rigorous and peer-reviewed scientific analysis are much more likely than those based on short-term political considerations to provide the pollution reductions needed to solve the climate crisis.

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tional tools of statutory construction, ascertains that Congress had an intention on the precise question at issue, that intention is the law and must be given effect.").

92. Train, 545 F.2d at 327. Nathan Richardson correctly notes that the court's identification of "ambiguity" should carry little weight, as this term was not "a talismanic ticket to increased deference" prior to *Chevron*. Richardson, *supra* note 86, at 311.

93. *See* Craig N. Oren, *When Must EPA Set Ambient Air Quality Standards? Looking Back at* NRDC v. Train, 30 UCLA J. ENVTL. L. & POL'Y 157 (2012).

Scientifically credible standards are needed not only to guide CAA implementation, but also to guide U.S. climate policy overall, if that policy is to have any chance of meaningfully addressing climate change.

A greenhouse gas NAAQS also would drive greater reductions from other CAA programs, as well as activate greenhouse reduction efforts in all fifty states through the SIP process.[94] The NAAQS program is not merely aspirational, but rather is designed to mandate attainment of a science-based, regularly updated, objective standard grounded in protection of health and welfare.[95] A host of necessary greenhouse gas reductions requires action in areas that have traditionally been regulated by states and municipalities, such as land use policies, building codes for residential, commercial and industrial facilities, transportation, utility and agriculture regulation, forestry, and non-hazardous waste handling.[96] By influencing local matters such as building codes, development and traffic patterns, efficiency requirements, and land use policies, states can significantly reduce emissions from these types of projects. The SIP process can incorporate these critically important, but traditionally state-controlled areas of regulation into a unified greenhouse gas regulatory structure for the nation.

The NAAQS-activated SIP program also has the advantage that the federal government, the states, and the emitters *already* know and use the existing system, which has served the public well for decades. These parties have substantial capacity and ex-

94. *See* Whitman v. Am. Trucking Ass'ns, 531 U.S. 457, 468 (2001) (describing NAAQS as "the engine that drives nearly all of Title I of the CAA").

95. Although attainment in the greenhouse gas context presents some challenges, those difficulties can be overcome without further congressional action. *See infra* Part IV.C.2–3.

96. Holly Doremus & W. Michael Hanemann, *Of Babies and Bathwater, Why the Clean Air Act's Cooperative Federalism Framework Is Useful for Addressing Global Warming*, 50 ARIZ. L. REV. 799, 827–28 (2008); Alice Kaswan, *A Cooperative Federalism Proposal for Climate Change Legislation: The Value of State Autonomy in a Federal System*, 85 DENV. U.L. REV. 791, 829 (2008). For example, one study found that residential and commercial buildings—structures that fit squarely within a state's jurisdiction—account for one third of U.S. carbon emissions. MARILYN A. BROWN ET AL., THE BROOKINGS INST., SHRINKING THE CARBON FOOTPRINT OF METROPOLITAN AMERICA (May 2008), *available at* http://www.brookings.edu/~/media/Files/rc/reports/2008/05_carbon_footprint_sarzynski/carbonfootprint_report.pdf. Another study concluded that compact development patterns can reduce vehicle miles traveled, and the associated carbon emissions, by as much as twenty to forty percent. REID EWING ET AL., GROWING COOLER: THE EVIDENCE ON URBAN DEVELOPMENT AND CLIMATE CHANGE 9 (Urban Land Instit. 2008).

pertise relating to NAAQS and SIPs for traditional pollutants, which can and should be put to use to reduce greenhouse gases. Moreover, many states have already taken important steps including completing greenhouse gas inventories, setting emissions reduction targets, and preparing climate action plans.[97] These existing state-level climate efforts could be readily incorporated into SIPs.

The SIP process also can integrate state and federal action. Federal review of SIPs would ensure consistency among states, address interstate leakage concerns by requiring all states to take action, and vertically integrate rapidly expanding local state and international climate change programs into a comprehensive national program.[98]

The autonomy retained by the states and the existing significant latitude to experiment with pollution reduction methods and technologies through the SIP process also encourages innovation.[99] Many believe that states' greater flexibility allows them to innovate more efficiently and to use their ability to experiment to produce the most effective models for future action. In addition to allowing states to experiment, the SIP framework permits them to learn from each other's successes and failures, and provides opportunity for greater collaboration among states.[100] Finally, no new legislation is required to activate the NAAQS program—an invaluable advantage in light of the recent congressional gridlock on greenhouse gas regulation.

In short, the Act already provides a comprehensive pollution reduction scheme for greenhouse gases that is guided by the science-based NAAQS to protect the public health and welfare. The NAAQS program has a proven track record of success in dealing with the very problem that greenhouse gases pose so dramatically: air pollution that originates from many different sources and accumulates to cause grave harm.[101] The EPA should fully implement the law without further delay.

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97. ENVTL. PROT. AGENCY, STATE AND LOCAL CLIMATE AND ENERGY PROGRAM: STATE PLANNING AND MEASUREMENT (2012), http://www.epa.gov/statelocalclimate/state/tracking/state-planning-and-incentive-structures. html; Doremus, *supra* note 96, at 826.

98. *See* Peterson, *supra* note 86, at 264.

99. Kaswan, *supra* note 96, at 800.

100. Doremus, *supra* note 96, at 829.

101. *See supra* text accompanying notes 15 through 17.

C. *Challenges and Criticisms Related to a Greenhouse Gas NAAQS*

Academic commentators and others have raised a number of criticisms and challenges to the establishment of a greenhouse gas NAAQS, and some have pronounced the program to be ill-suited to addressing climate change. On close inspection, however, none of the challenges identified in the literature poses an insurmountable barrier to implementation or outweighs the benefits of establishment of a NAAQS for greenhouse gases.

1. The Section 111(d) Trade-off

One of the more significant objections to establishing a NAAQS for greenhouse gases is that once a pollutant is designated as a criteria air pollutant pursuant to section 108(a), the EPA cannot use section 111(d) to establish a NSPS for that pollutant at *existing* sources.[102] Stationary source greenhouse pollution is relatively concentrated amongst the largest sources, including numerous already existing facilities. If a greenhouse gas NAAQS were established, the argument goes, these facilities' emissions could not be regulated under section 111(d), and would also escape review under NSPS and NSR unless the facility underwent a major modification. Although SIP provisions would reach these existing sources following criteria designation and establishment of a NAAQS, some believe that section 111(d) standards would be just as effective and could be promulgated more quickly.[103] Accordingly, it has been asserted that criteria air

102. Clean Air Act § 111(d), 42 U.S.C. § 7411(d) (2006). This section directs EPA to adopt regulations that require the states to establish emission standards for pollutants at *existing* industrial facilities that would be subject to NSPS if they were new facilities. Such standards are not required, however, for criteria air pollutants.

103. Section 111(d) may not offer a considerable time advantage in any event. States generally have three years to prepare SIPs following establishment of a NAAQS, although the Administrator may prescribe a shorter period. § 110(a)(1), 42 U.S.C. § 7410(a)(1). EPA's section 111(d) regulations, in contrast, offer no definite time frame within which the Administrator must promulgate guidelines for the states to use in applying a new or revised NSPS to existing sources, although a reasonable time frame must be presumed. *See* 40 C.F.R. § 60.22(a) (2011) (stating that "[c]oncurrently upon *or after*" promulgation of a NSPS, the Administrator "will publish" a "draft guideline document") (emphasis added). Once published, this "guideline document" must go through a full notice and comment rulemaking. *Id.* States must submit plans for compliance with section 111(d) within nine months of receiving notice of the availability of the final guideline document, although the Administrator may extend this deadline "whenever [she] determines necessary." 40 C.F.R. §§ 60.23(a), 60.27(a) (2011). The Administrator must approve or disapprove state plans within four months of receipt. 40 C.F.R. § 60.27(b) (2011). If a state fails

pollutant designation for greenhouse gases could, in the short term, slow the pace of pollution reductions.[104]

This concern, although legitimate, ultimately does not outweigh the benefits of a greenhouse gas NAAQS. First, the criteria pollutant program must adhere to the latest scientific knowledge and the need to protect public health and welfare, while the section 111(d) program is shaped by a variety of additional factors.[105] Although the establishment of a NAAQS and the implementation of SIPs may take somewhat longer than the implementation of one or more 111(d) standards, the achievement of a scientifically-derived standard to drive greater pollution reductions would be worth the wait.

Moreover, any time advantage remains entirely theoretical due to current agency inaction. The EPA has not yet promulgated even one NSPS for greenhouse gas emissions from new or modified facilities, much less taken any steps to require greenhouse gas standards for existing facilities under section 111(d). In one case, the EPA and intervenors successfully argued that the EPA's refusal to adopt greenhouse gas standards during its revision of the NSPS for Portland cement plants was not reviewable as final agency action because it was still working toward establishing such a standard.[106] Recent news reports also suggest that the EPA's long-anticipated greenhouse gas NSPS for power plants will not include 111(d) standards for existing sources.[107] While the EPA could theoretically achieve reductions for major pollution sources with section 111(d) standards that may approximate

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to submit a plan, the Administrator must adopt a plan for the state within six months of the missed deadline. 40 C.F.R. § 60.27(c), (d) (2011). Finally, each state plan is allowed considerable latitude in establishing schedules for compliance with the standards; indeed, compliance schedules can extend for much longer than a year. *See* 40 C.F.R. §§ 60.24(c)–(e) (2011); *see also, e.g.*, 40 C.F.R. § 60.36(c) (2011) (establishing thirty-month compliance deadline for municipal solid waste landfills). Accordingly, even if EPA were to publish the guidance document concurrently with a new or revised NSPS, the process from guideline document proposal to full compliance could take two or three years, and possibly longer. SIP preparation for a new criteria pollutant, in contrast, may not extend beyond three years, and EPA could require a shorter timeline following establishment of a greenhouse gas NAAQS.

104. *See, e.g.* Richardson, *supra* note 86, at 297–98.

105. *See* 40 C.F.R. § 60.22(b) (2011).

106. Portland Cement Ass'n v. Envtl. Prot. Agency, No. 10-1358, 2011 U.S. App. LEXIS 24577 at *37–38 (D.C. Cir. Dec. 9, 2011), discussed in section II.B.1, *supra.*

107. Dawn Reeves, *EPA Climate Rule Under Review Limits GHG Controls to New Power Plants*, INSIDE EPA'S CLEAN ENERGY REP., 7–9 (Nov. 11, 2011). As of press time, this rule was still under review by the Office of Management and Budget and had not been released to the public.

what would be achieved with a NAAQS, the agency is simply not on track to do so.

Some commentators also have suggested that designation of air quality criteria for greenhouse pollutants would immediately vitiate any standards that the EPA might eventually set for existing sources of greenhouse gases under section 111(d).[108] These commentators have not explained in any detail, however, why they think this is the case. The statute itself does not clearly require this result. Although the statute precludes the establishment of *new* section 111(d) standards for criteria air pollutants, it is silent as to the fate of existing section 111(d) standards when air quality criteria are subsequently designated. To our knowledge, the EPA has never established section 111(d) standards for a particular pollutant, and then designated air quality criteria for that same pollutant. Nothing in the statute requires that existing section 111(d) standards for a pollutant be automatically repealed or disabled upon designation of air quality criteria for that pollutant. Certainly, no policy reason supports such a result. Section 111(d) standards are adopted by the states to meet specific standards of performance and are thus in many ways functionally similar to SIP provisions for criteria pollutants.[109] It would make far more sense for the EPA to leave section 111(d) provisions in place until and unless they were replaced with more protective SIP provisions to attain the NAAQS.[110] For strong policy reasons, and in light of the lack of any clear statutory command to the contrary, the EPA could and should leave section 111(d) standards for greenhouse gases promulgated prior to criteria air

108. *See, e.g.*, Nathan Richardson et al., *Greenhouse Gas Regulation Under the Clean Air Act: Structure, Effects, and Implications of a Knowable Pathway*, 41 ENVTL. L. REP. NEWS & ANALYSIS 10098, 10110 (2011) (contending that "if § 111(d) regulation is in place and a NAAQS is subsequently issued, that § 111(d) regulation is effectively cancelled"); Timothy J. Mullins & Rhead Enion, *(If) Things Fall Apart: Searching for Optimal Regulatory Solutions to Combating Climate Change Under Title I of the Existing CAA if Congressional Action Fails*, 40 ENVTL. L. REP. NEWS & ANALYSIS 10864, 10885 (2010) (arguing that "§ 111(d) regulation would be displaced as soon as EPA issues air quality criteria or lists GHGs under §108(a)").

109. Section 111(d) expressly recognizes this similarity by giving the EPA the same authority it has in the SIP context to prescribe and enforce plans where states fail to do so. Clean Air Act § 111(d)(2), 42 U.S.C. § 7411(d)(2) (2006).

110. Indeed, Timothy Mullins argues that the Clean Air Act contemplates exactly this type of "seamless transition" between section 111(d) standards for existing sources and more protective SIP provisions under section 110(a)(2)(F) following criteria pollutant designation. Mullins & Enion, *supra* note 108, at 10885–86.

pollutant designation in place pending approval and implementation of SIP provisions to attain the greenhouse gas NAAQS.[111]

Finally, section 111(d) standards would apply only to specific categories of industrial sources. Accordingly, such standards alone would not be an effective substitute for a greenhouse gas NAAQS. Section 111(d) standards alone simply cannot drive and integrate state efforts to reduce greenhouse emissions as a NAAQS does, or achieve the other benefits discussed above. While the hypothetical loss of section 111(d) authority would be a substantial trade-off, the NAAQS program can achieve reductions from both new and existing sources *as well as* activities regulated only by individual states and outside of federal jurisdiction. In short, the NAAQS program offers advantages that section 111(d) alone cannot deliver.

2. NAAQS Attainment for a Globally Well-Mixed Gas

Unlike pollutants with purely local health effects, greenhouse gases are well-mixed globally, and the harm they cause to the climate is related more to global atmospheric concentrations of pollutants than increased local concentrations. As discussed below, some commentators have cited this difference in concluding that the NAAQS program is ill-suited to greenhouse gas regulation.[112] As a threshold matter, however, these objections overlook the fact that the nature of the NAAQS—a standard based on maximum ambient concentrations of pollutants—is actually well-suited to reducing CO_2 pollution because the warming effects of CO_2 depend directly on its atmospheric concentration. Indeed, implementation of a NAAQS for greenhouse gases may be easier and less expensive in some important respects than it is for more locally dangerous pollutants. For example, monitoring air quality for traditional pollutant levels at many points throughout the country requires considerable investment in equipment, staff time, and other resources. Although facility-based greenhouse gas emission monitoring and reporting would continue as

111. Even if regulated entities were to succeed in challenging a decision to maintain section 111(d) standards following criteria pollutant designation, a reviewing court might well remand the section 111(d) standards without vacating them. *See* North Carolina v. Envtl. Prot. Agency, 550 F.3d 1176, 1178 (D.C. Cir. 2008) (holding remand without vacatur appropriate where allowing the challenged rule to remain in effect "would at least temporarily preserve the environmental values covered by" the rule); *see also* Mullins & Enion, *supra* note 108, at 10885.

112. *See infra* notes 116, 123.

it does now,[113] there is likely no need for the design, installation, or maintenance of extensive new monitoring equipment and systems to monitor local, state, or even national ambient greenhouse gas concentrations, precisely because these gases are globally well-mixed. This characteristic could decrease the effort and cost of implementing NAAQS for greenhouse gases as compared to those for traditional pollutants.

Some critics of a greenhouse gas NAAQS point out that if the standard were set below current atmospheric concentrations, the entire country would be placed into nonattainment status.[114] This is true, but the consequences of nonattainment alone do not make NAAQS for greenhouse gases unworkable. In fact, nonattainment status would give the EPA and the states the full range of tools available under the Act. A nonattainment SIP must contain provisions designed to reduce emissions of criteria pollutants not included in other SIPs. For example, a nonattainment SIP must require implementation of all reasonably available control measures, demonstrate "reasonable further progress" toward attainment over the life of the SIP, quantify emissions from new and modified stationary sources, establish a stringent permitting system for such sources, and include other necessary or appropriate limitations and control measures.[115] Permits for stationary sources must ensure the "lowest achievable emissions rate" of criteria pollutants.[116] Transportation projects in nonattainment areas also must demonstrate "conformity" with the SIP.[117]

If a state, despite implementing all of these measures in good faith, nonetheless fails to achieve compliance with a NAAQS by its attainment date, it must revise its SIP and continue its efforts. Upon finding that a state has not attained an applicable standard on time, the EPA must publish a notice of nonattainment.[118] This

113. Mandatory Reporting of Greenhouse Gases, 40 C.F.R. § 98.1 (2011). States also have adopted greenhouse gas monitoring and reporting programs. *See, e.g.*, General Requirements for Greenhouse Gas Reporting, CAL. CODE REGS., tit. 17, § 95100 (2012). Such state-level programs could prove extremely useful in designing and monitoring compliance with SIPs under a greenhouse gas NAAQS.

114. *See, e.g.*, Arnold W. Reitze, Jr., *Federal Control of Greenhouse Gas Emissions*, 40 ENVTL. L. 1261, 1296 (2010) ("If CO_2 NAAQS values were below present CO_2 atmospheric concentration, the entire country would have a nonattainment status with no realistic expectation that any measure taken as part of a SIP would lead to attainment of the standard.").

115. Clean Air Act § 172(c), 42 U.S.C. § 7502(c) (2006).

116. § 173(a)(2), 42 U.S.C. § 7503(a)(2).

117. § 176, 42 U.S.C. § 7506.

118. § 179(c)(1), (2), 42 U.S.C. § 7509(c)(1), (2).

notice triggers the state's responsibility to revise and resubmit its SIP, which must include all of the usual requirements plus additional measures that the EPA Administrator may "reasonably prescribe," including all measures that can be feasibly implemented in light of cost, technological constraints, and other environmental impacts.[119] Once the new plan is approved, the state is given a new attainment date, which is up to ten years from the date of the EPA's initial notice of nonattainment.[120] Accordingly, if a state fails to meet an attainment deadline, it must continue to use all of the tools available under the Act, including additional technologically and economically feasible measures prescribed by the EPA, to continue on a path toward attainment. Nonattainment of a NAAQS, therefore, does not represent a catastrophe. Instead, it simply triggers additional and effective measures designed to attain the standard.

Perhaps the most serious objection raised by commentators is that the well-mixed nature of climate pollution would make attainment of a greenhouse gas NAAQS difficult if not impossible. The core purpose of the NAAQS program, after all, is to ensure attainment of air quality standards designed to protect health and welfare. No single state—and indeed no single country—could achieve a local concentration of a globally well-mixed gas on its own.[121] Accordingly, the EPA and various commentators have argued that the EPA would be unable even to *approve* any SIPs for greenhouse gases because no single SIP on its own could demonstrate attainment within the time frames established by statute.[122] The drafters of the Act, however, provided a remedy for situations where international emissions might interfere with SIP approval. Section 179B states that a SIP "shall be approved by the Administrator" if the state "establishes to the satisfaction

119. § 179(d)(1), (2); 42 U.S.C. § 7509(d)(1), (2); *see also* Latino Issues Forum v. Envtl. Prot. Agency, 558 F.3d 936, 943–44 (9th Cir. 2009) ("[A]ll feasible measures" does not literally mean *all* feasible measures, but rather only those that the Administrator reasonably sees fit to require in light of technological and other constraints.).

120. § 179(d)(3), 42 U.S.C. § 7509(d)(3).

121. *See, e.g.*, Richardson, *supra* note 86, at 296; Doremus & Hanemann, *supra* note 96, at 821–22; Robert R. Nordhaus, *New Wine into Old Bottles: The Feasibility of Greenhouse Gas Regulation under the Clean Air Act*, 15 N.Y.U. ENVTL. L.J. 53, 61–63 (2007).

122. Regulating Greenhouse Gas Emissions Under the Clean Air Act, 73 Fed. Reg. 44,354, 44,481 (July 30, 2008) (to be codified at 40 C.F.R. ch. 1); *see also*, e.g., Jonathan B. Wiener, *Think Globally Act Globally: The Limits of Local Climate Policies*, 155 U. PA. L. REV. 1961, 1966–67 (2007). The proposition that no pollution source should be controlled until all other pollution sources elsewhere have also been regulated is, of course, inherently self-defeating.

of the Administrator that the implementation plan of such State would be adequate to attain and maintain the relevant national ambient air quality standards by the attainment date . . . *but for* emissions emanating from outside of the United States."[123] Accordingly, if a state can demonstrate that its plan would be consistent with attainment "but for" international emissions, the EPA may approve it.

To date, section 179B has been invoked only in border areas. Clean air advocates might voice legitimate concerns that expanding this provision to cover a broad swath of global pollutant emissions would invite abuse and undermine local attainment efforts for other pollutants. Although there is little case law interpreting section 179B, one leading case indicates that the courts will not countenance slipshod or unsupported attempts to misuse this provision to escape attainment. In *Sierra Club v. EPA*, the Ninth Circuit dismissed the EPA's conclusion that exceedances of the particulate matter NAAQS in California's Imperial Valley were caused by pollution blowing in from Mexico.[124] Windrose data in the record simply did not support the agency's conclusion, rendering improper its reliance on section 179B to excuse the local air district's failure to attain the standard.[125] Given this precedent, states would have to produce—and the EPA would have to rely on—reliable data showing that each SIP would be on track to achieve the greenhouse gas NAAQS, but for actual emissions data showing that international pollution made attainment impossible.

Of course, the EPA might be tempted to resolve any attainment difficulties by setting the NAAQS at a level far above current concentrations. The Act, however, requires the NAAQS to be set at a level "requisite" to protect public health and welfare.[126] The Supreme Court has defined the "requisite" level as "not lower or higher" than necessary to achieve these goals.[127] The "primary" NAAQS that protects public health, moreover, must include an "adequate margin of safety" that protects against not only known adverse effects but also those about which the

123. § 179B(a)(2), 42 U.S.C. § 7509a(a)(2) (emphasis added); *see also* Christopher T. Giovinazzo, *Defending Overstatement: The Symbolic Clean Air Act and Carbon Dioxide*, 30 HARV. ENVTL. L. REV. 99, 154–55 (2006).

124. Sierra Club v. Envtl. Prot. Agency, 346 F.3d 955, 961–63 (9th Cir. 2003).

125. *Id.*

126. § 109(b), 42 U.S.C. § 7409(b).

127. Whitman v. Am. Trucking Ass'ns, 531 U.S. 457, 475–76 (2001).

science remains uncertain.[128] The NAAQS must therefore function as a "Goldilocks" standard of sorts, albeit one guided solely by the best scientific information and erring, if at all, on the side of precaution.[129]

A NAAQS set far above current concentrations—for example, at 450 to 500 ppm, as some commentators have suggested[130]—would likely fail to meet this standard. Recent scientific work suggests that stabilizing atmospheric greenhouse gas concentrations at 450 ppm CO_2e (roughly 400 ppm CO_2) would provide only a fifty-fifty chance of limiting global temperature increases to 2°C.[131] According to the National Research Council, a 2°C rise in global temperatures would cause a number of severe adverse effects in the United States and elsewhere, including an increase in the number of hot days, coastal erosion and inundation from sea level rise, reduced crop yields, loss of Arctic sea ice, damage to coral reefs, a 200–400 percent increase in wildfires, and substantial changes in rainfall patterns and streamflow.[132] These impacts are consistent with those identified by the EPA in the Endangerment Finding as posing a threat to public health and welfare.[133] The EPA cannot rationally set a NAAQS at a level where impacts endangering public health and welfare will occur.

To be sure, attaining such a greenhouse gas NAAQS—especially a long-term standard set at 350 ppm by the end of the century—will be a difficult task. Nonetheless, attainment is and must remain the overall goal of a greenhouse gas NAAQS. The fact that the effort may take longer than it has for other pollutants and will require international action should not be used as an excuse to defer attainment forever, under section 179B or other-

128. § 109(b)(1), 42 U.S.C. § 7409(b)(1); *Whitman*, 531 U.S. at 465; Am. Trucking Ass'ns v. Envtl. Prot. Agency, 283 F.3d 355, 378 (D.C. Cir. 2002).

129. *See Am. Trucking Ass'ns*, 283 F.3d at 378; Am. Lung Ass'n v. Envtl. Prot. Agency, 134 F.3d 388, 389 (D.C. Cir. 1998).

130. Peterson, *supra* note 86, at 255 (identifying 500 ppm CO_2e [roughly akin to 450 ppm CO_2] as a concentration that would avoid "dangerous anthropogenic climate change").

131. *See* Michel den Elzen & Niklas Höhne, *Sharing the Reduction Effort to Limit Global Warming to 2°C*, 10 CLIMATE POL'Y 247, 248 (2010).

132. *See* COMM. ON STABILIZATION TARGETS FOR ATMOSPHERIC GREENHOUSE GAS CONCENTRATIONS, NAT'L RESEARCH COUNCIL, CLIMATE STABILIZATION TARGETS 22–25 (2011), *available at* https://download.nap.edu/catalog.php?record_id=12877.

133. *See* EPA Endangerment Finding, *supra* note 18, at 66,496–99. EPA further found that National Research Council reports are among the "best reference materials" for guiding agency decisionmaking. *Id.* at 66,511.

wise. Nor should it be seen as a reason to forgo using the powerful tools that the NAAQS program places at our disposal.

3. Allocating State Reductions under a Greenhouse Gas NAAQS

Although the well-mixed nature of greenhouse gases does not present insurmountable legal obstacles to the attainment of a NAAQS, as discussed above, it nonetheless poses practical challenges. A threshold issue in this context is determining what overall emissions reductions the U.S. must make—given projected global emissions and climate mitigation efforts—to achieve the NAAQS. Ideally, these reductions would also be negotiated and agreed in the context of a legally binding international treaty under the auspices of the United Nations Framework Convention on Climate Change (UNFCCC). Unfortunately, no such agreement yet exists—in no small measure due to the reluctance of the U.S. to commit to scientifically defensible reduction targets even after it agreed, as party to the UNFCCC, to take measures necessary to avoid dangerous climate change.[134]

While some exercise of judgment in balancing scientific and equity principles would certainly be required to implement a greenhouse gas NAAQS,[135] the existing scientific literature supports a strong and effective target acknowledging these principles.[136] The EPA would need to develop a national emissions

134. *See* United Nations Framework Convention on Climate Change, *opened for signature* 1992 (entered into force Mar. 21, 1994), *available at* http://unfccc.int/resource/docs/convkp/conveng.pdf; *see also* David M. Driesen, *Neoliberal Instrument Choice*, *in* Economic Thought and U.S. Climate Change Policy 129, 133–137 (David M. Driesen ed., 2010) (summarizing the events leading up to the 2005 entry into force of the Kyoto Protocol without the participation of the United States).

135. The recent scientific literature contains a number of studies that consider both scientific and equitable principles in developing emissions reduction targets. *See, e.g.*, WWF & Ecofys, *Sharing the Effort Under a Global Carbon Budget* (Aug. 24, 2009) (by Sara Moltmann & Niklas Höhne), *available at* http://wwf.fi/mediabank/1058.pdf; Sholbal Chakravarty et al., *Sharing Global CO_2 Emission Reductions Among One Billion High Emitters*, 106 PROC. NAT'L ACAD. SCIS. U.S. AM. 11884 (2009), *available at* www.pnas.org/cg i/doi/10.1073/pnas.0905232106; PAUL BAER ET AL., THE GREENHOUSE DEVELOPMENT RIGHTS FRAMEWORK (rev. 2d ed. 2008), *available at* http://www.ecoequity.org/docs/TheGDRsFramework.pdf.

136. Current scientific literature has described emissions reduction pathways consistent with limiting global temperature increases to 1.5°C or 2°C. *See generally* Joeri Rogelj et al., *Emission Pathways Consistent with a 2°C Global Temperature Limit*, 1 NATURE CLIMATE CHANGE 413 (2011); NAT'L RESEARCH COUNCIL, *supra* note 132; UNITED NATIONS ENV'T PROGRAMME, *supra* note 12, at 30–35. These pathways, modified to account for global equity principles, could provide a solid scientific starting point for calculation of a national emissions budget.

reduction target consistent with a global pathway toward stabilizing CO_2 concentrations at a level sufficient to avert unmanageable climate damage, such as 350 ppm.[137] Such a target, if informed by both current science and the principles of equity that guide the UNFCCC, would, by necessity, be much more ambitious than the politically negotiated and science-divorced pledge announced by the U.S. in Copenhagen and perpetuated at subsequent negotiations in Cancun and Durban.[138] Moreover, the CAA's mandate to review each NAAQS at least every five years affords sufficient flexibility to account for advances in scientific understanding and international greenhouse gas reduction developments.

Once an overall national target is adopted, the EPA could then allocate emissions reduction goals to each state accordingly. The EPA could achieve this task in a number of ways. Most directly, the agency could issue a multi-state SIP call and promulgate additional regulations, allocating contributions to the overall target in accordance with its authority to ensure that emissions from one state do not contribute to nonattainment in other states.[139] Such a rule should be based on careful and well-supported analysis of each state's relative contribution to greenhouse gas concentrations and each state's relative capacity to assist in meeting the overall national target.[140] The EPA also could include informa-

137. Ideally, this determination would be made in conjunction with the State Department and within the auspices of the UNFCCC, but continued inaction in the international arena would not lessen the EPA's independent duty under the Act. *See* Clean Air Act §§ 112, 114, 42 U.S.C. §§ 7412, 7414 (2006).

138. For example, one recent study taking equity principles into account confirmed that developed country reductions in the range of twenty-five to forty percent below 1990 levels would be necessary in order to retain a fifty percent chance of stabilizing atmospheric CO_2 levels at 400–450 ppm and limiting global average temperature increases to 2°C. Elzen & Höhne, *supra* note 131, at 248. At 2°C warming, however, severe climatic effects would still occur. *See* Smith, *supra* note 7; Anderson & Bows, *supra* note 7. In order to reach a 350 ppm stabilization target that would create a better chance of safeguarding the public health and welfare against these effects, developed country reductions on the high end of this range—in the neighborhood of forty to forty-five percent below 1990 levels by 2020—will likely be necessary. *See* Press Release, Ctr. for Biological Diversity & 350.org, Not Just a Number: Achieving a CO_2 Concentration of 350 ppm or Less to Avoid Catastrophic Climate Impacts (Oct. 4, 2010), *available at* http://www.biologicaldiversity.org/programs/climate_law_institute/350_or_bust/pdfs/Not_Just_a_Number-v3.pdf.

139. *See* § 110(a)(2)(D), 42 U.S.C. § 7410(a)(2)(D).

140. The D.C. Circuit's opinion in *North Carolina v. EPA*, 531 F.3d 896 (D.C. Cir. 2008), provides important guidance on how EPA might use this authority in a legally defensible manner. According to the Court, EPA's Clean Air Interstate Rule—which relied on the agency's section 110(a)(2)(D) authority in enacting a regional program to reduce ozone and fine particulate matter pollution from several states—

tion to assist states in developing revisions to its minimum SIP criteria[141] and could provide relevant guidance on its air quality criteria and recommended pollution control techniques and alternatives.[142] In short, the EPA could use these existing authorities and the flexibility inherent in section 179B to divide responsibility among the states for keeping the U.S. on the path to 350 ppm, so that each state would contribute to meeting the overall science-based NAAQS on a realistic timeline.

4. Fear of Political Backlash

Another objection to enforcement of the NAAQS program for greenhouse gases is fear of political backlash through legislation prohibiting its use. A common theme in environmental discourse is that public interest advocates should not seek to accomplish more through existing laws than is politically "realistic" because such attempts may lead to judicial weakening or legislative repeal of these tools. The power of this prior restraint has contributed to a troubling dynamic: despite lackluster enforcement of the laws already on the books, extreme anti-regulatory attacks against them have proliferated while scientific evidence of the urgent need for far greater regulation continues to mount.

Any attempt to move forward with criteria air pollutant designation for greenhouse gases is highly likely to meet resistance in the current Congress. Indeed, the 112th Congress has introduced (but thus far failed to pass) bills to undo or delay nearly every greenhouse pollution control rulemaking the EPA has issued.[143] But an ex ante assumption that this backlash will succeed might have stymied the EPA enforcement activity altogether. In any event, a decision to abstain from setting a greenhouse gas NAAQS out of fear that Congress might annul it cedes the tremendous benefits of its enactment even more effectively than potential yet uncertain passage of anti-enforcement legislation.

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failed to adequately evaluate the degree to which each upwind state significantly contributed to nonattainment in downwind states. *Id.* at 906–08. Although the case suggests that EPA would have to carefully analyze relevant sources and relative state contributions to nonattainment in other areas, the well-mixed nature and global effects of the pollutants at issue might make this demonstration less onerous in the context of greenhouse gases.

141. *See* § 110(k)(1)(A), 42 U.S.C. § 7410(k)(1)(A); 40 C.F.R. 51, app. V (2011).

142. § 108(a)(2), (b), 42 U.S.C. § 7408(a)(2), (b).

143. *See, e.g.*, Elana Schor, *Senate to Vote Today on GOP Measure Limiting EPA Rules, Enviro Reviews* GREENWIRE (Nov. 3, 2011), http://www.eenews.net/Greenwire/2011/11/03/archive/5?terms=House+bills+against+EPA.

Such conduct hands anti-regulatory forces exactly the victory they seek—but without even a fight. The moral magnitude of the climate crisis requires a focused effort to build the political will to defend and fully implement the Act and other powerful tools of environmental protection.

V.
CONCLUSION

History will not look kindly upon the generation that failed to act on the climate crisis. While the CAA and other relevant domestic and international laws embody the precautionary principle, as Professor Heinzerling has pointed out, "we long ago frittered away climate change's precautionary period."[144] "Together, the effects of climate change on human health and the undeniable fact that climate change is upon us have several implications for public policy. Perhaps most important, they create a moral imperative for action—dramatic action, *now*—on this problem."[145] Moreover, society "already possesses the fundamental scientific, technical, and industrial know-how to solve the carbon and climate problem for the next half-century."[146]

While the U.S. faces profoundly disquieting political obstacles to progress on the issue, as the physical impacts of climate change, including rising seas, stronger heat waves, species extinction, and reduced food production continue to mount, the political dynamic will change both in the U.S. and globally. As the physical reality of global warming overtakes us, the disinformation campaign and anti-regulatory crusade waged by the fossil fuel industry and its allies will begin to fail. The political discourse will eventually shift to focus on the fastest and most effective ways to cut greenhouse pollution on a global basis.

Particularly in the absence of concerted legislative and international solutions to the climate crisis, the need to employ the tools already at our disposal is paramount. The Act already provides a comprehensive, science-based regulatory program for the reduc-

144. Lisa Heinzerling, *Climate Change, Health, and the Post-Cautionary Principle*, 96 Georgetown Law Journal 445, 460 (2008).

145. *Id.* at 447.

146. S. Pacala & R. Socolow, *Stabilization Wedges: Solving the climate problem for the next 50 years with current technologies*, 305 SCI. 968, 968 (2004). While Pacala and Socolow do not analyze a 350 ppm CO_2 stabilization target, their conclusion that deep and rapid greenhouse pollution reductions can be accomplished with technology on the shelf as of 2004 more than adequately supports the point that the primary barrier to action is not technological.

tion of greenhouse pollution. The Act has a proven track record of success and requires no additional legislative implementation. While there is broad agreement that many of the CAA's programs, including new source pollution standards and vehicle programs, are well-suited to reducing greenhouse pollution, the EPA has been slow and tentative in implementing these provisions. To date, the benefits of criteria air pollutant designation and NAAQS for greenhouse gases have been greatly under-appreciated. It is far more constructive in the current context to take the NAAQS program seriously, and to think carefully about how to put its powerful resources to work in controlling greenhouse gas emissions, than it is to simply dismiss the program as unworkable. Utilizing the criteria air pollutant programs would provide a science-based standard to protect public health and welfare, guide national climate policy, and drive greater reductions from all of the Act's successful and interlocking programs. The EPA should move forward with full implementation of this far-sighted law.