To: Faculty

From: David Adelman

Re: Drawing Board, March 25th, on "Preemption in Practice: The Loss of State Autonomy over Clean Air Policy"

I have completed a draft of the paper on which this Drawing Board is based. The excerpt below is taken from the introduction and a later section that covers several of the central arguments of the paper. The paper presents two related critiques of the Clean Air Act that have important implications for contemporary environmental policy, including emerging efforts to address climate change. The paper also draws on the history of environmental regulation (in a section not included below) to place contemporary debates and the arguments made in the paper in a broader historical perspective.

I will note a few questions that I have about the paper and some related issues below.

1. A central theme of the article is the divergence between the law in action versus how it is often portrayed in the literature. The article suggests two reasons for this disparity, but they are both impressionistic or inferred from the content of contemporary debates and scholarship. I would appreciate feedback on how to strengthen them.
2. A less developed theme of the article is the limits of the law, whether federal or state, as exemplified by the limited successes with regulating smaller sources of air pollution and transportation planning. It would be helpful to get input on analogous issues in other areas.
3. While the many successes of the Clean Air Act are broadly recognized, this article suggests that national standards have played only a secondary role. I nevertheless wonder whether the political salience of national standards is important to the continued support for clean air policy—in highly technical areas, you need simple standards/metrics around which groups can organize. This might suggest that earlier critiques of "symbolic legislation," which focused on legislators getting political points without having to make difficult policy choices, ignore a potentially important role of such broad aspirational goals.
4. Finally, in reading some of the historical literature on environmental policy, I have been intrigued by some of the parallels with the civil rights movement. The major legislation emerges at roughly the same time (~1965), a critical impediment to federal legislation in both areas was "state rights," and both quickly run into problems with local enforcement/implementation (e.g., school busing, transportation policy). I would be interested in discussing these potential parallels if time permits.

PREEMPTION IN PRACTICE: THE LOSS OF STATE AUTONOMY OVER CLEAN AIR POLICY

Two elements of the 1970 Clean Air Act (CAA) are viewed as essential to its many successes: the health-based national ambient air quality standards (NAAQS), which restrict emissions of six widely released criteria air pollutants,[1] and the statute's hybrid form of cooperative federal-state regulation.[2] This Article will show that these widely held beliefs are inconsistent with the actual operation of the law; an amalgam of parallel programs and external constraints have marginalized the NAAQS program and eroded state autonomy, such that state action is broadly preempted in practice.

The continued reverence for NAAQS is reflective of misconceptions about the major sources of air pollution. Large industrial sources receive undue attention when, apart from electric utilities, air pollution is overwhelmingly an urban problem for which numbers matter more than size.[3] Urban areas are home to 80 percent of the United States population and typically suffer from the worst air quality.[4] Urban density explains in large part why 50 percent of Americans live in areas that fail to meet one or more NAAQS. It also accounts for hotspots of toxic air pollution—the ten largest cities encompass 88 percent of the population exposed to the highest cancer risks nationally.[5]

None of this should be a surprise. Prior to 1970 air pollution had long been viewed as an urban problem, and the legal policies that exist today owe much to innovations that first emerged at the local level, most notably in Los Angeles.[6] It was also well established by the mid-1960s that "[t]he automobile is the primary villain in air pollution . . . . It accounts for at least 60% of the total air pollution in the United States—85% of the total air pollution in some of our sprawling urban areas."[7] The contemporary data, as shown in detail below, are remarkably consistent with these early estimates, despite the impressive declines in most air pollutants during the intervening decades.

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[1] Henry A. Waxman, *An Overview of the Clean Air Act Amendments of 1990*, 21 ENVTL. L. 1721, 1756 (1991) (describing the NAAQS as "the cornerstone of the CAA's pollution control programs"); Robert L. Glicksman, *et al.*, ENVIRONMENTAL PROTECTION: LAW AND POLICY 490-96, 514 (2011) (providing a representative statement that the "[t]he primary emphasis of the CAA is on the 'attainment' of these ambient standards").

[2] Glicksman, et al., *supra* note 1, at 389 (stating the CAA was "the model for other federal environmental laws").

[3] Other commentators have noted the importance of individual behavior as a major source environmental harms; however, they have assumed incorrectly that this is a new phenomenon when as I will show it has been the norm from the start. *See, e.g.*, Michael P. Vandenbergh, *From Smokestack to SUV: The Individual as Regulatory Entity in the New Era of Environmental Law*, 57 VAND. L. REV. 515, 517-18 (2004).

[4] PAUL MACKUN & STEVEN WILSON, POPULATION DISTRIBUTION AND CHANGE: 2000 TO 2010, at 4 (2011), *available at* http://www.census.gov/prod/cen2010/briefs/c2010br-01.pdf.

[5] The cancer risks in these cities were at least 100 times above the Clean Air Act's target risk level of one excess death per million. *See* 42 U.S.C. § 7412(f)(2) (2006).

[6] U.S. Department of Health, Education, and Welfare, STATE AND LOCAL PROGRAMS IN AIR POLLUTION CONTROL 112-13, 115-17, 120 (1966) (describing a series of leading state programs in the 1960s).

[7] James E. Krier & Edmund Ursin, POLLUTION AND POLICY: A CASE ESSAY ON CALIFORNIA AND FEDERAL EXPERIENCE WITH MOTOR VEHICLE AIR POLLUTION 1940-1975 202 (1977); Jeffrey Fromson, *A History of Federal Air Pollution Control*, 30 OHIO ST. L.J. 516, 535 (1969) (observing that "[i]n 1967 it was estimated that over 90 percent of the [air pollution] in Los Angeles was caused by motor vehicle emissions").

The importance today of motor vehicles, and smaller stationary (nonpoint) sources, is nevertheless underappreciated. Two interconnected factors explain this disconnect. The first stems from EPA's early efforts to implement the NAAQS. The impossibility of meeting the compliance deadlines in many states was recognized immediately,[8] and motor vehicles were the heart of the problem. By mid-1973, EPA determined that 38 cities would have to enact measures to reduce driving and that at least ten would have to institute gas rationing.[9] Under court order, EPA later issued a federal plan for California that required gas usage to fall 80 percent during the smoggiest months in Los Angeles.[10] As EPA had feared, the public responded with outrage and disbelief, and the controversy tainted public attitudes towards transportation policies.[11]

In the aftermath of this public turmoil, it was as though a collective amnesia took root among environmentalists and their supporters. Moreover far from prompting reassessment, the experience appears to have entrenched convictions about NAAQS,[12] and with the promise of effective emissions control devices awareness of motor vehicle emissions fell. Fervent belief in NAAQS persists today despite decades of delays and state resistance. Yet, it seems misleading, if not wrong, to claim that NAAQS function as national standards when 40 years after their enactment they exempt 50 percent of Americans.[13] Turning this observation around, one could conclude that in the areas with the largest populations and for which minimum standards matter most, NAAQS are honored in the breach through progressively shifting deadlines.[14]

The second factor is the singular status of electric utilities, which have shaped the legal framework of the CAA and public consciousness of air pollution. The widespread impacts of coal-fired power plants prompted the creation of two major programs—protections for air quality in areas complying with NAAQS and the first pollution trading program, which regulated SO_2 emissions associated with acid rain.[15] Other programs, most importantly New Source Review (NSR),[16] have evolved in the shadow of the political battles over coal and electric utilities. No

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[8] John Bachmann, *Will the Circle Be Unbroken: A History of the U.S. National Ambient Air Quality Standards*, 57 J. AIR WASTE MANAGEMENT ASSOC. 652, 675 (2007) (stating that it "[i]t soon became clear that many states could not meet the 1975 attainment deadlines for all NAAQS"); John Quarles, *The Transportation Control Plans—Federal Regulation's Collision with Reality*, 2 HARV. ENVTL. L. REV. 241, 244 (1977).

[9] John Quarles, CLEANING UP AMERICA: AN INSIDER'S VIEW OF THE ENVIRONMENTAL PROTECTION AGENCY 203 (1976); Krier & Ursin, *supra* note 7, at 223.

[10] Bachmann, *supra* note 7, at 675; Quarles, *supra* note 8, at 244-48; Krier & Ursin, *supra* note 7, at 221-23.

[11] Quarles, *supra* note 8, at 249-51; Eli Chernow, *Implementing the Clean Air Act in Los Angeles: The Duty to Achieve the Impossible*, 4 ECOLOGY L.Q. 537, 551-53 (1974-75).

[12] Quarles, *supra* note 8, at 249 n.21; Bachmann, *supra* note 7, at 674, 676 (describing a subsequent law suit by NRDC over listing lead as a criteria pollutant, despite EPA's regulatory efforts to control lead under another provision of the CAA and the earlier problems with the first set of NAAQS). EPA recognized early on that "the NAAQS should be considered as a last resort"; this view underlay EPA's decision in 1971 to abandon plans to set NAAQS for 24 additional elements, compounds, and mixtures. *Id*. at 674.

[13] David Harrison & Paul R. Portney, *Making Ready for the Clean Air Act*, 5 REGULATION 24, 26 (1981) (observing that "the current 'uniform' standards are not really uniform at all . . . . [g]iven both de jure and de facto departures from uniformity").

[14] In this light, the Obama Administration's recent failure to lower the ozone NAAQS can be read as rejecting the subterfuge of shifting compliance deadlines for a more forthright acknowledgment of what is possible. Barack H. Obama, *Statement by the President on the Ozone National Ambient Air Quality Standards* (Sept. 2, 2011) *available at* < http://www.whitehouse.gov/the-press-office/2011/09/02/statement-president-ozone-national-ambient-air-quality-standards>.

[15] 42 U.S.C. §§ 7470-49, 7651 (2006).

[16] 42 U.S.C. §§ 7503, 7511(C)(4) (2006).

other industry figures as prominently in clean air policy, nor does any other industrial sector approach the emission levels of electric utilities, whether facility-by-facility or collectively.[17]

These differences, and the failure to acknowledge them, have distorted perceptions of industrial sources as a class.[18] By virtue of being conflated with electric utilities, industrial sources have taken on an importance that is out of step with the risks they pose to human health and the environment. Contrary to public perceptions, EPA data show that emissions of criteria pollutants (and air toxics) from most industrial sources are modest, and that in cities they usually account for less than 25 percent of the criteria pollutants emitted.[19] Air pollution, as a general rule, continues to be caused largely by motor vehicles and nonpoint sources.

The strong attachment to NAAQS and focus on regulating industrial sources have obscured the structural problems of the CAA. The central feature of cooperative federalism is the division of responsibilities between the federal government and the states; the former sets the standards and the latter determine how to meet them.[20] The legal precedent emphasizes this point: "So long as the ultimate effect of a State's choice of emission limitations is compliance with the national standards for ambient air, the State is at liberty to adopt *whatever mix* of emission limitations it deems best suited to its particular situation."[21] As this holding suggests, preserving a state's autonomy to allocate emissions between different sources is a core principle of cooperative federalism.

What may be true *de* jure is not true *de facto.* State autonomy is bounded by parallel programs under the CAA and external constraints.[22] The CAA contains a mix of policies that preempt or to varying degrees preserve state authority in overlapping regulatory domains. With the exception of California, the federal government has exclusive authority to regulate emissions from motor vehicles, which remain the largest source nationally of most criteria pollutants. Similarly, new or modified industrial sources are subject to federal technology-based

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[17] Electric utilities account for a majority of the industrial emissions for three key criteria pollutants regulated under the NAAQS program, whereas no other industry accounts for more than a few percent. *See Infra* at 31.

[18] This inverted perspective is reinforced by casebooks, which focus largely on NAAQS and regulation of major industrial sources. *See, e.g.*, Holly Doremus, *et al*., ENVIRONMENTAL POLICY: PROBLEMS, CASES, AND READINGS 696-723 (discussing motor vehicle regulations primarily as an example of technology forcing); Glicksman, et al., *supra* note 1, at 490-96, 514 (motor vehicle policies covered in 7 pages out of more than 150 on the Clean Air Act).

[19] The six air pollutants regulated under the NAAQS program are referred to as "criteria pollutants." Bachmann, *supra* note 7, at 671-72.The most important criteria pollutants currently are sulfur dioxide (SO_2), fine particulate matter ($PM_{2.5}$), and ozone; however, ozone is regulated indirectly by controlling emissions of its two primary chemical precursors—volatile organic compounds (VOCs) and nitrogen oxides (NO_x). *Id*.

[20] Glicksman, et al., *supra* note 1, at 405; David E. Adelman and Kirsten H. Engel, *Adaptive Federalism: The Case Against Reallocating Environmental Regulatory Authority*, 92 Minn. L. Rev. 1797, 1811-12 (2008).

[21] *Train v. Natural Res. Def. Council*, 421 U.S. 60, 79 (1975) (emphasis added); *see also CleanCOALition v. TXU Power*, 536 F.3d 469, 472 n.3 (5th Cir. 2008) (holding that "EPA has no authority to question the wisdom of a State's choices of emission limitations if they are part of a SIP" that meets the relevant NAAQS). This deference also applies to SIP revisions. *Galveston-Houston Assoc. for Smog Prevention v. EPA*, 289 F. Appx 745, 754 (5th Cir. 2008) (holding that "unless the agency finds it make air quality worse," the revision must be approved).

[22] Emissions from natural sources or long-distance transport of pollutants that remain in the atmosphere for weeks or months often further limit state options. Jed Anderson, *Revisiting the SIP Process: Finding a Better Approach to Cleaner Air*, 36 ST. B. TEX. ENVTL. L.J. 213, 214 (2006) (noting that such background sources account for over 50 percent of the ozone pollution in the Dallas-Fort Worth area).

regulations,[23] and the largest industrial sources, coal-fired power plants, are regulated further under the federal pollution trading programs noted above.

Political and practical realities reinforce these legal restrictions.[24] Public opposition largely forecloses options other than emissions controls (or fuel economy) to reduce motor vehicle emissions.[25] For a combination of political and administrative reasons, state programs have made little progress with controlling emissions from nonpoint sources, which are second in importance to motor vehicles. The end result is that state agencies and EPA are required to engage in the complex and costly NAAQS planning process despite the lack of meaningful options available to states for reducing emissions.[26] Recent research on state plans developed to meet the NAAQS has come to similar conclusions,[27] including a 2012 study that found:

> the majority of emissions reductions documented in [the plans] resulted from federal programs. The relative role of federal measures is likely to increase in the near term, as major federal policies for power plants and mobile sources take effect . . . .[28]

These findings demonstrate the need for reforms to revitalize the NAAQS program and to provide states with greater flexibility in achieving emissions reductions. Three options for reform will be explored in the final section of the Article: (1) replacing the national ambient standards with a tiered system based on objective metrics, such as local population and meteorology; (2) ending federal technology-based programs with overlapping mandates; and (3) utilizing flexible market-based regulations more widely. Scholars have based similar calls for reform on economic efficiency; this Article is the first to be grounded on a detailed analysis of EPA's extensive air pollution inventories and cancer risk data.

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[23] New Source Performance Standards (NSPS), which are technology-based performance standards, operate as minimum standards that major sources of criteria pollutants are required to meet. At the same time, NSR offsets and emissions limits under the Prevention of Significant Deterioration program add further restrictions for nonattainment and attainment areas, respectively. 42 U.S.C. §§ 7503, 7511(C)(4), 7411, 7470-79 (2006).

[24] Penny Mintz, *Transportation Alternatives Within the Clean Air Act: A History of Congressional Failure to Effectuate and Recommendations for the Future*, 3 N.Y.U. ENVTL. L.J. 156, 167, 191-92 (1994-95); Tirza S. Wahrman, *Breaking the Logjam: The Peak Pricing of Congested Urban Roadways Under the Clean Air Act to Improve Air Quality and Reduce Vehicle Miles Traveled*, 8 DUKE ENVTL. L. & POL'Y F. 181, 189-92 (1997-98); National Research Council, AIR QUALITY MANAGEMENT IN THE UNITED STATES 212-14 (2004).

[25] Winston Harrington, *et al*., EXHAUSTING OPTIONS: ASSESSING SIP-CONFORMITY INTERACTIONS 18, 33 (2003) (finding that public opposition is "still strong" to the most promising methods (e.g., gasoline taxes, congestion fees) for reducing emissions from motor vehicles) *available at* http://www.rff.org/rff/documents/rff-rpt-exhaustopt.pdf.

[26] *Id*. at 16 (finding strong evidence for "heighten[ed] concern about a toolkit empty of ways to meet transportation needs and air quality goals").

[27] NRC, *supra* note 24, at 126-28 (concluding that "the effectiveness of the current SIP process in addressing serious and above [ozone and PM] nonattainment has yet to be established"); Phillip M. Roth, *et al.*, *Air Quality Modeling and Decision for Ozone Reduction Strategies*, 55 J. AIR WASTE MGMT. ASSOC. 1558, 1558 (2005) (finding that modeling analyses of SIPs were unreliable and that the uncertainties were too high to have confidence that the proposed emissions controls would yield attainment).

[28] Andrew H. Pegues, *et al*., *Efficacy of Recent State Implementation Plans for 8-Hour Ozone*, 62 J. AIR WASTE MANAGEMENT ASSOC. 252, 253 (2012). California was an exception because it has the authority to set standards for motor vehicles that are more stringent than those set by EPA. *Id*. Other studies suggest similar trends for emissions of air toxics. *See* Madeleine Strum, *et al*., *Projection of Hazardous Air Pollutant Emissions in Future Years*, 366 SCI. TOTAL ENVT. 590, 595-98 (2006).

III. The Failure of Cooperative Federalism Under the Clean Air Act

The NAAQS program and system of cooperative federalism form the central legal framework of the CAA and are viewed as integral to its many successes. However, the enormous literatures on the CAA and cooperative federalism have done little to connect their accounts of the law to the difficult realities of its implementation. The discussion that follows will argue that a substantial divide exists between the accounts in the legal literature and operation of the CAA in practice. It will show that the mix of overlapping programs, limits imposed by public opposition, and skewed distributions of emissions across source categories constrain or preempt most state action with the result that cooperative federalism is far more federal than it is cooperative.

The discussion begins with the emissions data evaluated in the preceding section. The distribution of emissions across source categories is shown to reinforce the legal and practical limits on state power. The analysis reveals that where states have the authority to regulate they are most limited by public opposition and administrative barriers. These core findings are then compared to the empirical work on the effectiveness of state planning to implement the NAAQS. The results of this work are found to be consistent with the observations about the legal and practical impediments to state action—federal programs drive most of the reductions in criteria pollutants. Finally, the actual trends in emissions reductions are shown to be associated with sources exclusively or largely regulated by the federal government.

The relative emissions levels of the four source categories indirectly bound state authority. Motor vehicles account for a majority of CO and NO_x emissions, and more than a third of VOC emissions. Yet with the exception of California, state regulation of motor vehicles is limited to operational incentives and restrictions, whereas emissions controls and fuel economy are regulated by the federal government.[29] Similarly, nonpoint sources account for a majority of VOC and $PM_{2.5}$ emissions, as well as a quarter of CO emissions. States have broad authority to regulate nonpoint sources, but their diffuse nature has largely blocked state regulation.[30] Together these source categories account for most of the criteria pollutants emitted— 96 percent of CO, 68 percent of NO_x, 92 percent of VOC, and 83 percent of $PM_{2.5}$.

The emissions effectively within the control of states are also limited by federal controls on industrial sources. Electric utilities account for a majority of the industrial emissions of SO_2, NO_x, and $PM_{2.5}$, but electric utilities are subject to direct federal regulation under several pollution trading programs.[31] Summing the emissions, electric utilities in combination with motor vehicles and nonpoint sources account for roughly 85 to 95 percent of the key criteria

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[29] Wahrman, *supra* note 24, at 193 (stating that "[i]n contrast to stationary sources, state power to limit emissions from mobile sources is restricted, even though mobile sources contribute significantly to ambient air quality violations");

[30] The diffuse nature of nonpoint sources is illustrated by those with the largest emissions nationally in 2005: (1) CO – residential fireplaces and woodstoves, wildfires, agricultural field burning, and opening burning of waste (fifty percent of emissions were from "miscellaneous sources"); (2) $PM_{2.5}$ – unpaved roads, crop tilling and livestock dust, residential fireplaces, agricultural field burning, and open burning of waste; and (3) VOCs – solvent emissions, industrial surface coating, gas stations, paint emissions, wildfire, and residential fireplaces.

[31] Potts, *supra* note __, at 36-39.

pollutants.[32] As a consequence, most emissions of criteria pollutants are either legally beyond state control or in practice have proven very difficult to regulate. Further, these national averages represent lower bounds for the largest metropolitan areas, which are more likely to suffer from poor air quality and to be in nonattainment for a NAAQS.

State regulation of industrial sources is constrained further by the New Source Review (NSR) program, which covers new or modified industrial sources in nonattainment areas.[33] The NSR program has two components: (1) strict technology- based standards, which are set on a facility-by-facility basis by the state;[34] and (2) the requirement that new or modified sources offset emissions of criteria pollutants for which an area is in nonattainment.[35] Both provisions limit state discretion, but offset requirements have had a greater impact on local development.[36] Offsets also have a ripple effect because they are generated when existing facilities reduce their emissions. Moreover, as the pool of low-cost offsets shrinks overtime, the net result can be that industrial sources operate under severe restrictions while state controls on motor vehicles and nonpoint sources remain lax.[37]

The political and administrative impediments to regulating driving habits and nonpoint sources intercede where legal preemption ends. In particular, the public resistance reflected in the backlash against transportation policies in the 1970s remains strong today. Although marred far less by explosive public opposition, experience with transportation planning since the 1970s has been marked largely by failure.[38] Few programs have been successful, and states have had a difficult time identifying cost-effective transportation control measures (TCMs).[39]

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[32] The specific percentages of aggregate emissions are as follows: 97 percent of CO, 87 percent of NO_x, 92 percent of VOC, 92 percent of $PM_{2.5}$, and 86 percent of SO_2.

[33] 42 U.S.C. §§ 7503.

[34] The federal NSPS program limits state discretion indirectly by operating as a minimum standard for facilities covered under the NSR and PSD programs. Robert J. Martineau & David P. Novello, THE CLEAN AIR HANDBOOK 300 (2004).

[35] In the most severely polluted areas, offsets in existing emissions must be greater than one-to-one. 42 U.S.C. §§ 7511, 7512, 7513. In practice, offsets are obtained through bilateral agreements with the owners of existing sources who have reduced their facility's emissions.

[36] Communication on February 15, 2013, with Joel Mack and Claudia M. O'Brien of Latham & Watkins. These attorneys have extensive experience obtaining CAA permits and offsets for major industrial facilities in California and Texas (describing shortages of offsets for VOCs in Houston and NOx and VOCs in Los Angeles).

[37] Mintz, *supra* note 24, at 183 (stating that the NSR offset requirement "makes it very difficult for new industry to locate in [areas with extreme ozone levels]").

[38] Wahrman, *supra* note 24, at 191-92 (finding that the more aggressive transportation measures in the 1990 Amendments to the CAA have "not resulted in significant motor vehicle emission reductions"); Mintz, *supra* note 24, at 167, 191 (stating that TCMs "have proved much more difficult to implement than emissions controls"). Even inspection and maintenance programs, which are cost-effective, have been contentious and often undermined by public opposition. Thomas O. McGarity, *Regulating Commuters to Clear the Air: Some Difficulties in Implementing a National Program at the Local Level*, 27 PAC. L.J. 1521, 1652 (1995-96) (concluding that "[p]erhaps the clearest lesson of the history of state implementation of I/M programs is that there are generally no adverse consequences for states that thumb their noses at EPA and refuse to take the appropriate implementation steps"); Harrington, *supra* note 25, at 18.

[39] Harrington, *supra* note 25, at 16-17 (reporting on a survey state officials who said that they were "scraping the barrel" to identify TCMs that would enable them to meet the ozone NAAQS that they had difficulties "identifying cost-effective TCMs"). After noting that these problems were not limited to their case study, the authors cite a respondent who "indicated that other than more aggressive measures (e.g., no-drive days), no significant reductions can result from TCM implementation. *Id*.

In a recent survey, state regulators indicated that the role of TCMs is "'small, minor, or very small'—in the range of 1-3% of needed reductions for attainment."[40] They also "complain[ed] that their [regulatory] toolbox is filled with high-cost or politically unacceptable approaches, whereas "technology-based measures [are the] most cost-effective and promising."[41] The central dilemma for state policymakers is that the TCMs with the greatest promise—gasoline taxes, mileage-based registration fees, congestion pricing—continue to be nonstarters politically.[42] A telling indicator of this impasse is that, rather than adopting measures to reduce vehicle-miles traveled or constructing new mass transit systems, the State Implementation Plans (SIPs) for meeting the NAAQS in California and New York have emphasized deployment of low- and zero-emissions vehicles.[43]

State experience regulating nonpoint sources is, if anything, more daunting, although accurate assessment is difficult given the dearth of information.[44] Regulators have been forthright about acknowledging the difficulties of regulating nonpoint sources, particularly the administrative challenges involved in developing standards for a "diversity of sources" and the need to have multiple control strategies.[45] A 2004 report on "Air Quality Management" issued by the National Research Council provides a clear-eyed and cautionary statement on current efforts to regulate nonpoint sources:

> To date, the efforts to control [nonpoint] sources have been relatively scattered and have slipped far behind mandated implementation schedules . . . . However, in the absence of a high-quality inventory of such sources, it is nearly impossible to quantify their emission contributions and to set priorities. Yet, those few analyses that have been done . . . suggest that [nonpoint]-source emissions are significant and will be even more important [in the future].[46]

The influence of these legal and practical is evident in the empirical studies of the SIP implementation process. Several studies have analyzed correlations between the nonattainment status of a county and the rates at which air quality improves. While a few have found

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[40] *Id*. at 18.

[41] *Id*. at 16-17.

[42] *Id*. at 18, 33 (noting that such programs are "very unpopular, and one of the greatest unsolved problems of transportation policy analysis is devising a politically acceptable incentives-based program to deal with the social costs of vehicle use"); Mintz, *supra* note 24, at 206 (discussing the failure of the federal government's program to promote congestion pricing nationally).

[43] Mintz, *supra* note 24, at 185, 188

[44] Similar problems have been observed for nonpoint sources of air toxics, which have suffered from chronic inattention and delays in issuing standards of more than a decade. EPA OIG, *Key Activities in EPA's Integrated Urban Air Toxics Strategy Remain Unimplemented* 5-6 (June 2010) (describing the regulatory delays and the failure finalize standards for most area sources until after 2006); GAO, *supra* note __, at 23 (noting that "the challenges in regulating small stationary sources center on the difficulty in characterizing the large number of widely dispersed facilities . . . . [In addition,] owners and operators of these sources have limited resources to implement regulations and will require extensive outreach and compliance assistance").

[45] Maximilian Auffhammer, *et al.*, *The City-Level Effects of the 1990 Clean Air Act*, 87 LAND ECON. 1, 5 (2011); *see also* NRC, *supra* note 24, at 213 (noting that "the major impediment to making progress on area-source emissions arises from the large number of uncertainties associated with emission inventories for these sources. Specific challenges include the many sources in any given category and the wide variation in the conditions and operating practices under which the emissions can occur").

[46] NRC, *supra* note 24, at 212-14.

statistically significant correlations,[47] a representative finding of this work is that nonattainment status is "responsible for only modest (and often not significant) reductions of ozone and [particulate matter]."[48] A recent study suggested that county-level data may obscure significant reductions in metropolitan areas, but even this work found only that "nonattainment designations at the city level account for 7.2% of the drop in PM_{10}." At best, these studies present a mixed picture of whether the nonattainment status of an area has a material impact on air quality.

Several researchers have attempted to evaluate the relative importance of federal and state programs under the CAA.[49] These studies suggest that with the exception of California, which benefits from having the authority to set standards for motor vehicles, federal programs have generated most of the emissions reductions.[50] Focusing on regulation of ozone levels, they found that federal programs often accounted for 70 to 80 percent of the reductions in VOC emissions, although the percentages were more variable across the studies (25 to 100 percent) for NO_x emissions.[51] In the most recent (2012) study, the authors conclude that:

> The contribution of the SIP process to the improvements [in ozone levels] is unclear. Average improvements were steepest in nonattainment regions. However, among locations with similar ozone or NO_2 levels initially, those in regions facing the impetus of nonattainment did not experience dramatically sharper trends. This is consistent with the fact that, apart from California, the majority of emission reductions documented in SIPs resulted from federal measures.[52]

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[47] Auffhammer, *supra* note 45, at 13-14 (finding that "nonattinament cities in nonattainment counties have a negative and statistically significant impact in explaining [reductions] in PM_{10}"); Vernon Henderson, *Effects of Air Quality Regulation*, 86 AM. ECON. REV. 789, 811-12 (1996) (finding statistically significant correlations with daily maximum concentrations of ozone in July, but weak or statistically insignificant efforts for other measures of ozone levels); Kenneth Chay & Michael Greenstone, *Air Quality, Infant Mortality, and the Clean Air Act of 1970*, NBER Working Paper 10053 31-34 (2003) *available at* http://www.nber.org/papers/w10053; Kenneth Chay & Michael Greenstone, *Does Air Quality Matter? Evidence from the Housing Market*, 113 J. POL. ECON. 376, 400-01 (2005) (finding a statistically significant impact of nonattainment status on air quality of between 9 and 12 percent).

[48] Auffhammer, *supra* note 45, at 2.

[49] Two studies also evaluated the analytical methods used in the SIP planning process to assess pollution mitigation measures, and both found them to be deficient. Phillip M. Roth, *et al.*, *Air Quality Modeling and Decisions for Ozone Reduction Strategies*, J. AIR WASTE MANAGE. ASSOC. 1558, 1571-73 (2005) (finding that the majority of SIP planning processes had not performed adequate performance evaluations and had insufficient corroborating analyses); James D. Fine & Dave Owen, *Technocracy and Democracy: Conflicts between Models and Participation in Environmental Law and Planning*, 56 HASTINGS L.J. 901, 978-80 (2005).

[50] Pegues, *et al.*, *supra* note 28, at 255 (finding California state programs account for 100 percent of the reductions in NO_x and VOC emissions, but noting the "California presents an unique case here because . . . it alone has the ability to set its own mobile emissions standards"); NRC, *supra* note 24, at 217-19 (concluding that "[f]or most states, emission-reduction credits from federal control measures have represented a major fraction of the emission reductions in their respective SIPs").

[51] Pegues, *et al.*, *supra* note 28, at 255 (finding that, with the exception of California, federal programs typically account for 70 to 100 percent of the reductions in VOC and NOx emissions); NRC, *supra* note 24, at 217-19 (finding that, with the exception of California, federal programs account for 50 to over 90 percent of the reductions in VOC emissions and 25 to 60 percent of the reductions in NO_x emissions). In the NRC study, the state programs reduced NO_x almost exclusively through reductions from industrial sources (particularly in Texas) and enhanced inspection and maintenance programs, which as we have seen are of uncertain efficacy in practice. NRC, *supra* note 24, at 217-19.

[52] Pegues, *et al.*, *supra* note 28, at 260.

Finally, the impacts of state programs should be evident in the actual trends in emissions reductions. The data speaks for itself. Reductions in emissions of $PM_{2.5}$ have been closely associated with major industrial facilities (declines of 35-45 percent between 2000 and 2012) and off-road motor vehicles (a decline of 45 percent). By contrast, nonpoint sources achieved reductions of 14 percent over this same period.[53] The trends are more skewed for NO_x and VOCs. Electric utilities, industrial boilers, and transportation sources accounted for 99 percent of the total reductions in NO_X emissions between 2000 and 2012. Similarly, whereas emissions of VOCs from these sources declined by 55 percent over this period, emissions of VOCs from nonpoint sources increased by over 40 percent just between 2005 and 2012.[54] These data indicate that the sources driving declines in emissions of key criteria pollutants are exclusively or largely regulated under federal programs.

The emissions data, legal and practical constraints, and studies of NAAQS programs present a consistent picture of state programs. The emissions data highlight how from the outset the options available to states for reducing emissions are severely constrained by the nature of the sources responsible for them. These barriers are reinforced by legal constraints and broad public opposition to state programs. In practice, the source categories with the greatest emissions are effectively beyond state control. The recent empirical work reflects these underlying dynamics. They find that direct federal regulations are largely responsible for declines in ambient levels of criteria pollutants and that the nonattainment status of an area has only a modest impact on the reductions observed.

The implications of these findings ought to be far reaching. They suggest that either the NAAQS program must afford states better options for reducing emissions or that the statute's legal framework should be reevaluated. Most importantly, the obstacles to effective transportation planning and regulation of nonpoint sources deserve much greater attention. A principal reason I chose to address this topic is my concern that the misplaced sense of action encouraged by the prevailing focus on industrial sources has become an obstacle to addressing these deeper problems. The opportunities for reform discussed in the final section are offered in this spirit as starting points for this realignment and broader reform.

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[53] The EPA longitudinal data on criteria pollutants do not utilize the conventional categories of point, nonpoint, on-road vehicles, and off-road vehicles; their "miscellaneous" category is closest to the nonpoint class used for the National Emission Inventory data. This analysis uses "miscellaneous sources" as a proxy for nonpoint sources.

[54] Emissions from miscellaneous sources increased dramatically around 2003, but this was driven by a recalibration of EPA's emissions inventories. It is also worth noting that industrial processes, which include large and small sources, is the source category with the single largest share of VOC emissions (about 40 percent of the total); emissions from this class declined about 10 percent between 2000 and 2012.