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Getting to Zero: A Roadmap to Energy Transformation in California Under the Clean Air Act

*Paul Cort**

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I. Introduction

California must eliminate the use of fossil fuels in virtually all mobile sources and as a source of most electricity generation. This is not the rallying call of an environmental activist or the findings of an ivory tower academic. This is the conclusion of the California Air Resources Board's ("ARB") June 27, 2012 Draft "Vision for Clean Air: A Framework for Air Quality and Climate Planning."¹ "To reach the State's multi-pollutant goals, zero- and near-zero emission technologies must become the norm. Fuels and electrical energy from renewable sources must dominate and efficiency gains are needed to mitigate the impacts of growth."² The radical transformation outlined by ARB is necessary to meet not only the State's aspirational greenhouse gas reduction goals, but also, more importantly, to meet the national health-based air quality standards for ozone pollution. Under the Clean Air Act, the State has a federally enforceable mandate to adopt plans to meet these national air quality standards.

Various reports and studies have explored what this transformation would look like technologically, including the steps that should be taken to make this transformation technically feasible.³ However, no one has

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1. CAL. AIR RES. BD., VISION FOR CLEAN AIR: A FRAMEWORK FOR AIR QUALITY AND CLIMATE PLANNING (2012), http://www.arb.ca.gov/planning/vision/docs/vision_for_clean_air_public_review_draft.pdf.

2. *Id.* at 34.

3. See, e.g., James H. Williams et al., The Technology Path to Deep Greenhouse Gas Emissions Cuts by 2050: The Pivotal Role of Electricity, SCIENCE, Jan. 6, 2012, at 53; CAL. COUNCIL ON SCI. & TECH., CALIFORNIA'S ENERGY FUTURE – THE VIEW TO 2050: SUMMARY REPORT (2011), <http://www.ccst.us/publications/2011/2011energy.pdf>; CAL. ENERGY COMM'N, CALIFORNIA'S CLEAN ENERGY FUTURE (2011), <http://www.cacleanenergyfuture.org/documents/CACleanEnergyFutureOverview.pdf>; Mark Z. Jacobson et al., A

outlined how California could legally require this sort of transformation. This is surprising given the magnitude of the envisioned transformation and the fact that ARB and the local air quality districts must prepare Clean Air Act plans *next year* that demonstrate how areas like Los Angeles and the San Joaquin Valley will meet the current national ozone standard.⁴

This article describes the legal tools available to ARB and the local air districts to adopt the basic regulatory components of a plan that will eliminate most uses of fossil fuels in the State. More important than these basic regulatory components themselves, however, will be the approach that ARB and the local air districts take in assembling these components into a plan that will drive the technical innovation and transformation necessary for success. ARB and the local air districts, with the assistance of the Environmental Protection Agency (“EPA”), have repeatedly adopted plans under the Clean Air Act that have failed to achieve the national air quality standards. In addition to a string of lawsuits, the result has been that California, despite its reputation as a leader in air quality controls, is home to the worst ozone-polluted regions in the United States. With the new acknowledgement of the radical transformation that will be required to meet the current ozone standard, it is even more important that the regulatory agencies abandon the failed approaches of the past. This article outlines the air planning practices that must change if California is to substantially end the use of fossil fuel within its borders.

Roadmap for Repowering California for All Purposes with Wind, Water, and Sunlight, 73 ENERGY 875 (2014).

4. EPA has not yet finalized when state ozone plans are due. EPA has proposed two options for setting deadlines for areas to submit nonattainment plan elements required under Clean Air Act section 182, 42 U.S.C. § 7511a (2012). See SIP Requirements for 2008 Ozone Standards, 78 Fed. Reg. 34,178, 34,183–84, 34,238 (proposed June 6, 2013) (to be codified at 40 C.F.R. pts. 50, 51, 70, 71). The deadline runs from the effective date of designations under the 2008 ozone NAAQS, which was July 20, 2012. See Air Quality Designations for 2008 Ozone NAAQS, 77 Fed. Reg. 30,088, 30,088 (May 21, 2012) (to be codified at 40 C.F.R. pt. 81). EPA’s preferred option would allow areas to take 2.5 years (i.e., to January 20, 2015) to submit whatever SIP elements are required. SIP Requirements for 2008 Ozone Standards, 78 Fed. Reg. at 34,184. The alternative would apply the deadlines in the statute for the various components of such plans. *Id.* This latter alternative would have the attainment plans for the Los Angeles and San Joaquin Valley ozone nonattainment areas due to EPA by July 20, 2016. See 42 U.S.C. § 7511a(c)(2) (2012) (providing four years to prepare attainment demonstration in areas classified serious or worse). Given the current lack of planning activities in these California areas, the assumption is that they will work off of the 2016 deadline.

II. California's Air Pollution Challenge

A. The Federal Mandate for Clean Air

1. National Ambient Air Quality Standards and State Implementation Plans

The Clean Air Act is a sprawling statute that has been built over time to address a wide range of air pollution problems and their sources.⁵ At the core of the Act is the program to address ambient air pollution that is the product of numerous emission sources, such as ozone (sometimes referred to as smog) and particulate matter (i.e., soot).⁶

The basic strategy for addressing these widespread air pollution problems starts with EPA's establishment of national ambient air quality standards ("NAAQS"). EPA sets NAAQS at the level that protects public health with an adequate margin of safety.⁷ EPA and states then measure concentrations of these pollutants in the ambient air.⁸ Areas with ambient concentrations above the national standards are designated "nonattainment" for that particular pollutant standard.⁹

5. The Clean Air Act includes a variety of programs to address a range of air pollution problems from ubiquitous sources of pollution. 42 U.S.C. §§ 7410, 7501–7515 (2012) (smog and soot); 42 U.S.C. § 7412 (2012) (specifically listed air toxics); 42 U.S.C. §§ 7651–7651o (2012) (pollution responsible for acid rain); 42 U.S.C. §§ 7671–7671q (2012) (emissions related to the creation of the ozone hole); *see also* *Massachusetts v. EPA*, 549 U.S. 497, 558 n.2 (2007) (Scalia, J., dissenting) (critiquing the majority's holding that greenhouse gases fall within Clean Air Act's definition of "air pollutant" and arguing that broad definition would cover "everything airborne, from Frisbees to flatulence").

6. *See* 42 U.S.C. § 7408 (2012) (directing EPA to prepare issue "criteria" for pollutants that cause or contribute to air pollution that harms public health or welfare and, the presence of which in the ambient air is the result emissions from numerous and diverse sources). These pollutants are often referred to as "criteria" pollutants. *See* *Union Elec. Co. v. EPA*, 427 U.S. 246, 249–50 (1976) (describing "heart" of the Clean Air Act is the requirement for states to prepare plans for meeting the national ambient air quality standards for criteria pollutants).

7. 42 U.S.C. § 7409(b) (2012); *Whitman v. Am. Trucking Ass'ns*, 531 U.S. 457, 471 (2001) (holding that EPA is to set the national ambient air quality standards based solely on the level that will protect public health with no consideration of cost).

8. *See, e.g.*, 42 U.S.C. § 7410(a)(2)(b)(i) (2012).

9. 42 U.S.C. § 7407(d) (2012).

States with nonattainment areas must develop a plan to bring the areas into compliance with the national standard.¹⁰ These plans, generally referred to as state implementation plans (“SIPs”), must include: (1) an inventory of where the pollution-causing emissions are coming from, (2) modeling to determine the level of emissions reductions necessary to achieve the NAAQS, and (3) a set of control measures that will achieve the required emission reductions.¹¹ The Clean Air Act sets deadlines for when states must prepare these plans and when the states must attain the national standards.¹² Congress included flexibilities for the most polluted areas, generally giving them more time to meet the national standards in exchange for meeting more stringent and prescriptive control requirements.¹³ EPA must review and approve all SIPs for compliance with the requirements of the Clean Air Act.¹⁴

2. National Ambient Air Quality Standards for Ozone

Ozone—more commonly known as smog—is one of the most familiar forms of air pollution around the world. The brown haze that forms on warm sunny days is caused by the reaction of volatile organic compounds (VOC) and oxides of nitrogen (NO_x), resulting in a highly reactive ozone (O₃) molecule.¹⁵ In the stratosphere, ozone forms the “ozone layer,” which is

10. See, e.g., 42 U.S.C. §§ 7410(a)(1), 7502, 7511a (2012).

11. See, e.g., 42 U.S.C. §§ 7502(c), 7511(a) (2012). The former requirements codified in subpart 1 of Clean Air Act title 1, part D are generally referred to as the “subpart 1” requirements. The latter requirements, added by Congress in the 1990 Clean Air Act Amendments are referred to as the subpart 2 requirements and are specific to ozone plans. There has been an extended fight over which of these requirements apply to current ozone plans. See, e.g., *S. Coast Air Quality Mgmt. Dist. v. EPA*, 472 F.3d 882, 889–90 (D.C. Cir. 2007). The Supreme Court has held that EPA must continue to ensure that ozone plans conform to the general requirements of 42 U.S.C. § 7511(a) (1990). *Am. Trucking Ass’ns*, 531 U.S. at 485. Where noting general air planning requirements, this article will cite to both the subpart 1 and subpart 2 requirements just to be complete.

12. See, e.g., 42 U.S.C. §§ 7502(a)(2), 7502(b), 7511(a), 7511a (2012).

13. See generally 42 U.S.C. § 7511 (2012) (creating tiers of classifications with extended deadlines and tiered sets of control requirements). For example, ozone areas classified as “extreme” nonattainment areas will have twenty years to attain the standard but must adopt plans that include the most stringent set of requirements. See *id.* §§ 7511(a)(1), 7511a(e).

14. 42 U.S.C. § 7410(k) (2012).

15. See U.S. EPA, EPA-452/P-12-002, POLICY ASSESSMENT FOR THE REVIEW OF THE OZONE NATIONAL AMBIENT AIR QUALITY STANDARDS, SECOND EXTERNAL REVIEW DRAFT 2-7

critical to shielding us from the Sun's harmful ultraviolet rays.¹⁶ However, in the troposphere, the lowest layer of our atmosphere where we live and breathe, ozone exposure is linked to a number of serious health problems. Ozone exposure can negatively affect the respiratory, cardiovascular and central nervous systems, and may result in reproductive and developmental harm and premature mortality.¹⁷ A recent EPA Policy Assessment estimates that every year over 10,000 deaths are attributable to current ozone pollution levels.¹⁸

In 1979, EPA concluded that one-hour average concentrations of ozone should be kept below 0.12 parts per million ("ppm") (the "one-hour ozone standard").¹⁹ Continued study of the health impacts resulting from ozone exposures found that problems are caused by not just short-term peak exposures but also by prolonged daily exposures at much lower ambient concentration levels.²⁰ As EPA has conducted periodic NAAQS reviews required by the Clean Air Act,²¹ the evidence of adverse health impacts at

(Jan. 2014), <http://www.epa.gov/ttn/naaqs/standards/ozone/data/20140131pa.pdf> [hereinafter EPA 2014 Ozone Policy Assessment].

16. As noted above, the Clean Air Act includes a program to control the use and release of pollutants such as chlorofluorocarbons that have been linked to stratospheric reactions that destroy ozone and have created the "ozone hole" over the southern pole of the planet. See 42 U.S.C. §§ 7671–7671q (2012).

17. See EPA 2014 Ozone Policy Assessment, *supra* note 15, at 3-5, 3A-3.

18. See *id.* at 3-110 (analyzing data from twelve urban areas, and calculating that short-term exposures to current ozone levels are responsible for 7,000 to 7,500 deaths per year, and long-term ozone exposures are linked to 8,000 to 9,000 deaths per year in these areas); see also F. Caiazzo et al., *Air Pollution and Early Deaths in the United States: Part I*, 79 J. ATMOSPHERIC ENV'T 198, 207 (2013) (estimating over 10,000 deaths per year as a result of ozone pollution caused by combustion sources).

19. Revisions to the NAAQS for Photochemical Oxidants, 44 Fed. Reg. 8202, 8215–17 (Feb. 8, 1979) (codified as amended 40 C.F.R. §§ 50.9, pt. 50 app. H (2013)). Under this standard, the ambient air in an area may not have measured one-hour ozone concentrations above this level on more than three days over a three-year period. *Id.*

20. 1997 NAAQS for Ozone, 62 Fed. Reg. 38,856, 38,859 (July 18, 1997) (codified as amended at 40 C.F.R. § 50.10 (2013)). EPA found that new evidence continued to show an array of adverse health effects associated with short-term peak exposures (*i.e.*, one to three hours) above the standard level of 0.12 ppm. *Id.* In addition, new evidence showed adverse effects at even lower concentrations where the exposures to those levels were prolonged (*i.e.*, six to eight hours). *Id.*

21. See 42 U.S.C. § 7409 (2012) (requiring review of NAAQS every five years). However, EPA has never met these deadlines and is regularly under a court order to force completion of the scientific review; see, *e.g.*, Order Granting Plaintiff's Motion for

lower and lower levels of ozone has continued to mount.²² In 1997, EPA promulgated an eight-hour ozone standard of 0.08 ppm.²³ In 2008, the Bush Administration EPA lowered the eight-hour ozone standard to 0.075 ppm.²⁴ EPA's 2008 decision was highly controversial because the agency rejected the unanimous recommendations of EPA's independent scientific advisory committee for an even lower standard.²⁵ EPA failed to complete its five-year review of the 2008 standard and is under another court-ordered deadline to complete that review by October 1, 2015.²⁶ EPA's Clean Air Scientific Advisory Committee has recommended that the agency lower the ozone standard to between 0.070 and 0.060 ppm.²⁷

Summary Judgment, *Sierra Club v. EPA*, No. 13-cv-2809-YGR (N.D. Cal. Apr. 20, 2014), available at <http://earthjustice.org/sites/default/files/files/Ozone-Motion-Summary-Judgment.pdf>.

22. See, e.g., EPA 2014 Ozone Policy Assessment, *supra* note 15, at 3-122.

23. 1997 NAAQS for Ozone, 62 Fed. Reg. at 38,863.

24. 2008 NAAQS for Ozone, 73 Fed. Reg. 16,436, 16,483, 16,500 (Mar. 27, 2008) (codified at 40 C.F.R. § 50.15 (2013)).

25. Shortly after these regulations were promulgated, EPA's Clean Air Scientific Advisory Committee ("CASAC") sent EPA a letter expressing its strong disagreement with EPA's primary and secondary ozone standards, which it contended failed to provide an adequate margin of safety, and were not supported by the best available science. See 2010 NAAQS for Ozone, 75 Fed. Reg. 2938, 2943 (proposed Jan. 19, 2010) (to be codified at 40 C.F.R. pts. 50, 58). Members of the CASAC Ozone Review Panel "*unanimously recommended* decreasing the primary standard to within the range of 0.060-0.070 parts per million." ROGENE F. HENDERSON, CHAIR, CLEAN AIR SCI. ADVISORY COMM., EPA-CASAC-08-009, CLEAN AIR SCIENTIFIC ADVISORY COMMITTEE RECOMMENDATIONS CONCERNING THE FINAL RULE FOR THE NATIONAL AMBIENT AIR QUALITY STANDARDS FOR OZONE 2 (Apr. 7, 2008), <http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P1000JY2.txt>.

26. Order Granting Plaintiff's Motion for Summary Judgment, *supra* note 21, at 2.

27. CHRISTOPHER FREY, CHAIR CLEAN AIR SCI. ADVISORY COMM., EPA-CASAC-14-004, CASAC REVIEW OF THE EPA'S SECOND DRAFT POLICY ASSESSMENT FOR THE REVIEW OF THE OZONE NATIONAL AMBIENT AIR QUALITY STANDARDS (June 26, 2014), [http://yosemite.epa.gov/sab/sabproduct.nsf/5EFA320CCAD326E885257D030071531C/\\$File/EPA-CASAC-14-004+unsigned.pdf](http://yosemite.epa.gov/sab/sabproduct.nsf/5EFA320CCAD326E885257D030071531C/$File/EPA-CASAC-14-004+unsigned.pdf); see also EPA 2014 Ozone Policy Assessment, *supra* note 15, at ES-5 (presenting EPA technical staff recommendation endorsing CASAC's conclusion).

3. The General Approach to Lowering Ozone Levels

The general approach to addressing ozone pollution is to regulate the VOC and NO_x emissions that lead to ozone formation.²⁸ VOCs come from the manufacturing and use of products containing organic chemicals, such as benzene and toluene, which tend to evaporate if uncontrolled. These products range from gasoline to paints and other coatings to pesticides.²⁹ In California, the largest sources of VOC emissions are exhaust and evaporative emissions from cars and other mobile sources.³⁰ Strategies to control sources of VOCs usually focus on either reformulation of the products to reduce their volatility or mandating pollution control technologies for capturing and destroying evaporative emissions.³¹

NO_x, the second ingredient in ozone formation, is created during combustion.³² In California, over 80% of statewide NO_x emissions come from the combustion of fuels in mobile sources.³³ Nearly 50% of California's total NO_x emissions come from on-road vehicles such as cars and trucks and over 30% come from "non-road" vehicles such as trains, marine vessels, construction equipment, and farm equipment.³⁴ The traditional strategies for reducing NO_x emissions have been to develop: (1) "cleaner burning" technologies that control the chemistry around combustion and (2) after-treatment technologies, such as selective catalytic reduction, which destroy

28. See *Ground-Level Ozone: Basic Information*, U.S. EPA, <http://www.epa.gov/groundlevelozone/basic.html> (last visited Oct. 30, 2014).

29. See U.S. EPA, EPA 453/R-92-018, CONTROL TECHNIQUES FOR VOLATILE ORGANIC COMPOUND EMISSIONS FROM STATIONARY SOURCES, 2-9 to 2-11 (Dec. 1992), http://www.epa.gov/glo/SIPToolkit/ctg_act/199212_voc_epa453_r-92-018_control_emissions_stationary.pdf [hereinafter EPA Control Techniques for VOCs]; see also CAL. AIR RES. BD., AIR RESOURCES BOARD'S PROPOSED STATE STRATEGY FOR CALIFORNIA'S 2007 STATE IMPLEMENTATION PLAN 26 (2007), <http://arb.ca.gov/planning/sip/2007sip/apr07draft/sipback.pdf> [hereinafter Cal. ARB 2007 SIP Strategy].

30. See *Almanac Emission Projection Data: 2012 Estimated Annual Average Emissions*, CAL. AIR RES. BD. (2013), http://www.arb.ca.gov/app/emsmv/2013/emseic1_query.php?F_DIV=-4&F_YR=2012&F_SEASON=A&SP=2013&F_AREA=CA [hereinafter Cal. ARB Emission Projection] (reporting statewide reactive organic gas emissions for 2012).

31. See EPA Control Techniques for VOCs, *supra* note 29, at 1–4.

32. See U.S. EPA, NITROGEN OXIDES (NO_x): WHY AND HOW THEY ARE CONTROLLED 4–5 (1999), <http://www.epa.gov/ttn/catcl/dir1/fnoxdoc.pdf> [hereinafter EPA Nitrogen Oxides]; see also Cal. ARB 2007 SIP Strategy, *supra* note 29, at 26.

33. Cal. ARB Emission Projection, *supra* note 30.

34. *Id.*

NO_x in the exhaust stream.³⁵ These strategies have resulted in the significantly cleaner vehicles that are manufactured today.³⁶

In very broad strokes, the Clean Air Act incorporates these different control strategies by directing state and local agencies to adopt controls for stationary sources, and by reserving for the federal government the authority to adopt national uniform standards for mobile sources.³⁷ California, however, is special.

California began prescribing emission control requirements for cars and trucks well before there was a federal Clean Air Act.³⁸ Consequently, when Congress adopted the Clean Air Act in 1970, the Act preempted all state standards on new cars and trucks but granted an exception for the more stringent standards adopted by California.³⁹ The legislative history of the Clean Air Act reflects a desire to afford California the ability to “continue its experiments in the field of emissions control.”⁴⁰ As a result, there are now two sets of requirements for most cars and trucks sold in the United States—the national standards adopted by EPA and the California standards adopted by the state ARB. Other states with areas in nonattainment for national air quality standards may choose to require that new vehicles meet the federal standards or the California standards.⁴¹

4. California's Current Strategy for Controlling Ozone

The responsibility for addressing air pollution in California is divided between ARB and thirty-five local air quality agencies. Generally, ARB is responsible for mobile source standards while local air districts are

35. See EPA Nitrogen Oxides, *supra* note 32, at 9.

36. Cal. ARB 2007 SIP Strategy, *supra* note 29, at 36.

37. See *Train v. Natural Res. Def. Council*, 421 U.S. 60, 79 n.16 (1975) (explaining division of responsibilities); see also 42 U.S.C. § 7543 (2012) (preempting certain state standards on mobile sources).

38. *Motor & Equip. Mfrs. Ass'n, Inc. v. EPA*, 627 F.2d 1095, 1109 n.26 (D.C. Cir. 1979).

39. The current version of Clean Air Act section 209(a) generally prohibits state and local governments from adopting or attempting to enforce “any standard relating to the control of emissions from new motor vehicles or new motor vehicle engines.” 42 U.S.C. § 7543(a) (2012). A “motor vehicle” is defined broadly and includes any passenger car or truck, as well as any on-road truck used for moving goods. See 42 U.S.C. § 7550(2) (2012). See *infra* Section II.A.1.a.

40. *Motor & Equip. Mfrs. Ass'n*, 627 F.2d at 1110.

41. See 42 U.S.C. § 7507 (2012).

responsible for stationary source measures.⁴² ARB's strategy for addressing ozone-causing emissions from cars and trucks has been to establish emission standards for new mobile sources and to encourage the deployment of new vehicle technologies through fleet purchase requirements and voluntary incentives.⁴³ Certain mobile sources, like diesel trucks and other equipment, can stay in operation for decades. Therefore, reducing emissions in a timely fashion requires not only introducing cleaner vehicles and equipment but also more rapid turnover of the existing fleets.⁴⁴ ARB has adopted retrofit requirements for diesel trucks, used subsidies to incentivize early replacement,⁴⁵ and has focused on reducing emissions through ever cleaner vehicles with an emphasis on cleaner diesel technologies.⁴⁶ As a result of these efforts, most new on-road cars are 99% cleaner in terms of NO_x and VOC emissions than their uncontrolled counterparts. Additionally, new trucks today are more than 98% cleaner in terms of NO_x emissions than trucks sold before 1988.⁴⁷

Local air districts have complimented ARB's mobile source programs with stationary source control measures that are, in many cases, as aggressive as any in the United States.⁴⁸ Once again, the result has been a

42. CAL. HEALTH & SAFETY CODE § 39002 (2013); *see also* Cal. ARB 2007 SIP Strategy, *supra* note 29, at 35.

43. *See* Cal. ARB 2007 SIP Strategy, *supra* note 29, at 36–39, 67; *see also* Air Pollution Incentives, Grants and Credit Programs, CAL. AIR RES. BD., <http://www.arb.ca.gov/ba/fininfo.htm> (last updated Mar. 8, 2011) (listing links to various ARB grant programs for mobile sources).

44. *See* Cal. ARB 2007 SIP Strategy, *supra* note 29, at 42 (noting that on-road vehicles fourteen years and older make up only 20% of vehicle miles traveled but 60% of total on-road NO_x emissions).

45. *See id.* at 39, 67.

46. *See id.* at 44-6; *see also* CAL. AIR RES. BD., RISK REDUCTION PLAN TO REDUCE PARTICULATE MATTER EMISSIONS FROM DIESEL-FUELED ENGINES AND VEHICLES 1–2 (2000), <http://www.arb.ca.gov/diesel/documents/rrpFinal.pdf>; CAL. AIR RES. BD., EMISSION REDUCTION PLAN FOR PORTS AND GOODS MOVEMENT IN CALIFORNIA, at ES-6 (2006), http://www.arb.ca.gov/planning/gmerp/plan/final_plan.pdf.

47. Cal. ARB 2007 SIP Strategy, *supra* note 29, at 36.

48. *See, e.g.*, SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DIST., 2007 OZONE PLAN 1-1 (2007), http://www.valleyair.org/Air_Quality_Plans/docs/AQ_Ozone_2007_Adopted/2007_8HourOzone_CompletePlan.pdf [hereinafter San Joaquin Valley 2007 Ozone Plan] (listing control measures and outlining plan to periodically review those measures for additional emission reduction opportunities).

significant reduction in VOC and NO_x emissions from most stationary sources.⁴⁹

B. California's Ozone Problem

While the reductions thus far are impressive, the sheer number of sources and volume of emissions continue to overwhelm the capacity of certain areas to absorb these emissions safely. Despite California's history of being a leader and innovator in the area of pollution control, the State continues to have the most polluted air basins in the country. In the American Lung Association's 2014 annual State of the Air report, which ranks regions based on their air pollution levels, California counties claimed the top eight worst ozone-polluted locations.⁵⁰ The San Joaquin Valley and the Los Angeles air basins are the only regions in the United States classified as "extreme" ozone nonattainment areas—the worst possible classification in the Clean Air Act.⁵¹ These areas are also the only areas that continue to violate the one-hour ozone standard of 0.12 ppm adopted by EPA in 1979.⁵²

California's sunny Mediterranean climate and the geography of the basins create ideal conditions for the formation of ozone⁵³ and accentuate some of the State's challenges. Additionally, these areas have suffered from a history of agency recalcitrance and corner-cutting that has undermined success.⁵⁴ ARB and EPA have been complicit in many of these failures by

49. See CAL. AIR POLLUTION CONTROL OFFICERS ASS'N., CALIFORNIA'S PROGRESS TOWARD CLEAN AIR 14 (2012), <http://www.capcoa.org/wp-content/uploads/downloads/2012/04/CAPCOA-Progress-Toward-Clean-Air-2012.pdf> (estimating statewide average reductions of roughly 70% from stationary sources).

50. AM. LUNG ASS'N, STATE OF THE AIR 2014, at 18 (2014), <http://www.stateoftheair.org/2014/assets/ALA-SOTA-2014-Full.pdf>.

51. See Air Quality Designations for the 2008 Ozone NAAQS, 77 Fed. Reg. 30,088, 30,101, 30,107 (May 21, 2012) (codified as amended at 40 C.F.R. pt. 81).

52. See Approval of SIPs, Failure to Attain the One-Hour Ozone Standard, 76 Fed. Reg. 82,133-02 (Dec. 30, 2011) (codified as amended at 40 C.F.R. pt. 52).

53. See, e.g., San Joaquin Valley 2007 Ozone Plan, *supra* note 48, at ES-5 (listing control measures and outlining plan to periodically review those measures for additional emission reduction opportunities).

54. The San Joaquin Valley Air District in particular has a history of missing deadlines under the Clean Air Act and creating exemptions for large swaths of industries. See *Sierra Club v. EPA*, 671 F.3d 955, 960 (9th Cir. 2012) (outlining history of ozone plans and missed deadlines in the San Joaquin Valley); see also Approval of Implementation Plans; San Joaquin Valley Unified Air Pollution Control District, 63 Fed. Reg. 49,053, 49,054 (proposed Sept. 14, 1998) (to be codified at 40 C.F.R. pt. 52).

refusing to enforce deadlines, backsliding on commitments, rubberstamping plans that had no chance of succeeding, and repeatedly trying to avoid the plain requirements of the Clean Air Act.⁵⁵ Whether the agency failings have contributed to—or are merely a symptom of—the pollution problems in California, the undeniable reality is that the challenge to solve the State’s air pollution problems is huge.

In 2012, ARB and the South Coast Air Quality Management District prepared a report describing what California must do to meet its greenhouse-gas goals (i.e., 80% reduction from 1990 levels by 2050) and the 2008 national air-quality standard for ozone (0.075 ppm) for the Los Angeles and the San Joaquin Valley regions by 2032.⁵⁶ The report concluded that California will need to transition to zero- and near-zero-emission technologies for electricity generation and transportation.⁵⁷ Because it will be more difficult for California to meet the ozone standard and NO_x reductions than to meet the greenhouse gas reduction goals, ozone and NO_x are more likely to compel California’s necessary transformation towards

(proposing EPA disapproval of District rules waiving control requirements for facilities located west of Interstate Highway 5 in Fresno, Kern, and King counties).

55. See, e.g., *S. Coast Air Quality Mgmt. Dist. v. EPA*, 472 F.3d 882, 895–96, 900–04 (D.C. Cir. 2007); *Sierra Club*, 671 F.3d at 968; *Ass’n of Irrigated Residents v. EPA*, 686 F.3d 668, 677 (9th Cir. 2012); EPA, MEMORANDUM TO DOCKET EPA-HQ-OAR-2012-0322, STATE IMPLEMENTATION PLANS: RESPONSE TO PETITION FOR RULEMAKING; FINDINGS OF SUBSTANTIAL INADEQUACY; AND SIP CALLS TO AMEND PROVISIONS APPLYING TO EXCESS EMISSIONS DURING PERIODS OF STARTUP, SHUTDOWN, AND MALFUNCTION 24 (2013), http://www.epa.gov/oar/urbanair/sipstatus/docs/ssm_memo_021213.pdf [hereinafter 2013 EPA Memo]; CAL. AIR RES. BD., FINAL STATEMENT OF REASONS FOR RULEMAKING (1996), <http://www.arb.ca.gov/regact/zev/fsor3.pdf>; CAL. AIR RES. BD., CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR 2003 AND SUBSEQUENT MODEL ZERO-EMISSION VEHICLES, AND 2001 AND SUBSEQUENT MODEL HYBRID ELECTRIC VEHICLES, IN THE PASSENGER CAR, LIGHT-DUTY TRUCK AND MEDIUM-DUTY VEHICLE CLASSES (2001), <http://www.arb.ca.gov/regact/zev2001/testprocedures.pdf>; CAL. AIR RES. BD., STAFF REPORT: INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING - PROPOSED AMENDMENTS TO THE TRUCK AND BUS REGULATION (2014), <http://www.arb.ca.gov/regact/2014/truckbus14/tb14isor.pdf> [hereinafter Cal. ARB Truck & Bus Regulation Report]; SOUTH COAST AIR QUALITY MGMT. DIST., 2012 AIR QUALITY MANAGEMENT PLAN 4-46 to 4-47 (2013), [http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2012-air-quality-management-plan/final-2012-aqmp-\(February-2013\)/chapter-4-final-2012.pdf](http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2012-air-quality-management-plan/final-2012-aqmp-(February-2013)/chapter-4-final-2012.pdf)

56. Cal. ARB Vision for Clean Air, *supra* note 1, at 1.

57. *Id.* at 1, 16.

zero-emissions.⁵⁸ Some illustrations of the magnitude of the transformation assumed in the ARB Vision for Clean Air report (“ARB Report”) are as follows:

- Sales of conventionally fueled new cars will need to drop precipitously (i.e., from 95% today to less than 40% by 2020, and to less than 10% in 2030) until, *by 2040, all passenger vehicles sold in California are zero-emission vehicles* (not even hybrids will be sold);
- Sales of conventionally fueled diesel trucks within the State will also need to be *eliminated* by 2040;
- Nearly *all locomotives operating statewide will need to be zero- or near-zero-emissions*; and
- The electrification of transportation will require a doubling of the State’s electricity generating capacity, but *zero-emitting sources of generation (including large hydro) will need to supply roughly 80% of electricity by 2050*.⁵⁹

Aviation, shipping, and off-road diesel equipment will also need to transform to zero- and near-zero technologies.⁶⁰ However, taking incremental steps towards cleaner fossil-fuel technology is not a viable option. Rather, California must revolutionize the State’s transportation and electricity-generation sectors so that zero-emission sources almost entirely replace the current fossil fuel-based system.

The ARB Report highlighted a number of significant issues. First, the basic “math” of the Report revealed the magnitude of transformation required. For decades, California and local air districts have focused on an incremental strategy with the hope of making sources of pollution “cleaner.” As the ARB Report exposed, California must reassess its strategies to achieve the emission goals. Instead of “cleaner” technologies, the State must require “clean” technologies and expand those technologies to apply to a wide range of sources. Second, the ARB Report revealed that, in contrast to the State’s prior focus on cutting-edge greenhouse gas programs, the Clean Air Act’s requirements to address ozone for traditional human health reasons will drive the transformation away from fossil fuels. This is particularly significant because, unlike the State’s aspirational greenhouse-

58. *Id.* at 16 (noting that while modeled scenarios could meet the 2050 greenhouse gas target, NO_x emission reductions would not be sufficient to meet national ozone standard).

59. *Id.* at 16, 32.

60. *Id.* at 16.

gas goals, the State's plans and strategies to meet the national ozone standards are an enforceable legal mandate under the Clean Air Act.

California's "business as usual" approach to Clean Air Act compliance will not work. For California to achieve the transformation necessary to attain the national ozone standards, the State needs to reassess the technological focus of its regulations and fundamentally change its approach to air quality planning and compliance with the Clean Air Act. The remaining discussion describes how California can realign its technology strategies under the Clean Air Act and, more importantly, how EPA, state, and local agencies must alter their current to approach air quality planning under the Act.

III. How California Can and Should Use the Clean Air Act to Transition the State Away from Fossil Fuels

The obvious first question is: "Can California do this?"⁶¹ There is a technology component of this question (is it technically possible?) and a legal component (does California have the legal authority to act on its own to require this sort of transformation?). Responding to the latter question, the first section in this part explains how the Clean Air Act and state law give California the legal tools required to mandate the basic regulatory components of the transformation outlined in the ARB Report. Although there is ample evidence that these changes are, or will be, technically feasible, this article does not attempt to make the case that this transformation is technically achievable.⁶² Instead, the second section in this part recommends changes to the current air planning practices, which have resulted in the State's present air quality mess and undermine any possibility of achieving the national ozone standards and the corresponding technical transformation. As that section describes, the kind of technology forcing that California must pursue requires clear and certain market signals

61. A second question might be: "Should California do this?" This obviously depends on how one values benefits such as clean air, taking steps to address climate change, and promoting investment in new technologies. For purposes of this article we need not answer this "should" question because, according to the analysis of the ARB Report, California "must" do this if it is to comply with the legal mandates of the Clean Air Act. *See id.* at 1.

62. *See, e.g.,* Williams et al., *supra* note 3, at 53; CAL. COUNCIL ON SCI. & TECH., *supra* note 3, at 5-6, 8-9; Jacobson et al., *supra* note 3, at 875; Russell Hensley et al., *Battery Technology Charges Ahead*, MCKINSEY & CO. (July 2012), http://www.mckinsey.com/insights/energy_resources_materials/battery_technology_charges_ahead; Zachary Shahan, *EV Battery Prices — The Disruptive Drop in Prices Will Continue*, CLEANTECHNICA (Jan. 19, 2014), <http://cleantechnica.com/2014/01/19/ev-battery-prices-disruptive-drop-prices-will-continue>.

that will incentivize and direct the investment necessary to ensure the viability of widespread zero-emissions technology. The current approach to air planning undermines those market signals and, in many cases, is likely illegal under the Clean Air Act. Thus, the recommended changes are necessary not only to promote the technical viability of transformation to zero-emission technologies but also to ensure that planning complies with the Clean Air Act.

**A. The Basic Regulatory Components that Must Be Included
in the Next Generation of California Ozone State
Implementation Plans**

The three major targets for transformation to zero-emission technologies will be on-road mobile sources (e.g., cars and diesel trucks), non-road sources (e.g., construction and farm equipment, trains, and marine vessels), and power plants. Generally for mobile sources, the Clean Air Act reserves regulatory authority to EPA. However, for on-road and non-road vehicles, California has special legal entitlements to adopt more stringent standards. This section outlines how ARB and local districts can use existing authorities to adopt the key regulatory components of a successful SIP for ozone. Such a plan requires transformation away from the use of fossil fuels towards zero-emission technologies. The basic regulatory components of such a plan would include: (1) zero-emission mandates for new on-road and non-road vehicles and equipment; (2) mandates that spur the replacement of existing fossil fuel burning vehicles and equipment; and (3) programs to expand the percentage of electricity supplied by zero-emission sources.

**I. Mandating Zero-Emission Vehicles and Non-Road
Equipment**

**a. California's Authority to Set Standards for New On-Road
Vehicles**

Section 209(a) of the Clean Air Act generally prohibits state and local governments from adopting or attempting to enforce "any standard relating to the control of emissions from new motor vehicles or new motor vehicle engines."⁶³ However, California can request that this prohibition be waived for its state standards on new motor vehicles and engines.⁶⁴ The Clean Air

63. 42 U.S.C. § 7543(a) (2012). A "motor vehicle" is defined broadly and includes any passenger car or truck, as well as any on-road truck used for moving goods. *See* 42 U.S.C. § 7550(2) (2012).

64. 42 U.S.C. § 7543(b) (2012); *see* CAL. HEALTH & SAFETY CODE §§ 43013, 43101 (2013) (granting ARB authority for adopting such standards); *see also* CAL. HEALTH &

Act provides that EPA shall waive the prohibition if California determines that its standards “will be, in the aggregate, at least as protective of public health and welfare as applicable federal standards.”⁶⁵ EPA can only deny such a waiver request if it finds that: (1) the “protectiveness” determination by California was arbitrary and capricious; (2) California does not need the standards to meet compelling and extraordinary conditions; or (3) the standards are not consistent with the requirements of Clean Air Act section 202(a).⁶⁶

Looking to the history and structure of these Clean Air Act provisions, EPA and the courts have concluded that that EPA’s review of waiver requests must be narrow and deferential. It is not permissible for EPA to deny a waiver request for reasons beyond those enumerated by the Act⁶⁷ or to question the State’s policy choices.⁶⁸ Opponents to a waiver for California carry the burden to show that the statutory criteria for approving the waiver have not been satisfied.⁶⁹

b. California’s Existing Zero-Emission Vehicle Requirements

EPA has already granted waivers for California’s limited zero-emission vehicle requirements for light-duty vehicles. In 1990, the ARB adopted its first zero-emission vehicle standards as a footnote in its Low Emission Vehicle Regulation (“LEV-I”).⁷⁰ The provisions specified that “[w]hile meeting the fleet average [emissions performance] standards, each manufacturer’s sales fleet shall be composed of at least 2% [zero-emission vehicles] in the model years 1998 through 2000, 5% [zero-emission vehicles] in 2001 and 2002 and 10% [zero-emission vehicles] in 2003 and subsequent [model years].”⁷¹

The California Legislature eventually codified these requirements, but only after adding a series of weakening amendments and flexibilities that

SAFETY CODE § 43000 (2013) (listing legislative findings regarding the need to control or eliminate emissions from motor vehicles and address dependence on petroleum based fuels).

65. 42 U.S.C. § 7543(b)(1) (2012).

66. *Id.* Section 209(e)(2) includes similar preemption language for standards on new non-road equipment and vehicles. 42 U.S.C. § 7543(e)(2) (2012).

67. *See, e.g.*, Notice of Decision Granting Waiver of Preemption for California, 78 Fed. Reg. 2112, 2115 (Jan. 9, 2013).

68. *See id.* at 2115–16.

69. *See id.* at 2116; *see also* Motor & Equip. Mfrs. Ass’n, Inc. v. EPA, 627 F.2d 1095, 1121 (D.C. Cir. 1979).

70. CAL. CODE REGS. tit. 13, § 1960.1(g)(2) n.(9) (1990).

71. *Id.*

reduced the required number of true zero-emission light-duty vehicles.⁷² Throughout the course of these regulations and amendments, EPA consistently approved the State's requests for waivers of preemption.⁷³

In 2012, ARB adopted its most recent amendments to the Zero Emission Vehicle program as part of its latest Low Emission Vehicle program ("LEV-III").⁷⁴ One stated goal for these amendments is to move from technology demonstration to commercialization of zero-emission light-duty vehicles. The amendments simplify the requirements and compliance mechanisms for model year 2018 and later vehicles and increase the zero-emission vehicle production volume requirements through 2025 model year vehicles.⁷⁵ ARB projects that, as a result of these amendments, over 15% of new vehicle sales by 2025 will be zero-emission light-duty vehicles and "transitional zero-emission vehicles" (e.g., plug-in hybrids).⁷⁶ In 2013, EPA approved a preemption waiver for these most recent amendments.⁷⁷

For heavy-duty vehicles, neither state nor the federal truck standards include a zero-emission vehicle requirement.⁷⁸ In 2011, EPA and the National Highway Transportation and Safety Administration ("NHTSA") adopted heavy-duty engine standards for greenhouse gas emissions and fuel

72. See CAL. CODE REGS. tit. 13, §§ 1962–1962.2 (2012); see also *History of California's Zero Emission Vehicle (ZEV) Program*, UNION OF CONCERNED SCIENTISTS, http://www.ucsusa.org/clean_vehicles/smart-transportation-solutions/advanced-vehicle-technologies/electric-cars/californias-zero-emission-1.html (last visited Oct. 30, 2014).

73. See, e.g., Notice of Decision for California's Vehicle Pollution Control Standards, 58 Fed. Reg. 4166 (Jan. 13, 1993); Notice of Determination for California Vehicle Pollution Control Standards, 66 Fed. Reg. 7751 (Jan. 25, 2001); Determination and Waiver of Preemption California's Zero-Emission Vehicle (ZEV) Standard Amendments, 76 Fed. Reg. 61095 (Oct. 3, 2011).

74. CAL. CODE REGS. tit. 13, § 1962.2 (2013).

75. *Id.*

76. CAL. AIR RES. BD., STAFF REPORT: INITIAL STATEMENT OF REASONS ADVANCED CLEAN CARS, at ES-2 (2011), <http://www.arb.ca.gov/regact/2012/zev2012/zevisor.pdf>.

77. Notice of Decision Granting Waiver of Preemption for California, 78 Fed. Reg. 2112, 2145 (Jan. 9, 2013).

78. For several years, California's standards for new trucks were more stringent than the federal EPA standards. Since model year 2007, however, the California and federal standards have been harmonized. See CAL. AIR RES. BD., STAFF REPORT: INITIAL STATEMENT OF REASONS: PUBLIC HEARING TO CONSIDER AMENDMENTS ADOPTING MORE STRINGENT EMISSION STANDARDS FOR 2007 AND SUBSEQUENT MODEL YEAR NEW HEAVY-DUTY DIESEL ENGINES (2001), <http://www.arb.ca.gov/regact/HDDE2007/isor.pdf> (describing ARB adoption of conforming regulations).

efficiency.⁷⁹ These standards, which do not require the use of any advanced technologies, such as hybrid or electric drivetrains, are not particularly aggressive. However, they do include provisions for claiming “advanced technology credits” for hybrids, fuel cells, and all-electric vehicles.⁸⁰ The federal agencies suggest that when they commence the next set of regulatory standards, they expect these advanced technologies will be an important consideration in the regulatory program for the stringency of standards beyond the 2018 model year.⁸¹

c. Expanding the On-Road Zero-Emissions Mandate

To achieve the transformation outlined in the ARB Report, California undoubtedly needs to significantly expand its current light-duty zero-emission vehicle requirements. First, California must push beyond the current 15% targets for 2025 and ramp up minimum sales percentage requirements to 100% by 2040. While the most recent amendments focused on the commercialization of new technologies, the next set of amendments must focus on widespread adoption, transformation, and eventual elimination of light-duty vehicles that burn fuel.

California must also expand the zero-emission vehicle requirements beyond the currently regulated light-duty passenger vehicle categories. Zero-emission technologies are already available for certain categories of medium and heavy-duty diesel trucks.⁸² California must amend its zero-

79. GHG Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Vehicles, 76 Fed. Reg. 57,106 (Sept. 15, 2011). California adopted complementary state regulations for which EPA granted a preemption waiver. Notice of Waiver of Preemption for California’s 2010 Model Year Heavy-Duty Vehicle and Engine On-Board Diagnostic Standards, 77 Fed. Reg. 73,459, 73,459–60 (Dec. 12, 2012).

80. See GHG Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles, 76 Fed. Reg. at 57,245–46.

81. See, e.g., *id.* at 57,170, 57,247; see also *Transportation and Climate: Regulations & Standards: Heavy-Duty*, US EPA, <http://www.epa.gov/otaq/climate/regs-heavy-duty.htm> (last visited Oct. 30, 2014) (describing and linking to President Obama’s 2014 directive to EPA to revise greenhouse gas standards for model year 2018 and later heavy-duty trucks).

82. CAL. HYBRID, EFFICIENT & ADVANCED TRUCK RESEARCH CTR., CALHEAT RESEARCH AND MARKET TRANSFORMATION ROADMAP FOR MEDIUM- AND HEAVY-DUTY TRUCKS 19 tbl.5 (2013), http://www.calstart.org/Libraries/CalHEAT_2013_Documents_Presentations/CalHEAT_Roadmap_Final_Draft_Rev_7.sflb.ashx [hereinafter *CalHEAT Transformation Roadmap*]; see also Amy Westervelt, *Electric Vehicles Lead Pack in Greening Corporate Fleets*, GREENBIZ.COM (Mar. 30, 2012), <http://www.greenbiz.com/blog/2012/03/30/electric-vehicles-corporate-fleet>.

emission vehicle regulations in order to capture more types of on-road motor vehicles.

In light of EPA's recent review and approval of California's 2012 amendments to the zero-emission vehicle regulations, there are no obvious roadblocks to California's legal ability to mandate the transformation of new cars and trucks to zero-emissions technologies. To receive a waiver, California must first demonstrate that its standards, in the aggregate, are at least as protective of public health and welfare as applicable federal mobile source standards.⁸³ EPA already concluded that California adequately demonstrated the LEV-III program, which included a zero-emission vehicle regulation, satisfies this requirement.⁸⁴ Looking at the standards "in the aggregate," as required by the Clean Air Act, EPA concluded that the LEV-III standards for light-duty vehicles were more protective than the federal standards.⁸⁵ In particular, EPA noted that the zero-emission vehicle regulations are "an addition to [California's] LEV program" and found no reason to believe that the addition of this regulatory component "undermines the protectiveness of [the] LEV III emission standards."⁸⁶ EPA also acknowledged that as a stand-alone requirement, the zero-emission vehicle regulation is certainly more stringent than federal standards because no similar zero-emission requirement exists in the federal regulations.⁸⁷

Any increase in the required percentage of zero-emission light-duty vehicles would continue to satisfy the protectiveness requirement. However, at some point, California may have to adjust the overarching LEV-III standards in order to (1) eliminate the emission standards altogether in favor of a 100% zero-emission vehicle mandate or (2) at least tighten the fleet-wide averages, which would ensure that non-zero emission models do not get dirtier and "average out" the fleet's growing portion of zero-emission vehicles. Assuming there is no change in the federal standards, the LEV-III standards will continue to be more protective based on fleet-wide averages. Nevertheless, adjustments to the LEV-III program that reflect an expanded percentage of zero-emission vehicles would bolster the protectiveness determination. No matter how it chooses to proceed, California will easily satisfy the protectiveness determination.

If unable to show that EPA's protectiveness determination for California was arbitrary and capricious, opponents of a preemption waiver must show either (1) that there is no compelling need for the state

83. 42 U.S.C. § 7543(b)(1) (2012).

84. Notice of Decision Granting Waiver of Preemption for California, 78 Fed. Reg. 2112, 2125 (Jan. 9, 2013).

85. *Id.*

86. *Id.*

87. *Id.*

standards or (2) that the standards do not comply with the feasibility requirements in section 202(a) of Clean Air Act.⁸⁸ Similar to the protectiveness determination, California can easily satisfy the compelling need requirement. As discussed above, California has some of the worst ozone-polluted areas in the country,⁸⁹ which establishes a compelling need to reduce greenhouse gas emissions. In its waiver for the 2012 LEV-III amendments, EPA acknowledged the conclusion of the ABR Report that transition to zero-emission technologies in all on- and off-road engine categories is necessary to meet the State's greenhouse gas goals and the national ozone standards.⁹⁰ EPA concluded that "whether or not the [zero-emission vehicle] standards achieve additional reductions above and beyond the LEV III [greenhouse gas] and criteria pollutant standards, the LEV III program overall does achieve such reductions, and EPA defers to California's policy choice of the appropriate technology path to pursue to achieve those emission reductions."⁹¹

EPA's analysis of the compelling need for an expanded zero-emission vehicle requirement would similarly defer to the State's policy choices. The ARB Report shows that the LEV-III program will not be sufficient to meet the greenhouse gas and ozone pollution targets. EPA should not second-guess the State's supported conclusion regarding the need to end the sale of conventionally-fueled new cars and trucks.

The only potentially complicated waiver issue is whether the expanded zero-emission vehicle regulations are consistent with the feasibility requirement of section 202(a) of the Clean Air Act.⁹² To determine whether California's regulations are consistent with section 202(a), EPA has explained:

The scope of EPA's review under this criterion is a narrow one. . . . [T]he determination is limited to whether those opposed to the waiver have met their burden of establishing that California's standards are technologically infeasible. . . . California's standards are not consistent with section 202(a) if

88. See 42 U.S.C. § 7543(b)(1) (2012).

89. See *supra* Part II.B.

90. Notice of Decision Granting Waiver of Preemption for California, 78 Fed. Reg. 2112, 2131 (Jan. 9, 2013).

91. *Id.*

92. See 42 U.S.C. § 7521(a)(3)(A)(i) (2012) (requiring generally that standards "reflect the greatest degree of emission reduction achievable through the application of technology which the Administrator determines will be available for the model year to which such standards apply, giving appropriate consideration to cost, energy, and safety factors associated with the application of such technology").

there is *inadequate lead time* to permit the development of technology necessary to meet those requirements, *giving appropriate consideration to the cost of compliance* within that time.⁹³

First and foremost, the issue of lead time—the time between adoption and enforcement of the standards—is central to the feasibility analysis. When regulations include significant lead time—as California should include in its expanded zero-emission vehicle regulations, as discussed below—the state agency is entitled to substantial deference on the question of future feasibility. EPA explained that section 202(a) requires EPA to “review whether adequate technology already exists, or if it does not, whether there is adequate time to develop and apply the technology before the standards go into effect.”⁹⁴ In an early decision under section 202(a), the D.C. Circuit in *NRDC v. EPA*⁹⁵ looked at the feasibility of EPA standards, which were premised on the prediction that industry would develop the necessary control technologies within the required five-year lead time. The court held that an agency “demonstrate[s] the reasonableness of its basis for projection if it answers any theoretical objections to the [predicted control technology], identifies the major steps necessary in refinement of the technology, and offers plausible reasons for believing that each of those steps can be completed in the time available.”⁹⁶

In addition to lead time, the feasibility analysis also incorporates the cost of implementing the regulations.⁹⁷ In the waiver context, California is again given broad deference for its cost determinations. Based on the Supreme Court’s discussion in *Motor Equip. Mfrs. Ass’n*,⁹⁸ EPA has concluded that it can deny a waiver for the California standards under the cost determination only when the cost of compliance is “excessive” and “reach[es] a very high level,” on the order of doubling or tripling the cost of the vehicle.⁹⁹ Cost and lead time are intertwined because any assessment of the feasibility of future technologies necessarily includes a projection of the reduction in cost as technical barriers are overcome.

93. Notice of Decision Granting Waiver of Preemption for California, 78 Fed. Reg. at 2132 (emphasis added).

94. *Id.* at 2133.

95. *Natural Res. Def. Council v. EPA*, 655 F.2d 318, 327–36 (D.C. Cir. 1981).

96. *Id.* at 331; *see also* Notice of Decision Granting Waiver of Preemption for California, 78 Fed. Reg. at 2133 (applying same test to California waiver analysis).

97. *See, e.g.*, 42 U.S.C. §§ 7421(a)(2), 7421(3)(A)(i) (2012).

98. *Motor & Equip. Mfrs. Ass’n, Inc. v. EPA*, 627 F.2d 1095, 1113 (D.C. Cir. 1979).

99. Notice of Decision Granting Waiver of Preemption for California, 78 Fed. Reg. at 2134.

California faces no new feasibility issues by expanding the sales percentage requirements for zero-emission light-duty vehicles. The technology for zero-emission passenger and other light-duty vehicles already exists and is commercially available. In EPA's waiver for the 2012 LEV-III standards, EPA found that "a number of manufacturers have clearly demonstrated the feasibility of [zero-emission vehicle] technology."¹⁰⁰ EPA further noted that, since the manufacturers were already producing zero-emission vehicles, assessing whether the costs of compliance were excessive was not necessary.¹⁰¹ Nonetheless, EPA concluded that California's projection—by 2025 the cost of zero-emission vehicles will rapidly decline, resulting in a high-end approximation of a \$10,000 price difference, between a conventional and a zero-emission vehicles—was reasonable.¹⁰² EPA concluded, "Under EPA's traditional analysis of cost in the waiver context, *because such cost does not represent a 'doubling or tripling' of the vehicle cost*, such cost is not excessive nor does it represent an infeasible standard."¹⁰³

For light-duty vehicles, the sizable increase in the percentage of zero-emission vehicles (from approximately 15% in 2025 to 100% by 2040) may alter EPA's feasibility analysis. Again, EPA's analysis of the 2012 regulations suggests that it should remain the same. As noted above, expanding from 15% to 100% is not an issue of basic technical feasibility. The technology exists and is reasonably projected to become more affordable.¹⁰⁴ Thus, the main issues for the feasibility analysis are: (1) the refueling infrastructure necessary to support increased numbers of zero-emission vehicles; and (2) consumer demand, which will support the elimination of conventional fossil-fueled vehicles. EPA addressed both of these issues in the waiver decision concerning ARB's 2012 regulations.

When EPA reviewed the LEV-III program, manufacturers and dealers raised concerns about the refueling infrastructure for zero-emission vehicles. In response, California outlined the various state and federal programs aimed at increasing vehicle-charging and hydrogen-refueling infrastructure, including agency activities to facilitate charging at the workplace and home.¹⁰⁵ Without much discussion, EPA found the evidence submitted by California was sufficient to reject industry's opposition to the feasibility of

100. Notice of Decision Granting Waiver of Preemption for California, 78 Fed. Reg. at 2142.

101. *Id.*

102. *Id.*

103. *Id.* (emphasis added).

104. *See, e.g.*, Hensley et al., *supra* note 62; Shahan, *supra* note 62.

105. Preemption Waiver for California's Clean Car Program, 78 Fed. Reg. at 2140.

the regulations.¹⁰⁶ To the extent that further expansion to 100% of light-duty vehicles raises the same feasibility concerns, EPA would be hard pressed to conclude that sufficient lead time could not adequately address any theoretical concerns about infrastructure. As long as California continues to encourage new infrastructure, arguments against feasibility based on concerns about refueling the increased number of zero-emission vehicles do not seem legally viable.

In addition to concern about refueling infrastructure, manufacturers and dealers argued that consumers simply would not want to buy zero-emission vehicles in the percentages required by California's regulations. Moving to 100% will magnify these objections. In support of its 2012 waiver request, California provided data showing that sales of zero-emission vehicles outpaced the sales of conventional hybrids in the first few years following their introduction.¹⁰⁷ EPA also considered independent research reports, which projected national sales volumes well above California's sales requirements.¹⁰⁸ While this data provided some comfort for the expectation of increased consumer demand consistent with the increased sales percentage requirements, EPA acknowledged that consumer demand is more an issue of marketability than of feasibility. EPA did not accept the industry's objections "given the substantial amount of lead time before the standards take effect and the steps that manufacturers and dealers can take to facilitate compliance with these standards (e.g., rebates and other incentives)."¹⁰⁹

106. Preemption Waiver for California's Clean Car Program, 78 Fed. Reg. at 2144.

107. *Id.*

108. *Id.* at 2141–42.

109. *Id.* at 2144; *see also id.* (noting that the "matter of how Manufacturers and Dealers choose to market these vehicles is one of market choice"). This debate over what consumers want is particularly fraught with "status quo thinking" and should generally be rejected by EPA as a feasibility argument. When the auto dealers argued that electric vehicles would not meet consumer expectations over vehicle range and refueling times, EPA properly rejected the unsupported assertion that these expectations were essential to consumers. *Id.* But even if industry could provide support, it would only beg other questions: whether those expectations might be open to change; whether other marketable advantages might be sufficient to motivate consumers to accept tradeoffs; and whether, with sufficient lead time, technology could advance to meet those expectations. More than any other issue, this is one within the control of manufacturers and dealers. As such, EPA should be very leery of accepting industry arguments as a basis for denying a waiver. That said, it is not too hard to imagine the public reaction to an announcement that in twenty-five years, California will prohibit the sale of new fossil-fueled vehicles. Any such

Given the maturity of zero-emissions technology in light-duty vehicles, there are no apparent legal barriers to expanding the mandate to require a shift to zero-emissions technology for all light-duty vehicles as long as the rules provide significant lead time. Expanding the zero-emission mandate to new categories of vehicles, such as heavy-duty trucks that currently run on diesel, should follow a similar script: ARB demonstrates that the standards are more protective than federal standards and that the State has a compelling need for such standards. However, a waiver for heavy-duty vehicles will be more difficult for California to secure due to the feasibility of zero-emission technologies in heavy-duty applications. California will not be able to rely as easily on the basic finding that technologies for these types of vehicles have been demonstrated as feasible. In general, zero-emission technologies for heavy-duty vehicles are in varying stages of demonstration and have not yet reached commercialization. Therefore, the analysis will be similar to the early stages of the zero-emission vehicle requirements for light-duty vehicles.

Depending on the size and intended function of heavy-duty trucks,¹¹⁰ there can be a substantial difference in the current feasibility of zero-emissions technologies.¹¹¹ For example, trucks used for local delivery, city buses, or garbage collection share similar operational characteristics such as limited ranges, lower speeds, and frequent starts and stops. These types of trucks have the highest potential to be replaced by plug-in hybrids and fully electric trucks. Indeed, zero-emission versions of these vehicles are already on the road as part of FedEx, UPS, and other fleets.¹¹² By contrast, long-haul tractor-trailers with long-distance ranges and fewer starts and stops may require different fuel cell technologies to achieve zero-emissions—technologies which have yet to be demonstrated in practice.¹¹³

To expand the zero-emissions mandates to heavy-duty vehicles, California can follow the path it took for light-duty vehicles. First, ARB could adopt a next generation of standards for both NO_x and CO₂ emissions from new heavy-duty trucks beginning with model years in the 2020 timeframe. As noted above, EPA and NHTSA have announced plans to adopt a more

public objections are political ones, however, not ones that would support a legal argument for denial of a waiver under the provisions of the Clean Air Act.

110. Trucks are often classified by size according to their gross vehicle weight rating (GVWR), which is generally the weight of the truck itself with fuel and cargo but not including attached trailers. EPA defines all trucks over 8,500 GVWR as “heavy duty.” CalHEAT prepared a California Truck Inventory Study that provides a useful breakdown based on weight and use. See CalHEAT Transformation Roadmap, *supra* note 82, at 9–10.

111. *Id.* at 9.

112. See *id.* at 20; see also Westervelt, *supra* note 82.

113. CalHEAT Transformation Roadmap, *supra* note 82, at 20.

stringent round of greenhouse gas and efficiency standards for heavy-duty trucks in that same timeframe.¹¹⁴ Thus, ARB might have the opportunity to act in coordination with the federal government, which might be desirable for various reasons. However, since there is no legal obligation to wait for federal action, California should act expeditiously even if it means acting before the federal government.

In tightening these standards, ARB ought to include a zero-emission vehicle sales mandate similar to the 1990 version of the light-duty LEV standards, which require that fleets of new vehicles and engines become cleaner and that a specified percentage of sales must be zero-emissions. ARB should set different sales mandates and timeframes based on the category of vehicle.¹¹⁵ For example, the State could set earlier adoption requirements and more aggressive targets for engines used in urban vocational vehicles where zero-emission technologies have been better demonstrated. For the more challenging truck categories such as long-haul diesel trucks, the regulations can allow longer lead times to enable technology to develop in the “simpler” truck categories. This staggered deployment approach spreads the zero-emissions requirements to other categories over time as technical barriers are overcome and costs are reduced. As with the early requirements for light-duty zero-emission vehicles, the State could provide credits if industry meets the sales targets for intermediate technologies, such as hybrid technologies, in the categories that pose the greatest technical challenges.¹¹⁶ As long as California provides sufficient lead time for meeting these requirements, the justification for a waiver and the defense of the feasibility of small initial sales mandates for certain categories of trucks will be easy. As these technologies mature and transfer from one category of heavy-duty trucks to another, California can ramp up the zero-emission vehicles sales percentages required to reach its ultimate goal.

114. See *supra* note 81 and accompanying text.

115. The categories identified in the CalHEAT Roadmap, for example, could provide a useful way to organize the requirements. See CalHEAT Transformation Roadmap, *supra* note 82, at 10, 20.

116. This was the approach taken in the ZEV mandate. See CAL. CODE REGS. tit. 13, §§ 1962–1962.2 (2013) (allowing certain credits for non-ZEV vehicles). Other ideas for transitional technologies include setting requirements in terms of “zero-emission miles” to allow for vehicles that can operate at least some of the time with zero emissions (e.g., diesel buses with catenary devices that can also run on electricity when connections are available).

d. Zero-Emission Mandates for New Non-road Vehicles

Section 209(e)(1) of the Clean Air Act prohibits state emission standards both on new non-road farm and construction equipment smaller than 175 horsepower and on “[n]ew locomotives or new engines used in locomotives.”¹¹⁷ Unlike the on-road preemption provisions, there is no mechanism for California or other states to obtain a waiver of this preemption. However, the Clean Air Act does authorize California to obtain a waiver from EPA, under nearly identical criteria as those for on-road waivers, for other categories of non-road engines and equipment, as well as for standards that apply to used non-road equipment.¹¹⁸ EPA has concluded that California is entitled to the same deference as on-road waivers for these particular non-road categories.¹¹⁹

California has set a number of standards for non-road equipment,¹²⁰ but to date has not included any zero-emissions mandates in those standards. California needs to strengthen these existing standards by adding zero-emission mandates. As with on-road vehicles, obtaining a waiver from EPA should be straightforward—ARB can demonstrate that these requirements will be more protective than the federal requirements and the compelling need demonstration will be the same as the on-road demonstration. Again, the key issue for non-road vehicles is feasibility.

Non-road equipment (e.g., forklifts, bulldozers, and marine vessels) varies even more significantly than on-road heavy-duty vehicles. As a result, the feasibility of zero-emission technologies for non-road vehicles also varies significantly. The technology to electrify some equipment, such as forklifts and ground support equipment at airports, largely exists.¹²¹ Other equipment, such as construction equipment (where large loads placed on the engines can quickly sap a battery) or marine vessels (where long range is required), poses increasingly difficult technical challenges. As with heavy-duty on-road equipment, the best approach to regulating these engines and vehicles is a category-by-category implementation with more aggressive

117. 42 U.S.C. § 7453(e)(1) (2012).

118. 42 U.S.C. § 7453(e)(2) (2012).

119. *See, e.g.*, Notice of Decision: California’s Nonroad Engine Pollution Control Standards, 79 Fed. Reg. 6584, 6586–87 (Feb. 4, 2014).

120. *See, e.g.*, CAL. CODE REGS. tit. 13, §§ 2420–2427. (2013).

121. *See, e.g.*, CAL. AIR RES. BD., AVIATION SECTOR TECH. ASSESSMENT 33 (2014), <http://www.arb.ca.gov/msprog/tech/presentation/aviation.pdf> (reporting that over 50% of various types of ground support equipment used at Los Angeles International Airport has already been electrified); CAL. AIR RES. BD., CARGO HANDLING EQUIPMENT TECHNOLOGY ASSESSMENT 14 (2014), <http://www.arb.ca.gov/msprog/tech/presentation/cargohandling.pdf> (noting forklifts with rechargeable batteries are commercially available with lift capacities up to 40,000 pounds).

requirements applied to uses for which zero-emission technologies are better demonstrated. This categorical implementation promotes the development and demonstration of new technologies and enables expansion to other categories over time.

The categories of non-road sources for which a waiver is not allowed (i.e., new farm and construction equipment under 175 horsepower, and new locomotives) present a more significant legal barrier to transformation of non-road equipment to zero-emission technologies in California. California's authority to set standards for these types of non-road equipment is limited to requirements for retrofitting used equipment.¹²² For these non-road sources, California will have to rely either on other legal tools to indirectly control these emissions or on voluntary measures, such as targeted subsidies to encourage adoption of new technologies.

2. Programs to Spur Adoption and Replacement

For most categories of mobile sources, California has clear authority to set standards that require new vehicles and equipment to be zero-emission. However, setting standards for manufacturers of new mobile sources is unlikely, on its own, to successfully meet the federal ozone attainment deadlines within the required timeframe. First, since only manufacturing zero-emission vehicles and equipment is not enough to meet the standards, consumers must be willing to buy the vehicles and equipment. Second, given the required emission reductions and the fact that some of these vehicles and equipment can stay in operation for decades, it does not suffice to just make new vehicles and equipment zero-emission. California needs to usher in not only the introduction of zero-emission technologies but also the rapid "turnover" from fossil-fueled technologies to zero-emission technologies. The regulatory framework for addressing these two additional needs—seeding the market for new zero-emission vehicles and accelerating the turnover of the legacy fleet—is already in place but must shift the focus away from "cleaner" vehicles and equipment towards zero-emission vehicles and equipment.

Although the psychology of consumer demand is far too complex to explore in this article, the keys to California's success include ensuring that costs are competitive and that customers are comfortable with the new technologies. Development of the technologies and economies of scale will address, in part, issues of costs. Incentivizing early adoption and

122. The question of when such equipment is no longer "new," and therefore no longer subject to preemption, can be more complicated than it would seem. For example, EPA has concluded that the Clean Air Act's preemption of new locomotive engines extends until an engine or locomotive has "significantly exceeded its useful life." Control of Emissions from Locomotive Engines, 72 Fed. Reg. 15,938, 15,971 (proposed Apr. 3, 2007).

demonstration programs will increase consumer comfort with the new technologies. ARB and the local air districts already have in place a number of programs aimed at spurring the initial phases of a meaningful market for new technologies. The fleet rules adopted by ARB and the local air districts are a key component of these strategies. These rules require owners and operators of certain fleets of mobile sources (e.g., garbage collection companies, city bus fleets, and utility companies with service trucks) to purchase new vehicles that meet specific standards or to ensure that percentages of their fleets are composed of vehicles that meet such standards.¹²³

123. SCAQMD adopted a series of fleet rules regulating the purchase of new vehicles for specified fleet owners and operators. These rules generally require that all new vehicles purchased after the specified dates be alternative-fueled vehicles, which can include fossil fuels other than diesel, as well as hybrid, electric and fuel cell vehicles. Authority for these rules comes from the California Health and Safety Code. E.g., CAL. HEALTH & SAFETY CODE §§ 40447.5, 40919 (2013). SCAQMD rules cover the following fleets: Less-Polluting Sweepers (Rule 1186.1); Clean On-Road Light- and Medium-Duty Public Fleet Vehicles (Rule 1191); Clean On-Road Transit Buses (Rule 1192); Clean On-Road Residential and Commercial Refuse Collection Vehicles (Rule 1193); Commercial Airport Ground Access Vehicles (Rule 1194); Clean On-Road School Buses (Rule 1195); Clean On-Road Heavy-Duty Public Fleet Vehicles (Rule 1196). South Coast Air Quality Mgmt. Dist., Rules 1186.1 (amended Jan. 9, 2009), 1191–1192 (June 16, 2000), 1193 (amended July 9, 2010), 1194 (amended Oct. 20, 2000), 1195 (amended May 5, 2006), 1196 (amended June 6, 2008) *available at* <http://www.aqmd.gov/home/regulations/rules/scaqmd-rule-book> (last visited Oct. 30, 2014) (providing links to PDF files of SCAQMD Rules).

ARB adopted regulations governing the emissions standards of new buses, CAL. CODE REGS. tit. 13 § 1956.1 (2013) and fleet requirements for transit agencies. CAL. CODE REGS. tit. 13 § 1956.2 (2005) (current version at §§ 2023, 2023.1 (2013)). The fleet requirements required regulated transit agencies to ensure that their fleets met either specified declining average PM limits, § 2023.1(c)(2), (e), or met specified purchase requirements for alternative-fueled vehicles. § 2023.1(b). For fleets that by 2009 opted into the latter “alternative fuel path,” 85% of the buses in the fleet had to be “alternative fuel” buses, §2023.1(b)(1), which means non-diesel and could include natural gas, propane, methanol, ethanol, hybrid-electric, electric, or hydrogen. § 2020(b). The Urban Bus Rule also included a zero-emission bus (ZEB or zBus) purchase requirement for certain large transit agencies. § 2023.3(c). These purchase requirements have been delayed several times and are now on hold. ROBERT H. CROSS, CAL. AIR. RES. BD., MAIL-OUT NO. MSC 10-04, POSTPONEMENT OF THE PURCHASE REQUIREMENT FOR ZERO-EMISSION BUSES UNDER THE TRANSIT FLEET RULE 2 (Jan. 29, 2010) (“ARB does not intend to enforce the ZBus purchase requirement . . . until after the Board has developed and approved new purchase requirements.”) <http://www.arb.ca.gov/msprog/mailouts/msc1004/msc1004.pdf>; *see, e.g.*, 6 Cal.

The Supreme Court has held that requiring the purchase of vehicles meeting specified emissions standards is the equivalent of setting emissions standards.¹²⁴ Thus, certain fleet purchase requirements are subject to preemption and can only be adopted by ARB with a waiver from EPA. The Court, however, under the presumption against federal preemption where the state or local government is acting as a market participant rather than a regulator, left room for local air districts to set restrictions on the purchasing decisions of state and local government agencies.¹²⁵ As a result, the local air districts retain considerable ability to control the makeup of fleets operated by state and local public entities, including the State of California, counties, cities, and special districts, and by private entities under contract to state or local public entities. By requiring these public fleets to choose zero-emission technologies when making new purchases, California will seed the demand necessary to support the development of new technologies.

Fleet rules are a valuable tool not only for controlling the purchase of new vehicles and equipment but also for converting the “legacy” fleets. California’s strategy has been to set standards for new vehicles and then, over time, require that older existing equipment be retired and replaced with these new vehicles, or retrofit to meet equivalent standards.¹²⁶

Regulatory Notice Reg. 581 (May 7, 2004) (noticing the amendments which delayed ZEB program from 2003-2006); 35 Cal. Regulatory Notice Reg. 1242 (noticing the amendments which delayed ZEB demonstration requirement start date from 2006 to 2011-2012). ARB is considering next steps and whether to reinstate the purchase requirement. See Lesley Stern, Cal. Air Res. Bd., Presentation at Cal. ARB Workshop: Zero Emission Bus Regulation Overview and Next Steps (Dec. 3, 2013), at 13, <http://www.arb.ca.gov/msprog/bus/zbus/meetings/120313/zero-emission-bus-dec2013.pdf>.

124. Engine Mfrs. Ass’n v. S. Coast Air Quality Mgmt. Dist., 541 U.S. 246, 255 (2004).

125. *Id.* at 259; see also Engine Mfrs. Ass’n v. S. Coast Air Quality Mgmt. Dist., 498 F.3d 1031, 1050 (9th Cir. 2007) (holding that Clean Air Act does not preempt provisions of the fleet rules applicable to state and local governments).

126. For example, ARB adopted requirements for the retrofit of existing garbage trucks. The rule sets deadlines for the retrofit or replacement of trucks over a certain age. By 2010, all trucks from model years 2006 and earlier should have been replaced with 2007 model year trucks, retrofitted with PM controls, or replaced with an alternative fuel engine. Compliance for Solid Waste Collection Vehicles, CAL. CODE REGS. tit. 13, § 2021.2 (2013); see generally *Solid Waste Collection Vehicle Rule*, CAL. AIR. RES. BD., www.arb.ca.gov/msprog/SWCV/SWCV.htm (last reviewed Sept. 28, 2011). ARB then expanded these requirements to other fleets operated by public agencies and utilities requiring them to replace or retrofit 2006 and older engines according to a specified schedule that ends with 100% replacement or retrofit by 2016. Determining Compliance for a Municipality or Utility, CAL. CODE REGS. tit. 13, § 2022.1 (2013); see generally *Fleet Rule for Public Agencies and Utilities*, CAL. AIR. RES. BD.,

The basic structure for spurring demand for zero-emission vehicles and equipment already exists. As with the programs to move to cleaner diesel equipment, the first step is to target purchases of new vehicles and equipment in public fleets for which zero-emitting technologies are most feasible. This might mean, for example, starting by requiring that all new purchases for public bus and garbage truck fleets be zero-emission vehicles. These purchase requirements would then be expanded over time to cover additional types of vehicles and fleets based on the projections of how zero-emitting technologies can be transferred from one category of vehicle to another.

As these purchase requirements are phased in, most likely at the local district level, ARB should simultaneously phase in replacement requirements for those fleets where turnover is otherwise low (e.g., heavy-duty diesel vehicles and diesel equipment).¹²⁷ Again, such replacement requirements would likely start with public fleets of vehicles and equipment most open to zero-emission technologies.¹²⁸ Unlike local air district rules, ARB replacement rules are not limited to public fleets and can ultimately

<http://www.arb.ca.gov/msprog/publicfleets/publicfleets.htm> (last reviewed Sept. 28, 2011). Finally, ARB expanded these requirements to all heavy-duty diesel trucks in its Truck and Bus Rule. The Truck and Bus Rule provides a phased-in schedule of replacement or retrofit of older in-use vehicles, culminating with the replacement of all 2009 or older trucks with 2010 or newer vehicles by 2023. CAL. CODE REGS. tit. 13, § 2025 (2013); *see generally On-Road Heavy-Duty Diesel Vehicles (In-Use) Regulation*, CAL. AIR. RES. Bd., <http://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm> (last reviewed Sept. 12, 2014).

127. To clean up existing vehicles and equipment, the two options are generally to replace the particular vehicle or equipment with a new model, or to retrofit it with, in this case, a zero-emission engine. The availability of the retrofit option will vary depending on the type of vehicle or equipment. Some vehicle chasses are manufactured separately from the powertrains, so there may be easier opportunities to swap out a conventionally-fueled engine for a zero-emission one. *See, e.g., Cynthia Shahan, Wrightspeed's Series Hybrid Retrofit Kit for Garbage Trucks—Making Waste Cleanup Cleaner Than Ever*, CLEANTECHNICA (Mar. 31, 2014), <http://cleantechnica.com/2014/03/31/wrightspeeds-series-hybrid-cleaner-ev-keeping-waste-clean-up-cleaner-ever>. For other vehicles or equipment, the engine powertrain may be so integral to the design that retrofit is not practical and replacement is the only real option.

128. The order of such regulations could follow the order of the regulations adopted by South Coast and ARB. *See supra* notes 122, 125.

expand to cover private owners and operators, most likely as the final stage of the transformation to zero-emission technologies.¹²⁹

The final piece of the program to spur the replacement of conventionally-fueled mobile sources must target those sources that California and the local air districts cannot regulate directly—new locomotives and small construction and agricultural equipment.¹³⁰ The strategy for these sources would be to create nonmandatory incentives to replace vehicles and equipment. In the past, California has accomplished this nonmandatory approach through government subsidy programs such as the Carl Moyer or AQUIP programs. However, such voluntary programs alone are unlikely to provide a sufficient market signal to support the meaningful development of new zero-emission technologies.¹³¹ In addition, where direct regulation of mobile sources is limited, California and the local air districts should explore their ability to regulate those *facilities* where such mobile sources operate.

Section 110(a)(5) of the Clean Air Act provides that states may include in their state implementation plans an “indirect source review program.”¹³² An indirect source is defined as “a facility, building, structure, installation, real property, road, or highway which attracts, or may attract, mobile sources of pollution.”¹³³ An indirect source review program is:

[A] facility-by-facility review of indirect sources . . . including such measures as are necessary to assure, or assist in assuring that a new or modified indirect source will not attract mobile sources of air pollution, the emissions from which would cause or contribute to air pollution concentrations . . . exceeding any [NAAQS].¹³⁴

The San Joaquin Valley Unified Air Pollution Control District used this authority to require developers to reduce the emissions associated with the construction and operation of certain specified projects.¹³⁵ The National

129. This was the final stage of ARB’s regulations to require cleaner diesel in trucks and buses. It was also the most politically contentious and may give ARB pause before attempting another round of such in-use requirements. *See supra* note 126.

130. This might also include those types of vehicles and equipment where retrofit is not an option. *See supra* note 127.

131. *See infra* Part III.B.4.

132. 42 U.S.C. § 7410(a)(5)(A) (2012).

133. 42 U.S.C. § 7410(a)(5)(C) (2012).

134. 42 U.S.C. § 7410(a)(5)(D) (2012).

135. San Joaquin Valley Unified Air Pollution Control Dist., Rule 9510: Indirect Source Review (Dec. 15, 2005), <http://www.valleyair.org/rules/currnrules/r9510.pdf>.

Association of Homebuilders, recognizing that the rule discouraged the use of dirty construction equipment, argued that the rule amounted to a preempted regulation of construction equipment. The Ninth Circuit disagreed and held that the District's rule "escapes preemption because its regulation of construction equipment is indirect . . . [and] measures emissions on a 'facility-by-facility' basis."¹³⁶ The model provided in the San Joaquin Valley Rule could be tightened¹³⁷ and expanded to incentivize the use of zero-emission technologies at rail yards, ports, and other facilities beyond construction sites that attract mobile sources which contribute to ozone pollution.¹³⁸

3. Tools for Transforming the Electricity Generating Fleet

The ARB Report noted that as more mobile sources are converted to zero-emission technologies, the demand for electricity will likely increase. The ARB Report recognized that the State must increasingly meet this demand through zero-emission sources of electricity generation. California currently requires that 33% of the electricity sold in the State must come from renewable sources by 2020.¹³⁹ By all accounts, the State is on track to easily surpass that goal by 2020¹⁴⁰ and the California Public Utilities Commission has even included scenarios in its long-term procurement proceedings that assume 40% of the State's electricity will come from renewable sources by 2024.¹⁴¹ However, the ARB Report assumed that

136. Nat'l Ass'n of Home Builders v. San Joaquin Valley Unified Air Pollution Control Dist., 627 F.3d 730, 740 (9th Cir. 2010).

137. Rule 9510 required NO_x emissions from construction equipment to be only 20% lower than baseline emissions. See San Joaquin Valley Unified Air Pollution Control Dist., Rule 9510 § 6.1.1. This level of reduction can be met with existing equipment and would not be a significant driver toward the use of new technologies. New rules should build targets to create incentives for the use of zero- and near-zero-emission technologies.

138. See Ctr. for Cmty. Action & Envtl. Justice v. BNSF Railway Co., 764 F.3d 1019, 1029–30 (9th Cir. 2014) (suggesting that the Clean Air Act's indirect source review might be one of the exclusive mechanisms for regulating emissions from rail yards).

139. CAL. PUB. UTIL. CODE § 399.15(b)(2)(B) (2013).

140. See, e.g., ENERGY + ENVTL ECON., INVESTIGATING A HIGHER RENEWABLES PORTFOLIO STANDARD IN CALIFORNIA 38–39 (2014), https://ethree.com/documents/E3_Final_RPS_Report_2014_01_06_with_appendices.pdf.

141. Assigned Commissioner's Ruling on Assumptions, Scenarios and Renewable Portfolio Standard (RPS) Portfolios for Use in 2014 Long Term Procurement Plan (LTPP) and 2014–2015 California Independent System Operator (CAISO) Transmission Planning Process (TPP), Rulemaking 13-12-010 (Cal. Pub. Util.

approximately 80% of the State's electricity will need to come from zero-emission sources by 2050 if the State is to meet its ozone and greenhouse gas targets.¹⁴² Thus, the final major regulatory component of a state implementation plan to meet the national ozone standard must provide for the rapid increase in the portion of electricity produced by zero-emission sources.

The basic Clean Air Act tools for cleaning up stationary sources, such as power plants, focus on permitting new sources and retrofitting existing sources with pollution control technologies.¹⁴³ Neither of these tools is ideal for replacing fossil-fuel burning plants with zero-emission plants. Requiring existing fossil fuel burning power plants to be retrofitted with zero-emission technologies is unlikely feasible in most cases and could not be justified as mandated under the "reasonably available control measure" standard of the Clean Air Act.¹⁴⁴ For new sources, although the authority to prohibit new fossil fuel-burning power plants probably exists,¹⁴⁵ a better

Comm'n Feb. 27, 2014) (order instituting rulemaking), <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M088/K489/88489746.pdf>.

142. Cal. ARB Vision for Clean Air, *supra* note 1, at 32 (showing that renewables, large hydro, and nuclear are assumed to provide 80% of future generation capacity). Since the release of the ARB Report, the San Onofre Nuclear Generating Station has been shutdown and some question the continuing viability of California's other nuclear plant, the Diablo Valley Power Plant. *See, e.g.*, Barani Krishnan, U.S. *Inspector Wanted Reactor Shut on Quake Fears: Report*, REUTERS, Aug. 25, 2014, <http://www.reuters.com/article/2014/08/25/us-nuclear-earthquake-diablocanyon-iduskbn0gp1w020140825>. All of this demonstrates a need for an aggressive renewables policy.

143. *See* 42 U.S.C. §§ 7503, 7471 (2012) (directing states to adopt new source permitting programs); 42 U.S.C. §§ 7502(c)(1), 7511a(b)(2), 7511a(f) (2012) (requiring retrofit standards for existing sources in those areas violating NAAQS).

144. The Clean Air Act requires that SIPs "provide for the implementation of all reasonably available control measures as expeditiously as practicable (including such reduction in emissions from existing sources in the area as may be obtained through the adoption, at a minimum, of reasonably available control technology) and shall provide for attainment of the national primary air quality standards." 42 U.S.C. § 7502(c)(1) (2013); *see also id.* § 7511a(b)(2); Preamble for Implementation of Title I of the 1990 CAA Amendments, 57 Fed. Reg. 13,498, 13,541 (proposed Apr. 16, 1992) (to be codified at 40 C.F.R. pt. 52) ("Generally, EPA recommends that available control technology be applied to those existing sources in the nonattainment area that are reasonable to control in light of the attainment needs of the area and the feasibility of such controls.").

145. New source review requires covered sources to install controls achieving the "lowest achievable emission rate" and to offset their emissions by finding emission reductions from other sources in the region. *See* 42 U.S.C. §§ 7503(a)(1),

approach to the required transformation is a holistic, long-term plan for building a clean electric grid for the State, as opposed to a permit-by-permit basis.

One approach to incorporating such a long-term strategy into the state implementation plan is to include a new renewable portfolio standard (“RPS”). As noted above, the current 33% renewable portfolio target must be increased significantly. ARB, which has signaled a willingness to adopt more aggressive renewable portfolio standards under its own authority, could certainly use compliance with the Clean Air Act as authorizing its adoption of an extended and more stringent RPS.¹⁴⁶ Alternatively, the California Legislature could assume responsibility for revising the RPS. Either way, the requirement should be incorporated in the SIP in order to make the targets federally enforceable and creditable in the plan.¹⁴⁷ Such enforceability is critical to ensure that the agencies tasked with achieving those targets, such as the Public Utilities Commission, are held accountable.

A second approach for long-term grid planning that achieves the targets of the national air quality standards is to incorporate an approach similar to the one connecting transportation and air quality planning. The Clean Air Act recognizes that transportation agencies, which are not

7503(a)(2) (2013). In addition, permitting decisions must analyze alternatives for the proposed source and demonstrate that the benefits of the proposed source significantly outweigh the environmental and social costs of its location, construction, or modification. *Id.* § 7503(a)(5). Notwithstanding some difficult EPA policies discouraging “redefining the source,” California and local districts could likely defend requiring renewable zero-emission technologies in lieu of fossil fuel based technologies for new and modified power plants either under the LAER requirements or the alternatives analysis requirement. *See* Gregory B. Foote, *Considering Alternatives: The Case for Limiting CO₂ Emissions From New Power Plants Through New Source Review*, 34 ENVTL. L. REP. 10642 (2004). By defining LAER or assessing alternatives in such a way as to require all new power plant to be zero-emission, California would effectively be announcing a moratorium on the construction of new fossil fuel burning plants because it would mean that power plants could not get an air permit because they could not have air emissions.

146. *See* CAL. AIR. RES. BD., PROPOSED REGULATION FOR A CALIFORNIA RENEWABLE ELECTRICITY STANDARD, STAFF REPORT: INITIAL STATEMENT OF REASONS, at ES-2 (2010) <http://www.arb.ca.gov/regact/2010/res2010/res10isor.pdf> (citing authority under AB32).

147. *See* 42 U.S.C. §§ 7604(a)(1), 7604(f)(4) (2012) (authorizing citizen enforcement of emissions standards and limitations contained in EPA-approved SIPs); *see also* *Safe Air for Everyone v. EPA*, 488 F.3d 1088, 1097 (9th Cir. 2007) (explaining that once a SIP provision is approved by EPA it becomes federal law and cannot be changed without EPA approval).

otherwise involved in adopting plans for meeting the national air quality standards, nonetheless make decisions that have direct impacts on the ability of areas to meet those standards. The Clean Air Act requires that transportation plans “conform” to air quality plans.¹⁴⁸ In nonattainment areas, this is accomplished by allocating an emissions “budget” to transportation agencies and requiring that their transportation plans ensure that projects will not facilitate the increase of mobile source emissions above those budgets.¹⁴⁹

California could apply this approach for transportation planning to electric grid planning. In the case of the upcoming ozone plans, the ARB Report assumed that 80% of the State’s electricity will be supplied by zero-emission sources by 2050. This assumption could be translated into milestones and budgets that agencies responsible for procurement planning for investor-owned and publicly owned utilities would need to meet. Although state law currently requires that these agencies prepare long-term procurement plans, the focus has been on assuring reasonable investments of ratepayer monies that are consistent with other state policies.¹⁵⁰ There is no consideration of how these investments are consistent with state implementation plans to attain the national air quality standards. Even though state legislation is likely necessary to require that utility agencies incorporate air quality planning assumptions into their own planning, this approach is sensible for recognizing the need for transforming the way the State produces its electricity.

While the regulation of electricity generation in California will require some additional and creative approaches beyond the traditional stationary source controls mandated by the Clean Air Act, nothing stands in the way of ARB and the State adopting and incorporating measures into the ozone implementation plan to achieve the required transformation of electricity generation in California.

To summarize this section, ARB and the local air districts have clear authority to radically transform mobile sources of pollution in the State and to affect the way the way California generates its electricity. *Then why hasn’t California done it? Why does California continue to have the worst ozone-polluted regions in the Nation?* The simple answer is, of course, politics. ARB and the local air districts have not wanted to adopt such aggressive measures and have instead, with the help of EPA, operated under the fiction that less radical approaches will solve the problem. In doing so, the various agencies have concocted tenuous legal theories in order to evade the basic tenets of the

148. 42 U.S.C. § 7506(c)(1) (2012).

149. See 40 C.F.R. §§ 93.109(c), 93.118 (2012).

150. See CAL. PUB. UTIL. CODE § 454.5(b)(9) (2013) (outlining requirements for utility procurement plans).

Clean Air Act.¹⁵¹ That fiction, and the legal tools the agencies have used to prop it up, are no longer sustainable. In combination, the ARB Report, the failure of these past ozone plans to meet any of the national standards, and the ratcheting down of the national ozone standard make it impossible to *rationaly* approve the types of air plans that have been approved in the past. The need for a transition away from fossil fuels is undeniable. If the transformation to achieve the national ozone standard within the required timeframe is possible, the agencies must adopt the basic regulatory components outlined above and change the way they approach air planning under the Clean Air Act. The following section outlines the air planning practices that the agencies must change. The following section previews the legal fights surrounding planning efforts that will likely face these agencies over the new few years if political expediency continues to drive agencies to deny reality.

B. Changing the Way California Builds State Implementation Plans

In order to assemble the basic regulatory components outlined above into a state implementation plan capable of achieving the sort of transformation anticipated by the ARB Report, the plan must provide a clear market signal to would-be manufacturers that California is shifting away from fossil fuels and towards zero-emission technologies for most mobile and electricity-generating sources. This section highlights five changes that ARB and local air districts should make in their preparation for this critical next generation of ozone plans required by the Clean Air Act.

I. Move Away from Strategies Built Upon Incrementally “Cleaner” Technologies and Instead Work Backwards from Zero

The traditional approach to ozone planning in Los Angeles and the San Joaquin Valley has been: (1) to build plans based on a set of control

151. See, e.g., SOUTH COAST AIR QUALITY MGMT. DIST., *supra* note 55, at 4-46 to 4-47 (describing use of black box to excuse adoption of specific control measures); EPA 2013 Memo, *supra* note 55, at 24 (describing use of unenforceable voluntary incentives to excuse adoption of enforceable regulatory measures); see also *S. Coast Air Quality Mgmt. Dist. v. EPA*, 472 F.3d 882, 895–95 and 900–904 (D.C. Cir. 2007) (rejecting EPA attempts to waive various implementation plan requirements for ozone areas); *Sierra Club v. EPA*, 671 F.3d 955, 968 (9th Cir. 2012) (remanding EPA approval of San Joaquin Valley ozone plan that was based on inventory data EPA knew to be wrong); *Ass’n of Irrigated Residents v. EPA*, 686 F.3d 668, 677 (9th Cir. 2012) (remanding EPA decision to leave in place South Coast ozone plan that EPA knew would not lead the area to attain the one-hour ozone standard).

measures deemed cost-effective; and (2) if those measures do not achieve the emission reductions which modeling demonstrates are necessary to attain the national standards, to promise to reassess and adopt controls in the future to achieve the additional reductions needed.¹⁵² Not surprisingly, this approach has never worked, as demonstrated by the failure of and Los Angeles and the San Joaquin Valley to attain even the least stringent of the national ozone standards. Even if there were some rationale for this flawed approach in the past, the old strategy of adopting incrementally cleaner control measures for the categories of sources requiring transformation will not work in light of the scope of the necessary transformation.

The traditional approach has focused on periodically evaluating current control measures to see whether there have been technological gains since the rules were last adopted or revised. Under this approach, regulators meet with industry and other stakeholders to see whether new technologies have emerged or whether existing technologies have been improved such that additional emission reductions would be cost-effective. Even where rules have been technology-forcing, such as ARB's "cleaner diesel" standards for heavy-duty trucks,¹⁵³ the standards have required incremental improvements rather than transformation to entirely new technologies. The conventional strategy is to ratchet down standards wherever feasible both technically and economically.

This passive approach has resulted in incremental gains but has not forced such progress or even provided a clear market signal that innovation will be rewarded. In some instances, agencies defend this traditional approach by declaring that they do not want to pick "winners," which means that they do not want to prejudge how technology will evolve. Such arguments are not persuasive when the target is zero-emissions. Fossil-fuel burning technologies can never be zero-emissions.¹⁵⁴ The current incremental approach to standard setting will fail to achieve the necessary transformation and threatens to misdirect and waste limited resources in the meantime. Because major sectors of sources need to become zero-emitting, the agencies need to signal that sources need to eliminate emissions altogether and build rules and standards that work backwards

152. See, e.g., SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DIST., *supra* note 48, at 6-6 (listing control measures and outlining plan to periodically review those measures for additional emission reduction opportunities); SOUTH COAST AIR QUALITY MGMT. DIST., *supra* note 55, at 4-43 (describing cost-effectiveness thresholds).

153. See CAL. AIR RES. BD., *supra* note 78, at 4 (explaining how the rule will require after treatment devices on heavy-duty diesel engines, which the "EPA and the ARB consider . . . the next step to control emissions from diesel engines").

154. As noted above, NO_x is created by combustion. Any technology that requires burning the fuel to release its energy will create NO_x and will not be zero-emissions.

from that ultimate target, rather than waiting to see how technologies can facilitate “cleaner” operations.

While this suggested approach may not seem like a radical recommendation to some readers, it has implications for many of the programs and strategies implemented by ARB and the local air districts. For example, instead of the current focus on making technology incrementally “cleaner,” the strategy would be to incrementally expand the number of sources that must incorporate “clean” zero-emission technologies. As described above, this means expanding the zero-emitting vehicle mandates in ARB’s current standards for light-duty vehicles to require larger sales percentages. In addition, ARB should incorporate a similar mandate into the standards for heavy-duty and non-road vehicles, starting with vehicles that have the range and load profiles that are most suitable for available zero-emission technologies (e.g., delivery trucks and local buses). As the technology is demonstrated and developed, the mandate would expand over time to the more challenging vehicle types.

Working backwards from zero would alter the intermediate steps taken to achieve the emission goals. In other areas, agencies have prepared reports and announced plans to achieve certain zero-emission goals,¹⁵⁵ but the steps identified in these reports are rarely, if ever, incorporated into Clean Air Act state implementation plans. In the meantime, the air agencies continually spend money and other resources to promote or require technologies with no potential for achieving zero emissions.¹⁵⁶ Instead,

155. Various state agencies have prepared roadmaps for transforming the way that we produce and use energy in California. See, e.g., CAL. AIR RES. BD., CLIMATE CHANGE SCOPING PLAN (2008), http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf; CAL. ENERGY COMM’N, 2013 INTEGRATED ENERGY POLICY REPORT (2013), <http://www.energy.ca.gov/2013publications/CEC-100-2013-001/CEC-100-2013-001-CMF.pdf>; GOVERNOR’S INTERAGENCY WORKING GRP. ON ZERO-EMISSION VEHICLES, 2013 ZEV ACTION PLAN (2013), [http://opr.ca.gov/docs/Governor’s_Office_ZEV_Action_Plan_\(02-13\).pdf](http://opr.ca.gov/docs/Governor’s_Office_ZEV_Action_Plan_(02-13).pdf). While SIPs may refer to these other efforts, the air agencies typically avoid converting those recommendations into enforceable commitments in the air plans.

156. California’s Carl Moyer program provides roughly \$60 million per year in grant funding for “cleaner-than-required engines and equipment,” which has meant subsidies for conventionally fueled technologies. See CAL. AIR RES. BD., FACT SHEET ON THE CARL MOYER PROGRAM (2013), http://www.arb.ca.gov/msprog/moyer/factsheets/moyer_program_fact_sheet.pdf. Even the Air Quality Improvement Program funds, established through the “Alternative and Renewable Fuel, Vehicle Technology, Clean Air, and Carbon Reduction Act of 2007,” AB 118, 2007 Cal. Stat. 6311 (codified at scattered sections of CAL. HEALTH & SAFETY CODE and CAL. VEHICLE CODE), which are supposed to be used to support development and commercialization of advanced technologies, continue to include funding for the diesel truck Loan Assistance Plan

agencies should target funds at projects that promote technologies and infrastructure that will support zero-emission technologies.¹⁵⁷

2. Provide Long Lead-Time for Technology-Forcing Standards

Related to the current problems with the incremental planning approach, short time horizons in agency regulations are an additional problem. The agencies generally refuse to set standards that become effective more than a few years in the future.¹⁵⁸ Again, the rationale is that the agencies are uncomfortable predicting the direction in which technologies evolve. These concerns are not relevant when the endpoint is known. In the current situation, certain sources must become zero-emission within roughly twenty years. Short-horizon, incremental strategies are actually counter-productive to achieving the necessary transformation. The transformation, as envisioned, requires that regulations incorporate longer lead times than agencies have traditionally used.¹⁵⁹ Longer lead times are necessary not only to allow developers time to overcome technical barriers but also to provide the clear market signal necessary for focused investments. The traditional approach, which delays adoption of regulations or standards in order to provide time for technologies to

to aid small businesses in the retrofit of old trucks and the purchase of new cleaner ones. See CAL. AIR RES. BD., PROPOSED FISCAL YEAR 2014–15 FUNDING PLAN FOR THE AIR QUALITY IMPROVEMENT PROGRAM AND LOW CARBON TRANSPORTATION GREENHOUSE GAS REDUCTION FUND INVESTMENTS (2014), http://www.arb.ca.gov/msprog/aqip/fundplan/fy14_15_funding_plan_aqip_ggrf_final.pdf. While there are certainly policy arguments to support these programs, they will not advance the transformation to zero-emitting technologies.

157. ARB's recent proposed plan for use of AB 118 funds is a promising start in this direction. See *supra* note 156.

158. For example, in the most recent amendments to the ZEV mandate, ARB adopted standards in 2012 that would apply to vehicles beginning in model year 2018 (i.e., six-year lead-time). See CAL. CODE REGS. tit. 13, § 1962.2 (2013). EPA's emission standards for new heavy-duty diesel trucks beginning in model year 2007 were promulgated in 2001 (i.e., six-year lead-time). See Heavy-Duty Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements, 66 Fed. Reg. 5002 (Jan. 18, 2001) (codified at 40 C.F.R. pts. 69, 80, 86).

159. See, e.g., CAL. AIR RES. BD., VISION FOR CLEAN AIR app. 12 (2012), http://www.arb.ca.gov/planning/vision/docs/vision_for_clean_air_appendix_public_review_draft.pdf (noting that for heavy-duty vehicles "development and deployment of some zero- and near-zero technologies must begin now in order to provide reduction by the deadline").

develop, fails to signal that investment in developing these technologies will eventually be rewarded.

Unfortunately, the Clean Air Act has enabled ARB and the districts to hide behind short-term thinking. Section 182(e)(5) of the Act allows EPA to approve implementation plans for “extreme” ozone nonattainment areas (i.e., Los Angeles and the San Joaquin Valley) that “anticipate development of control techniques or improvement of existing control technologies.”¹⁶⁰ EPA has interpreted this language to allow these areas to prepare plans without actually demonstrating how the plans will attain the standards.¹⁶¹ Instead, plans for these areas identify the control measures they have decided to adopt and, if the emission reductions do not attain the ozone standard, the plans claim that some magical technology will achieve the remaining emission reductions before attainment is required.¹⁶² These “black boxes” have never been filled with actual control measures, and, not surprisingly, these areas have yet to meet *any* national ozone standard.

The black box strategy is problematic because it enables the passive approach to technological development that has failed California and, more importantly, undermines the need for long lead time that is crucial for transformation. Even if the agencies applied the black box flexibility in a meaningful way (i.e., took steps to “fill” the back box with measures based on new technological developments), which has never been done, the strategy would still be flawed because delaying the adoption of standards does not provide a clear market signal. In addition, to the extent these future standards are subject to scrutiny as to their feasibility, delayed adoption with shorter lead-times means less deference to the agencies.¹⁶³

Congress’ rationale for the black box is, again, not relevant when the agencies know that sources must be required to have zero emissions. There is no reason to wait to adopt the standards that must eventually be met. Although agencies may not know exactly how technology will evolve to get from point A to point B, they do not need such information to set standards

160. 42 U.S.C. § 7511a(e)(5) (2012).

161. See, e.g., Approval of San Joaquin Valley Attainment Plan for 1997 8-Hour Ozone Standards, 77 Fed. Reg. 12,652, 12,655 (Mar. 1, 2012) (approving 2007 ozone plan for the San Joaquin Valley based on ARB and District “commit[ment] to propose or adopt measures, which are not specifically identified, to achieve a specific tonnage of emission reductions by specific years”).

162. See, e.g., SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DIST., *supra* note 48, at ES-12 to ES-14 (explaining shortfall in strategy for attaining the 1997 eight-hour ozone standard); SOUTH COAST AIR QUALITY MGMT. DIST., *supra* note 55, at 4-46 to 4-47. This “gap” that is assigned to be addressed by some future solution is typically referred to as the “black box.”

163. See Notice of Decision Granting Waiver of Preemption for California, 78 Fed. Reg. 2112, 2132 (Jan. 9, 2013).

requiring that we get to point B.¹⁶⁴ To the contrary, use of the Clean Air Act's black box provision undermines the likelihood of success. ARB and local air districts need to adopt standards with long lead times and to reject past practices, such as the use of the black box that are based on short-term planning.

3. Provide Market Certainty by Incorporating Measures into State Implementation Plans

Part of the goal in adjusting the emissions mandate is to provide a clearer market signal to manufacturers and developers regarding the required transformation. That signal must provide clarity of the ultimate goal and certainty that the goal will not change. California has repeatedly undermined its technology-forcing efforts by relaxing or abandoning requirements at the last minute.¹⁶⁵ Such decisions undermine the agency's credibility and create investment dilemmas for those responsible for complying, especially where long lead-times are involved. To insure that investments in research and development are made in a timely fashion to enable future compliance, manufacturers and developers must be able to rely on the agency's commitment to the requirements.

164. In EPA's "General Preamble" interpreting the 1990 Clean Air Act requirements for SIPs, EPA explained that "black boxes" are allowed where control measures cannot be fully developed because of uncertainty about future technological developments. Preamble for Implementation of Title I of the 1990 CAA Amendments, 57 Fed. Reg. 13,498, 13,524 (proposed Apr. 16, 1992) (to be codified at 40 C.F.R. pt. 52). For a zero-emission mandate, it is no longer an exercise of guessing what emissions level to set based on a prediction of how technologies will develop. The agencies know what the control measure must be, and technology must be developed to get there.

165. As described above, ARB has relaxed the ZEV mandate on several occasions. In 1996, ARB eliminated the percentage ZEV requirements for model years 1998 through 2002. See CAL. AIR RES. BD., FINAL STATEMENT OF REASONS FOR RULEMAKING (1996), <http://www.arb.ca.gov/regact/zev/fsor3.pdf>. In 2001, ARB again relaxed the regulations to allow more flexible compliance options. See CAL. AIR RES. BD., CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR 2003 AND SUBSEQUENT MODEL ZERO-EMISSION VEHICLES, AND 2001 AND SUBSEQUENT MODEL HYBRID ELECTRIC VEHICLES, IN THE PASSENGER CAR, LIGHT-DUTY TRUCK AND MEDIUM-DUTY VEHICLE CLASSES (2001), <http://www.arb.ca.gov/regact/zev2001/testprocedures.pdf>. Another high-profile relaxation was ARB's recent compliance extension for its in-use diesel truck and bus rule. See CAL. AIR RES. BD., STAFF REPORT: INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING - PROPOSED AMENDMENTS TO THE TRUCK AND BUS REGULATION (2014), <http://www.arb.ca.gov/regact/2014/truckbus14/tb14isor.pdf>.

Similarly, the Clean Air Act directs that air quality plans be built upon certain and enforceable commitments.¹⁶⁶ Once a regulation is approved into a state implementation plan it becomes federally enforceable. This enforceability means that, even if the state or local agency decides not to enforce the requirements aggressively, citizens and EPA can bring actions to ensure compliance.¹⁶⁷ In addition, if an agency decides to abandon or relax a SIP-approved requirement, it must get EPA approval and show that the rule change does not violate any requirement of the Clean Air Act or otherwise undermine the plan for meeting the national air quality standards.¹⁶⁸

ARB has refused to incorporate most of its mobile source measures into California's SIP, presumably because the agency does not want to be constrained in its ability to change direction. To accommodate the State, EPA has invented a legally suspect argument: EPA's grant of a waiver under section 202(a) of the Clean Air Act is equivalent to EPA's approval of an SIP.¹⁶⁹ Under this interpretation, ARB is allowed to take credit for these

166. Section 110(a)(2)(A) of the Clean Air Act provides that each implementation plan must "include enforceable emission limitations and other control measures, means or techniques (including economic incentives such as fees, marketable permits, and auctions of emissions rights) . . . as may be necessary or appropriate to meet the applicable requirements of this chapter" 42 U.S.C. § 7410(a)(2)(A) (2013). EPA has explained that to be "enforceable," EPA and citizens must have the ability to bring enforcement actions to assure compliance:

SIP provisions that operate to preclude enforcement by the EPA or citizens for violations, whether through impermissible exemptions or other SIP provisions that function to bar effective enforcement, not only undermine the enforcement structure of the CAA in a technical sense, but undermine effective enforcement in reality. Congress provided states, the EPA, and citizens with independent statutory enforcement authority to ensure compliance with CAA requirements. By empowering states, the EPA, and citizens to make their own enforcement decisions with respect to violations, the CAA provides deterrence and helps to assure better source compliance.

EPA 2013 Memo, *supra* note 55, at 24; *see also id.* at 7 ("A core principle of the CAA is that by taking action to approve emission limitations into a SIP, the EPA thereby makes those emission limitations a federally enforceable component of the SIP that the state, the EPA, or citizens can thereafter enforce in the event of alleged violations.").

167. *See* EPA 2013 Memo, *supra* note 55, at 24.

168. 42 U.S.C. § 7410(l) (2012); *see* Hall v. EPA, 263 F.3d 926, 938 (9th Cir. 2001).

169. *See, e.g.*, Approval of 2008 San Joaquin Valley PM^{2.5} Plan and 2007 State Strategy, 76 Fed. Reg. 69,896, 69,907 (Nov. 9, 2011); Approval of San Joaquin Valley Attainment Plan for 1997 8-Hour Ozone Standards, 77 Fed. Reg. 12,652, 12,655–56 (Mar. 1, 2012).

waiver programs in the SIPs for meeting ozone and particulate matter standards without actually having to include these measures in the federally enforceable plan. Thus, ARB remains free to modify or abandon these requirements without EPA approval and with no one other than ARB to ensure proper enforcement.¹⁷⁰

This practice, which is likely illegal under the Clean Air Act,¹⁷¹ also undermines the certainty of California's mobile source programs. If ARB is serious about pursuing transformation to zero-emission technologies in a variety of mobile source categories, it needs to abandon the illegal practice of keeping these mobile source measures out of the federally approved and federally enforceable SIP. Making these measures subject to anti-backsliding requirements significantly increases the certainty that these requirements stay in place and thereby improves their likelihood of success. If adjustments to the rules become necessary, it is not a significant administrative burden to get those changes approved into the SIP unless the changes are inconsistent with the plan for meeting the national standards.

Transformation requires that manufacturers and developers are secure in knowing that their investments will be rewarded and, conversely, that their delay will have negative consequences. ARB and the local air districts, which do not have a reputation of sending the correct signal, can send more powerful signals to the market through compliance with the Clean Air Act instead of avoidance.

4. Use Subsidies to Support, Not Replace, Technology-

170. As noted above, this is not some abstract concern. ARB has relaxed the ZEV mandate on several occasions, and just recently relaxed its Truck and Bus Regulation even though the rule was central to area plans for meeting the national standards for particulate matter and the analysis showed that the changes would interfere with attainment. Making matters yet more complicated, most of the Truck and Bus Regulation requirements are not preempted under the Clean Air Act and did not require a waiver from EPA because they apply to existing on-road diesel trucks and buses. See Cal. ARB Truck & Bus Regulation Report, *supra* note 55, at 8. Portions of the regulation, however, apply to non-road equipment that is covered by Clean Air Act preemption and waiver requirements. *Id.* The result is that EPA must ensure that portions of this relaxation comply with Clean Air Act section 110(l) but can ignore other portions of the relaxations. This simply highlights the fact that approval of a waiver is not equivalent to SIP approval.

171. This issue of whether EPA can provide SIP credit for California mobile source measures that are not included as federally enforceable measures in a plan will be raised in upcoming Ninth Circuit cases: *Comm. for a Better Arvin v. EPA*, No. 11-73924 (9th Cir. filed Dec. 22, 2011); *Physicians for Social Responsibility—Los Angeles v. EPA*, No. 12-70079 (9th Cir. filed Jan. 10, 2012); *Comm. for a Better Arvin v. EPA*, No. 12-71332 (9th Cir. filed Apr. 30, 2012).

Forcing Regulations

Subsidies can be a useful tool to incentivize the development and adoption of new technologies. As noted above in the discussion of fleet purchase requirements, promoting early adoption is important to establish a market for the new technologies and to overcome resistance to new approaches. Subsidies can also be targeted to promote adoption in the early stages of commercialization by moderating price differentials between new and conventional technologies while the new technologies mature and manufacturing is brought up to scale.¹⁷²

Although ARB and the local air districts have successfully used subsidy programs in a number of areas, the popularity of these programs now threatens to undermine the technology-forcing that they should be enabling. Instead of using these programs to support the demonstration and adoption of technologies required in the future, the agencies have attempted to rely on these programs as justification for not adopting actual emission control requirements.¹⁷³ The government simply will not be able to buy or subsidize the full transformation that is required, even though subsidy programs are certainly an easier political sell than actual enforceable requirements. As a result, these subsidy programs, which are funded by fixed appropriations, are only available for limited periods of time and do not provide the certainty that manufacturers and developers need in order to justify full investment in new zero-emission technologies. Standing alone, without enforceable regulatory requirements signaling that new technologies will ultimately be mandatory, subsidy programs cannot be the method for incentivizing the required investment.

In addition to being bad policy, the new strategy of reliance on voluntary subsidies, rather than enforceable control measures, does not

172. ARB and the Districts implement a number of subsidy programs to promote demonstrations of new technologies and early adoption once technologies are commercially available. See *Vehicle and Engine Upgrades*, SOUTH COAST AIR QUALITY MGMT. DIST., <http://www.aqmd.gov/home/programs/business/business-detail?title=vehicle-engine-upgrades> (last visited Oct. 30, 2014); *Diesel Activities- Related Programs, Plans and Other Topics*, CAL. AIR RES. BD., <http://www.arb.ca.gov/diesel/rppot.htm> (last reviewed Jan. 25, 2010); *Grants & Incentives*, SAN JOAQUIN VALLEY AIR POLLUTION CONTROL DIST., <http://valleyair.org/grants> (last visited Oct. 30, 2014).

173. See, e.g., Proposal to Approve San Joaquin Valley Incentive Programs, 79 Fed. Reg. 28,650 (proposed May 19, 2014) (to be codified at 40 C.F.R. pt.52) (proposing approval of San Joaquin Valley Rule 9610 which would provide SIP credit for voluntary incentive programs); Approval of San Joaquin Valley Contingency Measures for the 1997 PM_{2.5} Standards, 79 Fed. Reg. 29,327 (May 22, 2014) (granting approval of San Joaquin Valley voluntary incentive programs to satisfy Clean Air Act requirements for contingency measures).

comply with the Clean Air Act. The Act requires that measures relied upon to fulfill SIP requirements must be enforceable, which, as EPA has previously explained, means that compliance can be enforced by citizens and the EPA.¹⁷⁴ These subsidy programs do not satisfy the requirements for enforceability because the emissions reductions are enforceable only through the contract between the agency and the operator whom the agency subsidizes. Stakeholders who are not party to the contract have no ability to ensure compliance with the terms of the deal.

Again, EPA has tried to accommodate the State and local districts by arguing that EPA will treat the emission reductions as enforceable if the agencies promise to make up any shortfall in emission reductions credited in the SIP.¹⁷⁵ EPA's view is inconsistent with the fundamental planning requirements of the Clean Air Act¹⁷⁶ and renders SIPs into little more than *promises* to reduce emissions.

ARB and the local districts must abandon this illegal approach. Instead, the agencies should adopt enforceable technology-forcing standards with long lead times and use subsidy programs to support early demonstration and adoption. By being clear about the mandate for zero-emission technologies, the agencies can also target their subsidy programs on appropriate technologies, rather than the current approach, which continues to fund technologies that have no potential for developing into zero-emission technologies.

5. Adopt a More Meaningful Approach to Transportation Planning

Moving to zero-emission mobile source technologies requires a change to the underlying infrastructure currently serving fossil-fueled vehicles. Examples include building a bigger network of charging stations for electric vehicles or electrifying certain truck, bus or train lines.¹⁷⁷ To date, however, there has been little meaningful connection between transportation planning and air quality planning, despite the fact that the Clean Air Act contemplates that these planning efforts will be

174. See Cal. ARB Truck & Bus Regulation Report, *supra* note 55, at 8.

175. See, e.g., Approval of San Joaquin Valley: Contingency Measures for the 1997 PM_{2.5} Standards, 79 Fed. Reg. at 29,335–48.

176. EPA's approach would allow areas to rely on unenforceable measures as long as they promise to adopt actual controls if the voluntary measures fail. The Clean Air Act allows no such flexibility, and instead requires plans to include enforceable emission limitations and other control measures as necessary to meet the requirements of the Act. See 42 U.S.C. § 7410(a)(2) (2012).

177. See, e.g., GOVERNOR'S INTERAGENCY WORKING GRP. ON ZERO-EMISSION VEHICLES, *supra* note 154, at 8–13.

coordinated.¹⁷⁸ Traditionally, air planning agencies first formulate their plans and convert their assumptions about vehicle emissions into budgets. Then, transportation planning agencies utilize these budgets to ensure that new transportation activities do not result in reduced air quality or delayed attainment of the standards.¹⁷⁹ The air quality plans typically provide little to no direction for transportation planning agencies. As a result, transportation agencies focus only on staying under budget through reductions in congestion and vehicle miles traveled rather than thinking about how projects enable one form of technology over another. A new approach is necessary to achieve transformation to zero-emission mobile sources. Infrastructure is not technology neutral and must be recognized as part of the plan for promoting transformation.¹⁸⁰

178. See, e.g., 42 U.S.C. §§ 7506(c) (2012) (requiring transportation plans to conform to SIPs), 7511a(d)(1) (2012) (requiring states to identify transportation control measures to offset increases in vehicle miles traveled in severely ozone polluted areas).

179. See, e.g., SOUTH COAST AIR QUALITY MGMT. DIST., 2012 AIR QUALITY MANAGEMENT PLAN: FEDERAL AND STATE CLEAN AIR ACT REQUIREMENTS 6-20 (2013). The most recent South Coast plan notes that section 176(c) of the CAA requires that transportation plans and programs not delay the timely attainment of the air quality standards, and assigns budgets based on modeling of expected mobile source emissions. There is no acknowledgment of the fact that these emission levels are not, in fact, consistent with any strategy that will attain the national air quality standards because the District has not yet identified how it will achieve the needed emission reductions. Instead of insisting on lower transportation-related budgets, the plan relies on a “black box” to claim that future control will solve the problem. In the history of ozone planning in the South Coast, these future “black box” emission reductions have never fully materialized and for more than twenty years the District has continued to satisfy its planning obligations by relying on *future* reductions.

180. Cf. SOUTH COAST AIR QUALITY MGMT. DIST., 2012 AIR QUALITY MANAGEMENT PLAN: REGIONAL TRANSPORTATION STRATEGY AND CONTROL MEASURES app. IV-C at IV-C-12 (2013) (“In addition, SCAG is a strategic partner in a regional effort to accelerate fleet conversion to zero- and near-zero emission transportation technologies. SCAG’s policy with regard to alternative fuels is technology neutral and does not favor any one technology over any other. To accommodate the anticipated increase in alternative fueled vehicles, a significant expansion of infrastructure is needed throughout the region, among other preparedness steps.”). This “neutrality” position is simply not sustainable and has been rejected by other efforts that have looked at the special infrastructure barriers to zero-emission vehicle adoption. The proposed I-710 expansion project in Southern California, which includes multiple alternatives including a “Community Alternative” that would establish zero-emission truck lanes, is an example of how infrastructure projects are not technology neutral. See, e.g., LOS ANGELES METRO, ALTERNATE COMPARISON STUDY: I-710 CORRIDOR PROJECT EIR/EIS (2014)

As with the first recommendation, agencies will benefit from working backwards from zero. A number of analyses have looked at the technological steps required for the widespread commercialization of zero-emitting technologies and the ways in which infrastructure needs to change.¹⁸¹ Rather than an accounting exercise, this alteration means a different level of interaction between air planning agencies and transportation agencies to demonstrate that transportation projects support the air plan's assumptions about the feasibility of zero-emission technologies.¹⁸²

Much of these results can be achieved through the conformity and transportation control measure provisions of the Clean Air Act.¹⁸³ Air and transportation agencies can map out a collection of measures that will support a zero-emission world. Again, providing clear direction with long lead-times is essential to ensuring the proper investment of limited resources.

IV. Conclusion: California Will Not Be Alone

It is always difficult being first. Indeed, in the area of environmental protection, the pattern over history has been to race to the bottom.

http://media.metro.net/projects_studies/1710/images/alternative_comparison_summary_CAC_062014.pdf.

181. See, e.g., GOVERNOR'S INTERAGENCY WORKING GRP. ON ZERO-EMISSION VEHICLES, *supra* note 155, at 8-13.

182. Recent air quality plans adopted by the South Coast and San Joaquin Valley air districts have identified this as a need and alluded to future plans to identify transportation control measures that will support zero-emission technologies, but to date no specific plans have been included in any SIP. See, e.g., SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DIST., 2013 PLAN FOR THE REVOKED 1-HOUR OZONE STANDARD, at 3-18 (2013), http://www.valleyair.org/Air_Quality_Plans/OzoneOneHourPlan2013/03Chapter3ControlStrategy081613.pdf ("The District created the San Joaquin Valley Plug-in Electric Vehicle Coordinating Council (SJV PEVCC), comprised of representatives from industry, local government, utility companies, etc., as required by the grant to help the District appropriately address the challenges unique to our area. The final deliverable for this project is a comprehensive Readiness Plan (includes best practices info, templates, etc.) that can be used as a tool by local municipalities to help get more electric vehicles on the road and infrastructure in place.").

183. See, e.g., 42 U.S.C. §§ 7511a(c)(5) (2012) (requiring States to adopt transportation control measures where vehicle emissions are not consistent with demonstrating attainment), 7506(c)(2)(B) (prohibiting approval of any transportation improvement program that does not provide for timely implementation of transportation control measures in the applicable implementation plan).

However, California and its leaders should rest assured that California will not be alone. Many states have already adopted California's vehicle standards.¹⁸⁴ This list of states is likely to grow over time as EPA continues to lower the national ozone standards to reflect the scientific evidence of significant health impacts at lower concentrations. The transformation required for California to meet the current 0.075 ppm ozone standard will certainly be exported to other states if, and when, EPA adopts an ozone standard in the range of 0.05 to 0.06 ppm as recommended by many scientists and other public health organizations.¹⁸⁵ An increasing number of states will look to follow California's lead in their quest for available emission reductions, which in turn will move the transformation outlined in the ARB Report from radical to inevitable.

184. There are fifteen states that have opted into at least some of California's motor vehicle standards. See U.S. EPA, EPA POLICY ON SALES OF 2008 TO 2010 MODEL YEARS CALIFORNIA-CERTIFIED VEHICLES (2011), available at http://iaspub.epa.gov/otaqpub/display_file.jsp?docid=24724&flag=1.

185. See, e.g., WORLD HEALTH ORG., AIR QUALITY GUIDELINES: GLOBAL UPDATE 2005, at 325 (2006) (establishing ozone guideline of 100 micrograms per cubic meter which is roughly 0.05 ppm), http://www.euro.who.int/__data/assets/pdf_file/0005/78638/E90038.pdf.
