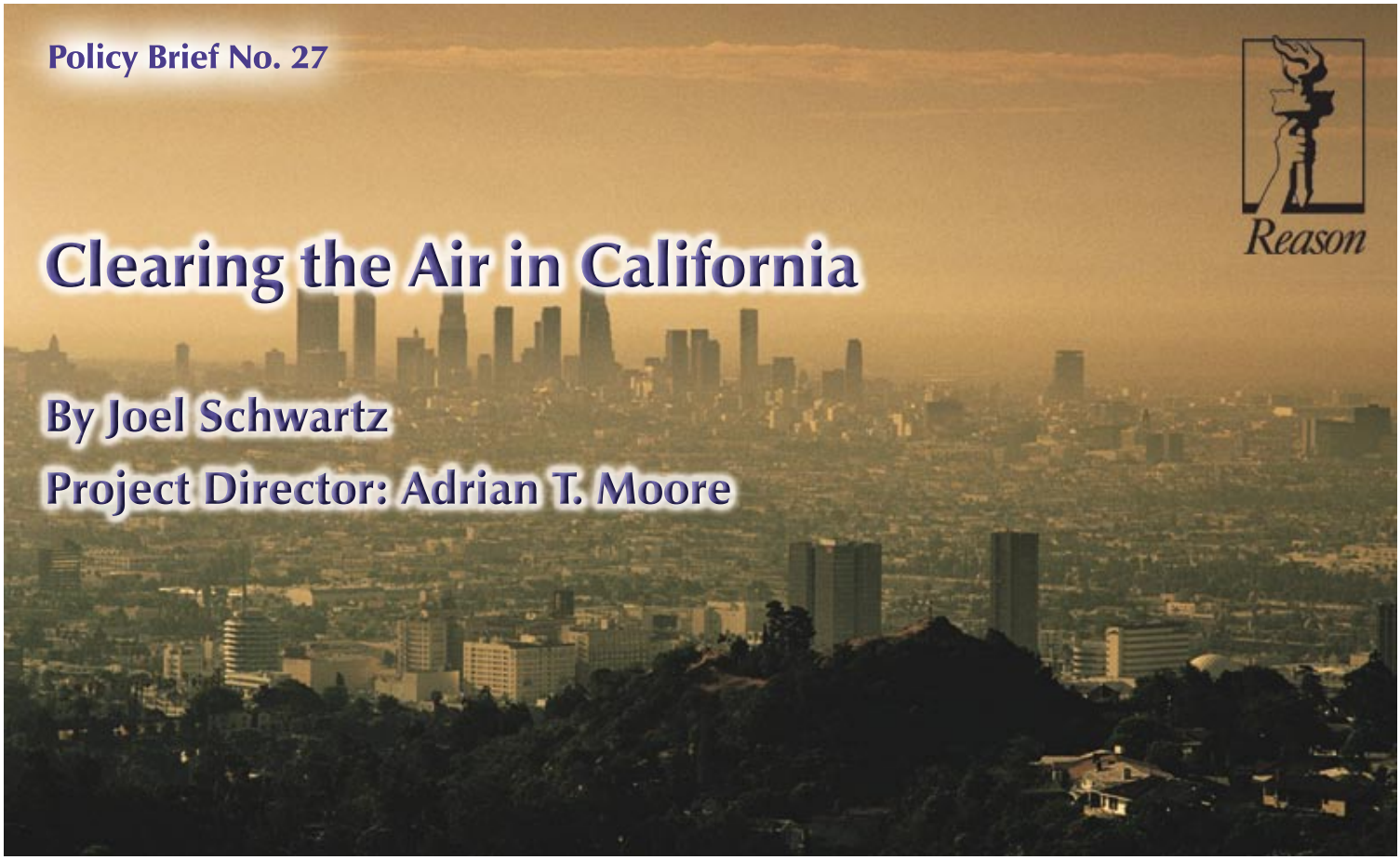

Policy Brief No. 27

Clearing the Air in California

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Reason

California has made tremendous progress on air pollution during the last few decades, but still faces two major air quality challenges. Parts of the San Joaquin Valley and South Coast exceed federal standards for ozone and particulate matter by a large margin. Both areas are in danger of missing federal deadlines for meeting air pollution standards.

California can meet these challenges. Unfortunately, California lawmakers and regulators have often pursued unnecessarily expensive and even counterproductive policies, while failing to exploit cost-effective pollution reduction opportunities. This briefing paper summarizes the air pollution situation in the San Joaquin Valley (SJV) and South Coast (SC), recommends policies for achieving cleaner air more quickly and more cheaply than current policies, and assesses the political viability of the recommended approaches.

BACKGROUND

Pollutants

Ozone and particulate matter are the two remaining air quality challenges for California.

Ozone is formed from emissions of nitrogen oxides (NOx) and volatile organic compounds (VOC), which are known as "ozone precursors." The highest ozone levels occur during summer on sunny days with stagnant air. The EPA has two standards for ozone, the "1-hour standard" and a new, more stringent standard called the "8-hour standard" that the EPA plans to begin enforcing next year. Much of Los Angeles, Orange County, and the northern SJV already meet both ozone standards. However, the San Bernardino, Fresno, and Bakersfield areas exceed the standards by a large margin and have the worst ozone levels in the country.

The EPA regulates two types of particulate matter (PM). PM10 is particulate matter less than 10 micrometers (microns) in diameter. PM2.5 is particulate matter less than 2.5 microns in diameter, and is therefore a subset of PM10. PM can be directly emitted (primary PM), for example as diesel soot, fireplace smoke, soil, or dust. PM can also be formed from NOx and VOC through chemical reactions in the atmosphere (secondary PM). The EPA has both an

annual-average and a 24-hour standard for both types of PM. Only a few areas of the SJV and SC exceed either of the PM10 standards, and the margins of exceedance are small. The PM2.5 standards are comparatively more stringent and virtually all of the SJV and SC exceed one or both standards.

All of California complies with federal air pollution health standards for carbon monoxide, sulfur dioxide, and nitrogen dioxide, as does virtually all of the rest of the United States. Levels of these pollutants continue to decline.

Pollution Sources

Most air pollution comes from "mobile sources"—automobiles, diesel trucks, and off-road equipment such as farm and construction equipment. In SC, about 80 percent of VOC and about 90 percent of NOx comes from mobile sources; in the SJV mobile sources contribute about 70 percent of VOC and NOx. The vast majority of mobile VOC emissions come from gasoline vehicles and a small fraction from diesel. Most of the non-mobile NOx comes from industry and agriculture, while most non-mobile VOC comes from coatings (paints, sealants, etc.), consumer products, and agriculture.

The highest PM levels occur in fall in SC and winter in the SJV. The SJV has a particularly strong seasonal dependence for PM2.5. PM2.5 is virtually always very low from March through November, and often very high during December through February. Here is a breakdown of PM contributors in the SJV:

- PM10. About half of PM10 is dust and soil, mainly from paved and unpaved roads, farming, and construction. Most of the rest is ammonium nitrate formed from NOx and ammonia emissions, and smoke from residential wood burning.
- PM2.5. PM2.5 is mainly ammonium nitrate (25-40 percent) and fireplace soot (15-50 percent), as well as diesel soot (7-10 percent), and secondary VOCs (2-14 percent) formed mainly from gaseous motor-vehicle VOC emissions. Dust is an insignificant contributor.

Pollution Trends

Emission trends. Emissions of all pollutants have been declining. For example, based on on-road measurements, average emissions from the automobile fleet are dropping

15 percent per year for VOCs, 13 percent for CO (carbon monoxide), and 9 percent for NOx as the fleet turns over to more recent models that start out and stay cleaner than earlier models. As emissions have declined, levels of VOC, CO and NOx in air have been declining as well.

Driving is growing at a rate of about 1.7 percent to 2.7 percent per year. Average vehicle emissions are thus dropping much more rapidly than driving is increasing, so growth has little effect on air pollution levels. SUVs built during the last few years have had the same emissions as cars, and therefore make no difference to air quality.

A vehicle fleet meeting standards that come into effect this year—that is, the vehicle fleet that will be on the road in 15 to 20 years—will be more than 80 percent cleaner than the current fleet, even after accounting for projected growth in driving. Similar standards for diesel trucks and off-road equipment will eliminate most remaining pollution from these sources as well.

Thus, existing requirements have essentially solved air pollution as a long-term problem. What remains is a near-term problem.

Trends in pollution levels. Levels of all pollutants have been steadily declining for decades. For example, PM2.5 declined 25 percent and PM10 declined 30 percent during the last 10 years in SC and the SJV. The San Bernardino area went from exceeding the 1-hour ozone standard 150 days per year in the 1980s to about 20-30 times per year recently.

There are only two exceptions to these trends: First, in

South Coast during the last five years ozone has leveled off or even risen slightly. Second, during the 1990s ozone in the SJV has gone down in some areas, risen in others, and stayed the same in still others. Nevertheless, 1990s levels are generally lower than 1980s ozone levels.

THE BIG CHALLENGES

In the near term, South Coast and the San Joaquin Valley need to attain the 1-hour ozone standard and the PM10 standards. Both regions are in danger of forfeiting federal transportation funds if they fail to meet various deadlines for submitting plans, making progress, and reaching attainment. SC and the SJV will face even tougher challenges in meeting the 8-hour ozone standard and PM2.5 standards, though the EPA will also allot more time to achieve these standards.

Unfortunately, California's legislative and regulatory policymakers have made four key policy errors:

- Missing the opportunity to go after "gross-polluting" vehicles . Field studies in SC and the SJV show that gasoline vehicles account for more than two-thirds of VOC emissions in the SJV and three-quarters in SC. Nevertheless, the official "emission inventories" used by regulators for air pollution policymaking assume only about 25 percent and 40 percent of VOCs, respectively, come from gasoline vehicles. Furthermore, on-road emissions measurements show that about half of tailpipe VOC emissions come from the worst 5 percent of automobiles. Despite the Smog Check program, a small percentage of gross-polluting automobiles has contributed most of the emissions ever since the beginning of on-road emission data collection in the 1980s. By using an inaccurate inventory and ignoring gross polluters, regulators have for more than a decade forgone the largest and cheapest source of rapid pollution reductions available. Regulatory custom and policy discourage correction of the problem, because California's State Implementation Plan has already taken credit for eliminating emissions from gross polluters, despite their continued on-road existence. For example, the California Air Resources Board (CARB) and the SJV air district have concluded that the SJV can't identify sufficient VOC reductions to attain the 1-hour ozone standard. Yet the SJV air district's ozone plan doesn't mention gross polluters or the inaccuracy of the official inventory.
- Increasing levels of ozone through reducing NOx emissions too early. Field studies and ozone and NOx monitoring data strongly indicate that reducing NOx increases ozone levels or at least slows reduction in most of California, especially in South Coast and in the urbanized areas of the SJV. Legislators have failed to consider this science and as such continue to foster an increase in ozone by focusing on NOx too early. All other things being equal, ozone rises in all of SC and much of the SJV when NOx levels go down.
- Treating a short-term problem as a long-term one. On-road trend data, CARB's own vehicle emissions model, and the requirements of EPA and CARB emissions standards all point to the conclusion that turnover of the vehicle fleet will eliminate almost all remaining air pollution during the next 20 years or so. Air pollution has been solved as a long-term problem, and should now be treated as the short-term problem it has become. Too often policymakers make decisions on air quality in a "crisis mode" that discourages prioritization and focus on the measurable results of measures. Since the trends are going the right way, we should be looking for effective and efficient ways to accelerate further reductions in emissions.
- Focusing on high-cost/low-benefit pollution measures. Much air pollution policy focuses on high-cost and/or low-benefit measures. For example, emission reductions from rail transit cost about $1 million per ton—tens to hundreds of times the cost of other air pollution control measures. Electric vehicles cost more than $500,000 per ton. And gasoline vehicles' emissions are about the same as alternative fuels like natural gas. In fact, cars

meeting CARB's ULEV (ultra-low emission vehicle) standard are more than 90 percent cleaner than the current average vehicle on the road, while (super ultra-low emission vehicle) SULEV-certified cars are more than 95 percent cleaner. Because gasoline vehicles are now so clean, growth and suburbanization will have little effect on future pollution levels, but smart-growth measures, such as requiring higher urban densities, will increase road congestion. Though the Smog Check program is intended to identify and ensure repair of gross polluters, many escape the system. Smog Check is also very inefficient, with more than 70 percent of funds spent testing clean cars and on program administration.

Regulation of industrial pollution is based on a process-focused, bureaucratic "command-and-control" system, even though much less expensive performance-based alternatives can deliver more pollution reduction per dollar invested and spur greater innovation in pollution control.

RECOMMENDATIONS—CLEANER AIR TODAY

Pollution reduction strategy. California should implement the following strategy to reduce ozone and particulate matter:

- Seek large near-term reductions in VOC and CO with a targeted repair/voluntary scrap program. Reducing VOC and CO will reduce ozone and also the VOC contribution to secondary PM2.5. Reducing ozone levels might also reduce PM2.5 through reductions in nitrate formation. Large, inexpensive and rapid VOC and CO reductions can best be achieved by identifying gross polluters with on-road remote sensing and requiring repair or voluntary scrappage. Such a program would cost no more than a few thousand dollars per ton of pollution eliminated—less than just about any other measure. The program could be funded by exempting the newest 8 to 10 vehicle model years from Smog Check and requiring exempted motorists to pay an extra $5 to $10 per year at registration. Other potential funding sources include motor vehicle surcharge funds that now go to less efficient or pork barrel projects through local air districts.
- Delay NOx reductions where possible. Near-term NOx reductions are harmful to progress on ozone and possibly PM2.5. California can delay at least some planned NOx reductions from stationary and mobile sources. For example, the Carl Moyer program funds retrofit of diesel engines with modern engines and/or emission controls. The program is focused on NOx reductions, which are likely to be counterproductive. The program should instead focus on reducing diesel soot, and/or funding VOC and CO reductions from gasoline vehicles. Note that this proposal would not affect long-term NOx reductions from fleet turnover, which will occur in any case due to new engine emission standards. The goal is just to delay some NOx reductions for the next few years to avoid the negative effects of NOx reduction preceding ozone reduction.

- Reduce primary PM10 and PM2.5 emissions. The main primary PM10 source is dust and soil emissions. Only a few areas need to reduce PM10 to attain the standard, and modest reductions should be sufficient. Fireplace smoke is a large contributor to winter PM2.5 in the SJV and the SJV air district has already implemented an aggressive rule to restrict fireplace and wood-heater use when weather conditions favor PM2.5 buildup.
- Move to a performance-based regulatory system. The current federal and state air pollution control system is based on a "command-and-control" system that is focused on process rather than results, wastes resources on large administrative burdens, and doesn't provide incentives to go beyond regulatory requirements. A better approach would be for regulators to set and enforce overall emission targets and measurement requirements, but allow businesses to find the most

cost-effective means of meeting the targets. The Clean Air Act's acid rain program has shown how such a program can result in far greater pollution control per dollar invested, stimulate a wide range of pollution control innovations, and increase compliance. Implementing this recommendation would require substantial changes to how regulatory agencies operate and probably changes in state law as well.

CONCLUSION

There are political obstacles to implementing these recommendations. CARB has long opposed on-road identification of gross-polluting vehicles and both state and local regulators are devoted to a regulatory system and structure that has failed to deal with inaccuracies in the emission inventory and the gross-polluter problem/opportunity. Both regulators and environmentalists will likely oppose delaying NOx reductions and reforming regulatory policy toward a performance-based approach.

But the bottom line remains. Implementing these recommendations would speed reductions in ozone and PM, lower pollution control costs, and reverse counterproductive regulatory policies.

ABOUT THE AUTHOR

Joel Schwartz is a Senior Fellow in the Environment Program at Reason Foundation. Before joining Reason, Joel was the Executive Officer of the California Inspection and Maintenance Review Committee, the state agency charged with evaluating California's Smog Check program and advising the legislature and governor on Smog Check policy. Joel previously worked as a Senior Policy Analyst with the Legislative Analyst's Office in Sacramento, consulted for the RAND Corporation and the South Coast Air Quality Management District, and served as the first Staff Scientist at the Coalition for Clean Air, in Los Angeles. Joel earned a Bachelor of Arts in Chemistry from Cornell University and a Master of Science in Planetary Science from the California Institute of Technology. He lives in Sacramento, California. ■