EPA's Tier 2 standards will hurt consumers and the environment.

A Fuel and Your Money: EPA's New Tier 2 Standards

BY SUSAN E. DUDLEY

In December 1999, the Environmental Protection Agency (EPA) issued draconian new Tier 2 vehicle emission and gasoline regulations that will impose major lifestyle changes on American citizens. EPA accomplished the passage of the standards despite judicial rebukes, statutory constraints, and evidence from its own analysis that the regulatory changes will not significantly improve air quality or public health nationwide, and that they may actually cause air quality to deteriorate in some parts of the nation. This article describes the requirements of the Tier 2 rule and its expected consequences, and explores viable alternatives to EPA's approach. Because the rule is likely to impose such high social costs with little, if any, corresponding benefits, I conclude by examining possible political economy explanations for EPA's action.

EPA'S RULE

EPA's Tier 2 rule has two components: (1) stringent new emission standards for passenger cars and light trucks and (2) limits on the amount of sulfur in gasoline.

Vehicle Controls The vehicle standards limit emissions of oxides of nitrogen (NOx) from new vehicles to an average of 0.07 grams per mile (g/mi.) (1999 vehicle emissions standards ranged from 0.30 to 1.53 g/mi.). The standards also limit emissions of nonmethane hydrocarbons (NMHC), carbon monoxide (CO), and particulate matter (PM). The Tier 2 standards will be phased in between 2004 and 2007 for passenger cars (light-duty vehicles, or LDVs) and lighter-weight pickup trucks, sport utility vehicles, and minivans (in EPA parlance, "light light-duty trucks or LLDTs or LDT1s and LDT2s"). The standards will become applicable to heavy light-duty trucks ("HLDTs or LDT3s and LDT4s"), including full-sized vans and full-sized pickup trucks, between 2008 and 2009. Manufacturers can meet the standards by averaging emissions across their fleet and by trading emission credits across manufacturers.

Gasoline Controls Under the gasoline component of the rule, sulfur in gasoline must be reduced by an order of magnitude, from 340 parts per million (ppm) for non-California gasoline to an average of 30 ppm. Refiners may meet the average standard by trading sulfur credits. Those refiners that can reduce sulfur levels below 30 ppm would generate excess sulfur credits that could be sold to others, as long as each batch of gasoline produced by each refiner contains less than 80 ppm of sulfur.

Statutory Basis Congress, through the Clean Air Act Amendments of 1990 (CAAA), directed EPA to consider tightening vehicle emission standards no sooner than the 2004 model year. The directive was based on the following three considerations:

- Need for further reductions to meet national ambient air quality standards (NAAQS)
- Availability of pertinent technology
- Need for and cost-effectiveness of further reductions from vehicles (in comparison with other approaches for attaining the NAAQS).

EPA examined those factors in a 1997 staff paper and in a 1998 report to Congress. A proposed rule of May 1999 reflected EPA's conclusion that tighter "Tier 2" emis-

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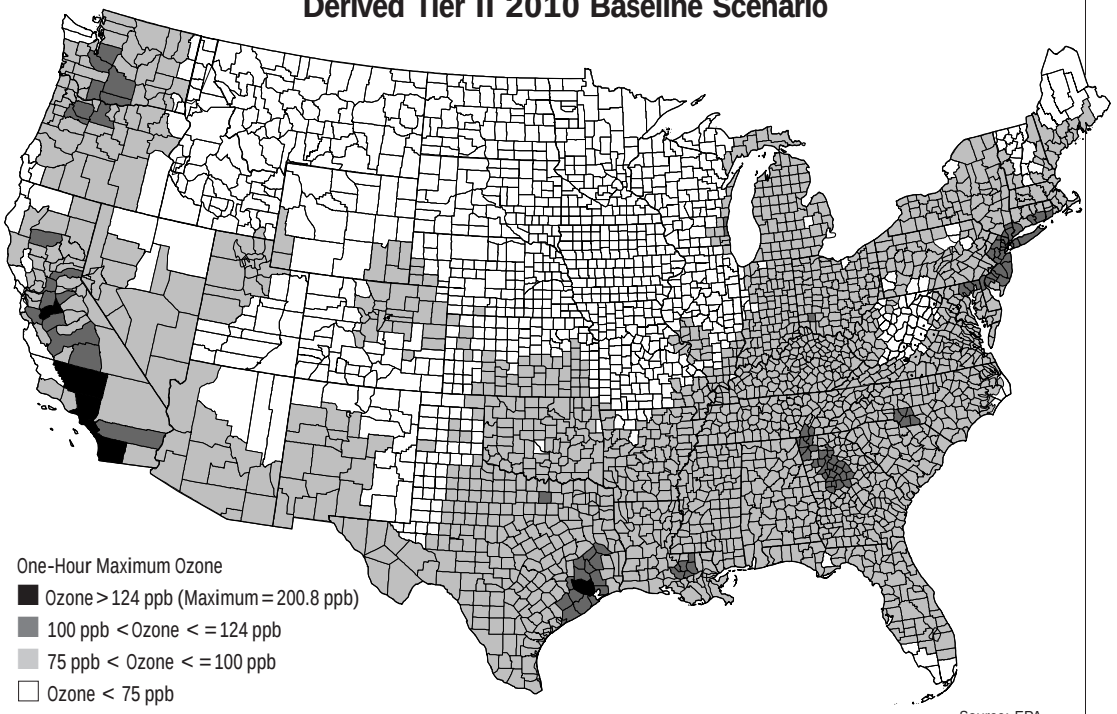
sion limits were necessary to bring the nation into compliance with the stringent new NAAQS for ozone, which EPA issued amid much controversy in 1997. The 1997 NAAQS limited ambient levels of ozone in the atmosphere to 0.08 ppm, and the nitrogen oxides and nonmethane hydrocarbons emitted from vehicles can combine with sunlight to form ozone under certain conditions.

Acting under CAAA, EPA also determined that new emission standards were both technologically feasible and cost-effective. Although CAAA directed EPA to consider new standards for vehicles weighing up to 3,750 pounds, EPA's proposal imposed a uniform standard on vehicles weighing up to 8,500 pounds. EPA also found that additional controls on the sulfur content of gasoline were necessary to achieve desired vehicle emission reductions.

Figure 1

One-Hour Maximum Ozone, UAM-V Model Derived Tier II 2010 Baseline Scenario



Source: EPA

District Court Ruling On May 14, 1999, just one day after EPA proposed its new vehicle and gasoline regulations, a three-judge panel of the United States Court of Appeals for the District of Columbia struck down the NAAQS on which the regulations were based. In fact, the court said that in setting the NAAQS, EPA had construed sections of the Clean Air Act "so loosely as to render them unconstitutional delegations of legislative power," and had ignored the offsetting health benefits of ozone in the atmosphere.

Rather than postpone consideration of the Tier 2 rule, EPA hurried to justify it on the basis of the preexisting NAAQS for ozone instead of the overturned standard. The task appeared to be difficult, because most of the country was well on its way to complying with the older NAAQS. In fact, EPA's own air quality analysis, prepared for the Tier 2 rule before the court decision, revealed that—with the exception of California (which is exempt from the new rule) and a handful of localized areas around Houston and in the Northeast—the nation will be able to comply with the preexisting ozone air quality standard without the agency's draconian measures.

Undaunted however, EPA produced new modeling statistics in June and October 1999 that contradicted its earlier analysis. The new findings predicted many more nonattainment areas, and those results were offered as support for the agency's objective of restricting vehicle NOx and NMHC emissions.

LACK OF STATUTORY SUPPORT FOR EPA RULE

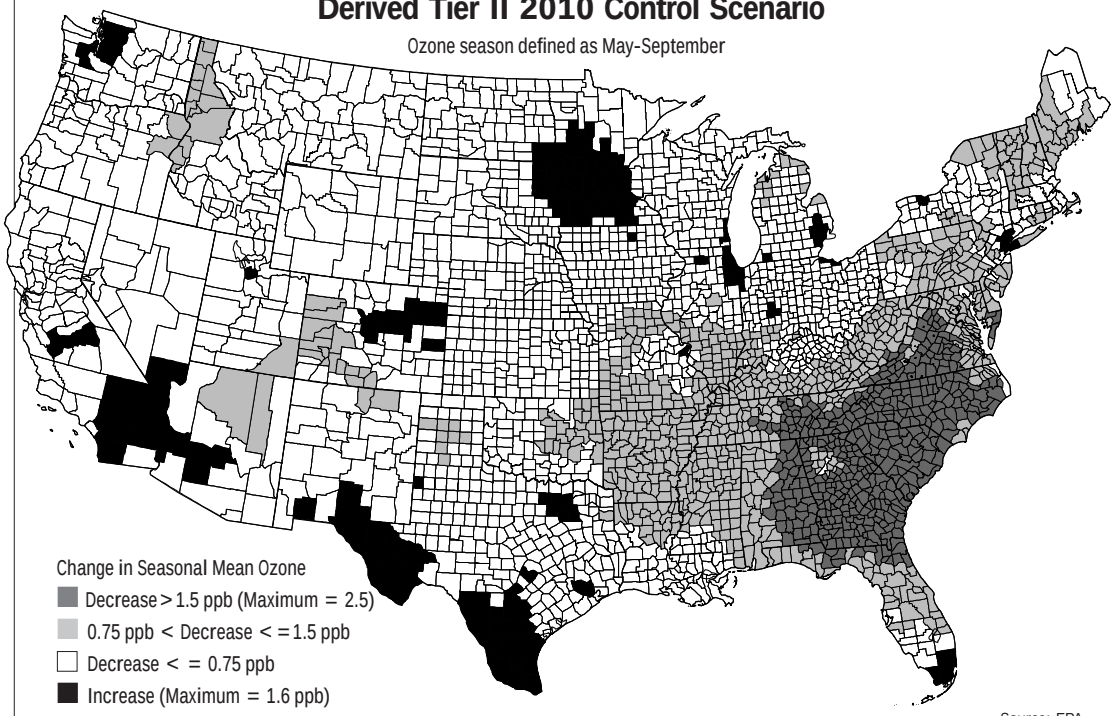
AS ARGUED IN MERCATUS CENTER'S PUBLIC INTEREST COMment on the proposal, EPA has not justified its rule according to any of the three considerations required by Congress in the 1990 statute. The principal focus of the rule is the reduction of ozone precursors; yet by the agency's own estimates, the costs of the proposal far outweigh any benefits that EPA attributes to improvements in ozone quality. EPA estimates annual costs of $3.5 billion and annual benefits ranging from $3.2 billion to $19.5 billion. Only 17 or 18 percent of EPA's estimated benefits are due to reduced ozone concentrations, however. Instead, the quantified benefits of the proposal are dominated by reductions in particulate matter (PM), even though gasoline-powered vehicle emissions, particularly NOx and NMHC emissions, have little effect on PM.

Compliance without Stringent New Standards EPA argued that widespread nonattainment with the 1997 (.08 ppm) ozone NAAQS justified the proposed vehicle and gasoline standards. The court decision vitiated EPA's argument though, because nonattainment with the preexisting (0.12 ppm) NAAQS is far less widespread and less significant than nonattainment with the remanded NAAQS.

Figure 1, a map from EPA's air quality analysis, illustrates that only a few localized areas are not in compliance with the 0.12 ppm NAAQS for ozone. (California is an exception that is not covered by EPA's rulemaking in any case.) Furthermore, EPA's April 1999 air quality analysis reveals that the proposal will not significantly improve air quality in those nonattainment areas and that it will actually increase

Figure 2

Change in Seasonal Mean Ozone, UAM-V Model Derived Tier II 2010 Control Scenario



Source: EPA

ozone concentrations in many parts of the country. (See EPA's map in Figure 2.)

Although EPA's new analysis, produced in response to the court decision vacating the 1997 NAAQS, predicted more widespread nonattainment than the earlier analysis, the supplemental modeling does not appear to be constructed to produce careful, unbiased estimates of future air quality in the absence of the Tier 2 regulation. Unlike the earlier models, the new models rely on worst-case meteorological conditions, which are likely to result in overestimates of nonattainment, especially on a national level. Indeed, the new models double the estimated total population living in nonattainment areas. Assumptions about the status of marginal compliance areas, areas that are attaining the standard, and types of controls that would be in place if the standards were not in effect also appear to overstate the likely degree of noncompliance.

Ineffectiveness of New Standards Even if EPA could show widespread nonattainment with the ozone NAAQS standard, the new rules do not comply with congressional instructions unless EPA can show that such controls will make a significant contribution to solving the nonattainment problem. EPA predicts that the lower vehicle emissions would reduce atmospheric ozone concentrations by just 0.0004 ppm on average, or 1.3 percent. EPA also predicts that urban areas (where ozone is believed to pose health risks) would have smaller reductions in ozone than less populated areas, and it estimates that changes in particulate pollution also would be "generally very small."

EPA's analysis also indicates that the proposal could actually increase seasonal ozone concentrations in some parts of the country by as much as 0.0016 ppm. Vehicle emissions can combine with sunlight to form ozone; the relationship is not direct, however, and the resulting ozone levels depend on various man-made and natural factors. Parts of the Great Lakes, the Northeast, Texas, New Mexico, Arizona, southern California, Utah, Washington, Colorado, and southern Florida will experience *worse* air quality after the new rules than before. Furthermore, EPA predicts that the process of removing sulfur from gasoline will increase carbon dioxide emissions by 6.9 million tons per year.

Minor Health Benefits Reductions in ambient ozone concentrations (the proposal's objective) would, at best, result in minor changes in the health of a small number of sensitive individuals. As the scientists on EPA's Science Advisory Board confirmed in Senate hearings on the ozone NAAQS rule, the vast majority of the population would observe no effect on its health or well-being from reductions in ambient ozone concentrations that were more than 10 times greater than reductions expected from the Tier 2 proposal.

Health tradeoffs such as the increase in skin cancers, fatalities, and cataracts that would result from an increased penetration of ultraviolet radiation as ozone levels decline are not considered important by EPA. A decision by the United States Court of Appeals for the District of Columbia Circuit on May 14, 1999, directed the agency to take such health tradeoffs into consideration. (Although EPA has appealed the overall court decision to the Supreme Court, it failed to appeal the lower court's ruling on that particular point, thus suggesting that EPA has abandoned the position that the Clean Air Act prevents it from considering offsetting health effects when setting NAAQS.)

Finally, EPA does not consider that regulatory costs themselves affect public health. A recent empirical study by economists Lutter, Morrall, and Viscusi reveals that every $15-million increase in regulatory costs results in one additional statistical death. If that estimate is correct and if one accepts EPA's cost estimate, the new Tier 2 proposal would result in 233 more statistical fatalities each year.

Questionable Technological Feasibility CAAA directed EPA to determine whether more stringent standards are

appropriate on the basis of "the availability of technology (including the costs thereof)" and consideration of "the lead time and safety and energy impacts of meeting more stringent emission standards." EPA embraced its statutory mandate selectively. The agency's analysis focused on expectations regarding the availability of technologies but did not adequately address cost, safety, or energy concerns, as required by CAAA.

Vehicle Controls Fuel efficiency and NOx emissions produce real tradeoffs. The Tier 2 rule, with its stringent emission limits and short lead-time, is likely to preclude promising fuel-efficient technologies from competing in the U.S. market (e.g., gasoline direct-injection, or GDI, engines that are sold in Japan and Europe). Diesel vehicles also hold promise for increasing fuel efficiency, but they are less likely to comply with the standards without expensive aftertreatment devices. An April 1999 report of the National Research Council of the National Academy of Sciences expressed concerns that the standards "could jeopardize research efforts of the public-private program to create a highly fuel-efficient, affordable car." Additionally, EPA never presented information on whether the new technologies required by the rule might pose safety concerns.

Gasoline Controls EPA based its determination that the gasoline-sulfur component of the rule was technologically feasible by drawing analogies to California's experience with low-sulfur fuel and by assuming the availability of new desulfurization technologies that have not yet been commercially tested. EPA simply assumes that the new technologies will offer a three- to four-fold reduction in cost compared to current technology and that there will be enough of the new technologies to supply all refiners by 2003 at low costs. That assumption is unrealistic for technologies that have not yet been installed and operated at a single refinery and that are thus commercially unproven.

EPA's conclusion that its sulfur standards are technologically feasible also depends heavily on the projected availability of excess sulfur credits. However, EPA's projections are subject to numerous assumptions, which the agency recognizes may not hold true, thus undermining its own conclusions.

Cost-Effectiveness CAAA requires EPA to measure the cost-effectiveness of reducing vehicle emissions relative to other approaches in pursuit of the NAAQS. In response, EPA focuses on a single metric: the cost per ton of emissions removed. EPA estimates that its combined emission and gasoline standards will cost, on average, $2,134 per ton of combined emissions (NOx and nonmethane hydrocarbons) removed in the near term and $1,748 per ton removed in the long term. EPA suggests that those values are in the range of previously implemented mobile source programs, including the voluntary National Low-Emission Vehicle (NLEV) program and Tier 1 vehicle controls.

The simple cost per ton metric used by the EPA is a poor proxy for measuring the rule's cost-effectiveness under any common use of that term.

Fuel Standard Cost The *average* cost per ton also masks important information about the variance in fuel costs across regions and vehicles as shown in Table 1. Western states will bear per ton costs of meeting the sulfur standard that are five or more times greater than the national average per ton costs that EPA reports for the combined components of the rule.

Inappropriate Definition The use of tons of pollutants in the denominator of EPA's cost-effectiveness calculation is inappropriate because tons of vehicle emissions removed is not a good proxy for the risk of concern (i.e., health risks from human exposure to high ozone concentrations in nonattainment areas during peak ozone periods). That awareness is particularly important considering the large cost differences among regions of the country. Clearly, as shown in Figure 2, reducing vehicle emissions in western regions of the country will have trivial effects at best on attainment of the ozone NAAQS. Yet, according to EPA's estimates, residents of western states will pay much higher prices than eastern states for virtually no improvement in air quality.

If EPA were to define effectiveness as incremental improvements in attainment of the ozone air quality standard, not as tons of pollutant removed, the denominator of the cost-effectiveness calculation for attainment areas would be zero. Thus, the proposed national standards for the western states, would have a marginal cost per unit of clean air that approached infinity.

Other Approaches A comparison of the incremental cost per ton of the different elements of EPA's rule suggests that targeted approaches can more effectively achieve ambient air standards. EPA refused to consider alternative strategies that could

Table 1

Cost per Ton of Gasoline Sulfur Controls for Western States

State	LDV	LDT1	LDT2	LDT3	LDT4
Utah	$7,077	$9,402	$10,275	$8,109	$7,411
Arizona (non-API)	$5,937	$7,806	$8,483	$6,746	$6,181
Arizona (API)	$9,135	$12,357	$13,629	$10,623	$9,665
Colorado	$7,050	$9,358	$10,222	$8,072	$7,379
Nevada	$6,295	$8,394	$9,194	$7,235	$6,606
Oregon	$5,111	$6,448	$6,839	$5,618	$5,200
Washington	$5,903	$7,750	$8,415	$6,700	$6,141
Idaho, Montana, Wyoming	$3,010	$5,757	$5,947	$5,087	$4,774

achieve public health goals at much lower costs, though. Because only vulnerable populations experience health effects at the ozone concentrations under consideration, the simplest and perhaps cheapest alternative strategy is the recommendation that vulnerable people avoid extended exposure outside during the few days a year when ozone levels are high. As EPA's Clean Air Science Advisory Committee has recommended, public health advisories issued on days designated as "ozone action days" could encourage sensitive individuals to take appropriate "exposure avoidance" behavior and make voluntary emission reductions.

Regional Solutions If vehicle emission reductions are still deemed necessary, the Mercatus Center's analysis of EPA data suggests that a regional approach would be much less costly and equally effective at reducing ambient levels of ozone in areas that are not expected to attain the 0.12 ppm ozone NAAQS by 2010. However, EPA was unwilling to consider a regional approach to regulating sulfur in fuel. The agency reasoned that because sulfur might have irreversible effects on vehicle catalysts, permitting higher levels of sulfur in fuel in some parts of the country could pose a contamination risk to vehicles that operate in nonattainment areas.

EPA has not justified its contention that sulfur effects on catalysts are irreversible. In fact, its test vehicle studies suggest that the opposite is true. The rulemaking record is not clear on how much and to what extent exposure to sulfur in different concentrations (e.g., 80 ppm vs. 100 ppm, or more than 300 ppm) affects catalysts and, thereby, vehicle emissions. However, interagency correspondence during the rule development process suggests that the incremental effect of extended exposure to sulfur may be small.

Vehicle or Fuel Standards EPA has not examined the cost-effectiveness of fuel-only or vehicle-only standards, arguing that only with both controls in place will we achieve cost-effective emission reductions. The agency makes an assertion that it cannot support by its emissions modeling results: that high-sulfur fuel poisons catalysts such that significant synergies are offered by a combined vehicle-fuel approach to regulating emissions. If EPA's assertion were true, we would expect to see fewer tons of NOx reduced by initiating just one control (either vehicles only or fuel only) and greater relative reductions by initiating the second measure in combination with the first (because only with the addition of the second measure would we see the synergies emerge).

EPA's emissions data do not support synergistic effects. In areas with inspection and maintenance controls and conventional fuels, for example, EPA's data suggest that (with the exception of the heaviest light-duty trucks) the incremental emission reduction from instituting either fuel standards or vehicle standards once the other standard is in place is actually less than the emission reduction achieved by either measure alone. Vehicle and fuel controls are more accurately described as substitutes than as complements. Depending on vehicle class, requirements of fuel-only or vehicle-only controls would achieve emission reductions at significantly lower costs per ton than the combination of controls.

For passenger cars, EPA's data suggest that either vehicle emission or gasoline sulfur controls alone will be more cost-effective than the combination. Sulfur controls appear to be more cost-effective at removing NOx than additional vehicle controls. Sulfur controls cost $1,700 per ton, compared to $2,200 per ton for vehicle controls alone. If low-sulfur fuels were in place, the incremental cost of adding passenger vehicle controls would be $4,700 per ton.

For light-duty trucks, EPA data suggest that vehicle emission controls are likely to reduce emissions at a lower cost than gasoline sulfur controls. According to EPA data, simply fueling light-duty trucks with low-sulfur gasoline would reduce emissions at a cost of between $7,500 and $11,000 per ton, whereas modifying vehicle design could reduce emissions at a cost of $1,500 to $2,500 per ton.

EPA's own analysis shows that although the controls do little to improve the health and welfare of American citizens, they will impose huge costs.

CONCLUSION

WITHOUT EPA'S NEW INITIATIVES, OZONE CONCENTRATIONS have declined by at least 30 percent since 1978. Most of the country is now able to attain the ambient air standards for ozone, and by 2010, when the Tier 2 regulations would begin to affect air quality, EPA modeling predicts that only a handful of areas would be out of compliance without the rules. EPA has offered no evidence that implementation of the Tier 2 rules will bring about compliance in the remaining nonattainment areas, but its modeling does suggest that air quality in some areas of the country will actually deteriorate because of the new restrictions. EPA's own analysis shows that although the controls do little to improve the health and welfare of American citizens, they will impose huge costs, particularly for western states that will be hit hardest by the fuel sulfur requirements.

Why does EPA pursue a regulation that (1) glosses over judicial decisions, (2) defies statutory requirements, (3) imposes consumer costs of at least $3.5 billion per year, and (4) makes air quality worse in some areas? I explore that question by examining the interests and incentives of the organized parties affected by the rule: environmental activists, vehicle manufacturers, and oil producers.

Organized environmental groups' support for technology-forcing regulations may be better understood if the regulations are viewed not as a means of reducing the effects of vehicle emissions on air quality or public health but as a means of achieving a different end—such as steering Americans away from their SUVs or eliminating the internal combustion engine altogether. President Clinton's speech announcing the new Tier 2 standards blamed Americans' love of driving for increasing our risk of "debilitating disease." Vice President Al Gore, in his 1993 book, *Earth in the Balance*, supported establishing a "global Marshall Plan … to accomplish the strategic goal of completely eliminating the internal combustion engine over, say, a twenty-five year period."

The Natural Resources Defense Council complains on its web site that the U.S. auto industry is still "churning out combustion-engine vehicles." It reserves "monster SUVs" for particular ridicule, calling them "big and bloated Global Warming Vehicles." It nicknames the Ford Excursion the "Ford Valdez," or "mother of all Global Warming Vehicles." It argues that "although many promising clean-car technologies exist or are in development, American automakers are not moving quickly enough to make them widely available." National technology-forcing standards may be the way to force automakers to direct their efforts toward the development of the type of vehicles that organized environmental groups consider desirable.

The auto manufacturers, which have produced passenger cars with dramatically lower emissions in recent years—largely as a result of a voluntary agreement with eastern states and EPA—argue that further reductions are not achievable unless their vehicles are operated on fuel that is virtually free of sulfur. Vehicle manufacturers actually support nationwide requirements over the alternative prospect of having to make different vehicles to meet different requirements in different regions of the country. Consequently, the Alliance of Automobile Manufacturers opposes any regional approach to reducing vehicle emissions.

The oil industry counters with the arguments that vehicles can be designed with emission systems that are not highly sensitive to sulfur and that, in any case, sulfur's effects on catalytic converters are reversible. The industry has called for a regional approach to controlling the level of sulfur in fuels; in other words, it is in favor of requiring low-sulfur fuel only in parts of the country that are not able to attain the ozone NAAQS.

The different positions taken by the auto and oil industries reflect not only a desire by each industry to avoid regulatory costs by shifting them to the other, but also the different structures of the two industries. The oil industry has dispersed production operations and can thus tailor its product to regional needs. The auto industry is concentrated and enjoys large-scale effects from producing a few mostly undifferentiated products. The auto industry's general preference for uniform national standards is more compatible with EPA's thinking and organized environmental goals.

A uniform national standard may be appealing for political reasons as well. The cost of developing vehicles that meet the demands of southern California and the Northeast can be spread among drivers nationwide. And drivers in less-polluted areas subsidize drivers in smog-prone urban areas, thereby lowering per-vehicle costs.

Clearly, targeting vehicle and fuel controls could achieve emission reductions and ozone air quality improvements in nonattainment areas at lower costs. Other regulatory alternatives may offer significant benefits over EPA's approach, but to study them would require more detailed analysis of EPA's modeling than is possible with the data provided in the rule. For example, what is the relative cost-effectiveness of different emission standards for light trucks and SUVs? What are the cost and effectiveness of having different sulfur levels? What standard can passenger vehicles meet under different sulfur levels and with no additional vehicle controls beyond NLEV? Would it make sense to phase out sulfur in fuels (the way lead in gasoline was phased out) by requiring low-sulfur fuel for new passenger cars only?

Alternatives to EPA's approach have not been adequately evaluated, however, because the focus of the debate has been on national one-size-fits-all standards. Such standards are easier for EPA to enforce and easier for large companies to meet, but consumers will suffer. As the auto and oil industries each argue for requirements that impose the costs on the other industry, American consumers get squeezed in the process.

readings

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