"Regulation is out; litigation is in.
The era of big government may be over,
but the era of regulation through litigation
has just begun."
—Robert Reich

Regulation by Litigation
The Diesel Engine Episode

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Introduction

In recent years, a new form of regulation has emerged. Instead of issuing rules to regulate the behavior of firms and industries, a number of government agencies have been filing lawsuits. As Robert Reich, Secretary of Labor in the Clinton administration, put it, "Regulation is out; litigation is in. The era of big government may be over, but the era of regulation through litigation has just begun." This new mode of regulating is called regulation-by-litigation, or, familiarly, "reg-lit."

Reich's comment came after attorneys general of 46 states had signed a $246 billion settlement with the tobacco industry that specified, among other things, how the firms would market their products. Thus, the tobacco industry is now regulated by litigation.

At the same time that the tobacco suits were going forward, the U.S. Environmental Protection Agency was suing—and reaching settlements with—the major producers of heavy-duty diesel engines. The engine producers were charged with using EPA-approved electronic controls to defeat the EPA's mandated engine emissions tests. In 1998, the firms and the EPA signed a $1 billion settlement, which specifies when and how the industry will regulate nitrogen oxide (NO_x) emissions. Other industries in the regulation-by-litigation list include major refinery operators, electric utilities, and wood product firms.

This *Policy Series* paper focuses on the EPA suit against diesel engine manufacturers.[1] It will begin with some theoretical background on regulation and show how theories that claim to predict regulator behavior can be applied to reg-lit. It will discuss a major reg-lit episode involving coal-fired electricity producers and then turn to the centerpiece of our report, an analysis of the diesel engine reg-lit episode. By understanding the facts surrounding regulation of diesel engines and the insights offered by theories of regulation, we may be able to explain this new episode in regulatory history.

Litigation as Regulation

Theories of regulation help us to understand the choices made by regulators when they decide to take action. For example, the public interest theory holds that politicians and their appointees systematically seek to serve a broad public interest, always searching for lower-cost ways to provide public benefits.[2] Although this theory has some merit as a starting point, analysts have come up with other theories that better predict what actually happens

between the regulator and the regulated industry. For example, the capture theory argues just the opposite from the public interest theory: Politicians, captured by special interests, seek to provide benefits to highly organized and specialized groups, without worrying too much about the broader public welfare. The special interest theory of regulation takes this view further, suggesting that the content of specific legislation is "auctioned" to the highest bidder.

Another refinement is an "extraction" theory, in which politicians in effect extract payments from threatened firms and industries. And the "bootlegger and Baptist" theory explains how regulation can occur as one supporting group (labeled Baptists) takes the moral high ground while another (labeled bootleggers) simply seeks competitive advantage.

These theories of regulation assume that the regulator is a purposeful and faithful decision maker carrying out the goals of the legislature. Of course, in the real world, legislators and regulators may have different goals. The legislator may intend that the regulator act in a particular way, but the regulator may either misunderstand or have another agenda to satisfy.

No theory of regulation can be viewed as a silver bullet that can be used to explain all regulatory actions. However, out of these theories comes the notion that concentrated gains and diffuse costs can help explain the regulatory process. When all else is equal, regulators will attempt to spread the cost of their action across a large number of relatively powerless consumers, while achieving a concentrated political gain. Regulation-by-litigation fits this pattern.

The gains from the tobacco settlement are concentrated in a relatively few hands—the attorneys bringing the suits, the tobacco companies (because the settlement removed competition), and state politicians who now have more money to allocate to favored projects. Meanwhile, the cost of the settlement is imposed on smokers worldwide. Outside the Western world, most smokers are unaware of the settlement and its costs, and in the United States

smokers may not know that the higher prices of cigarettes incorporate, in part, the costs of the settlement.

In a similar way, the EPA's suit against diesel engine producers involved a small number of engine producers and a massive number of users who purchase diesel engine-equipped trucks and other machinery. The EPA reaped political gains from a high-profile settlement accompanied by multi-million-dollar fines levied against a few large, well-known companies. The costs of the EPA's action can conceivably be spread across a huge number of buyers.

Reg-lit may also be used to divide and conquer. Traditional regulation often requires all firms in an industry to adopt similar technologies or meet similar standards. This coincidence of interest spurs them to create a cartel, enabling them to wrest some benefits from regulation such as higher prices. Successful suits attacking one or two major firms in the industry will disrupt this regulation-based cartel. It will raise costs for the firms that are sued and keep them from opposing regulatory actions that might be taken against other firms in the industry. Indeed, the bruised firms may become quiet supporters of action against their competitors, arguing for a level playing field.

Finally, reg-lit will be used when there are true gains that can be captured by the regulators. The announcement of large civil penalties following a reg-lit lawsuit telegraphs to important constituents the fact that enforcement actions are being taken. The size of the settlements can be seen as a trophy by those who favor regulation. Traditional regulation, on the other hand, rarely makes headlines once the rules are in place and are operating.

The Regulation Options

The regulatory process begins when Congress writes legislation that instructs an agency to develop and promulgate rules for accomplishing a policy goal that Congress has embraced. Con-

gress delegates regulatory authority to the regulatory agencies, which are operated by people with diverse goals and objectives.

The Environmental Protection Agency, like other agencies, has three options available when initiating a new regulation. The agency can engage in what we call traditional regulation or "regulation-by-regulation." This involves a notice of a proposed rule, a comment period for any and all parties to express their reactions to the agency, and a final notice of rulemaking, which addresses the comments received from interested parties. Once regulations are final, those affected by them may bring suit against the agency, if there is a basis for doing so.

Instead of engaging in traditional regulation, the EPA may choose a modified and somewhat less contentious approach, "regulation-by-negotiation" or "reg-neg." This approach entered the regulatory arena as a way to reduce litigation and delay and as a way to increase respect for regulation after the rulemaking process has ended. An appendage to the regulatory process rather than a replacement for it, reg-neg can theoretically reduce the cost of achieving less burdensome rules while also reducing costly litigation.

Reg-neg works in the following way: A regulatory agency decides that it will use a formal consensus-building process before coming forward in the *Federal Register* with a proposed rule. The agency determines the composition of a working group that will consider the rule to be developed, names a time, place, and moderator for the negotiation, and announces the details in the *Federal Register* along with a request for additions to the list of parties to be represented and other suggestions for improving the process. After receiving comments, the agency moves forward, seeking to negotiate around objections and concerns, with the goal of gaining consensus among the negotiating parties. A successful reg-neg means that few objections or major concerns are communicated from interest groups in the evolving regulatory procedures.

The third option, regulation-by-litigation (or reg-lit), is all that reg-neg is not. Here, the regulator abandons the traditional regula-

tion-by-regulation process and heads to the courts. The large hammer of suit, penalties, and/or settlement is used to achieve what might be accomplished by other means.

The movement from traditional regulation to litigation in the courts raises a basic constitutional question as to where and how public policy will be made. By constitutional design, collective decisions that affect one and all are to be made by elected representatives. Decisions to regulate guns, diesel engines, emissions from electric utilities, and drugs are political decisions made by legislative bodies and generally delegated to administrative agencies, not to courts. The courts are there to adjudicate matters of legislative intent and interpretation. They also play an important role in the enforcement of rules that have evolved through the regulatory process.

The EPA Initiates "Reg-Lit"

Before considering the diesel engine litigation, let us now review a prominent episode in which the EPA used regulatory litigation against an industry subject to the agency's traditional regulatory powers, in this case, electricity generators. Filed at about the same time as the suit against diesel engine manufacturers, this case also involves compliance with technical regulations that had been in place for years. It also was motivated by efforts to reduce NO_x emissions. This is the one criteria pollutant regulated by the EPA whose emissions continue to grow in spite of extraordinary efforts made since 1970 to control it.[3]

As the nation's protector of environmental quality, the EPA faced a serious challenge in the early 1990s. The level of NO_x emissions, a precursor to ozone, was so high that a major region of the northeastern United States was about to be declared "nonattainment" with respect to the ozone standard. This meant that the EPA might have to impose burdensome growth and transportation constraints that

would be politically contentious. The EPA searched for ways to gain significant NO_x emission reductions. One of these was to take a dramatically new position on the EPA's New Source Review process.

The origins of New Source Review (NSR) are found in the Clean Air Act of 1970, which imposed stricter standards on new emission sources such as electricity generators and industrial plants than on ones already built. Later amendments to the act defined the modifications or reconstruction that would make an old source a new one. The EPA required operators of old sources to obtain permits when maintenance and modifications were being planned. In this way, the agency could decide whether a modification of an existing source was so extensive or detrimental to the environment that it transformed an old source into a new one, which then would have to meet far more stringent standards and include more costly air pollution control equipment. However, the EPA failed to provide a rigorous definition of what might lead to this review for old sources. As a result, firms and state regulators developed a common-sense working relationship that enabled many industrial plants to be maintained without triggering the New Source Review. All along, however, the troublesome definition of what might cause an old plant to become new plagued both industry and the regulators, creating uncertainty throughout the industry.

While still wrestling with the definitions, the EPA began to adopt the regulation-by-litigation tactic in connection with New Source Review requirements, starting with the wood products industry. The EPA charged wood products firms with having crossed the new-source line in the past when modifications and repairs were made. The firms claimed that they had received EPA approval and permits for the past work, all part of the New Source Review process. The EPA prevailed, however, and the firms settled.

Then, in November 1999, the EPA took aim at major electrical-utility targets. The enforcement division issued notices of violation to seven electric utilities and administrative compliance orders

to the Tennessee Valley Authority. These papers charged that since 1977 the firms had modified plants in ways that should have triggered New Source Review and therefore possible installation of new source emission controls. At a press conference announcing the investigation, EPA Administrator Carol Browner indicated that the enforcement action was "one of the largest investigations in the history of EPA." Attorney General Janet Reno described the effort as "one of the most significant enforcement actions in our nation's history." The investigation and notice of violations quickly expanded to include 32 power plants operating in 10 states.

The EPA also investigated the twenty-year history of New Source Review permits issued to firms in the petroleum refining industry. Suits were filed against 31 refineries. By July 2001, the EPA had settled with BP Amoco, Koch Petroleum Group, Motiva Enterprises, Equilon Industries, Deer Park Refining, Marathon Ashland, and Premcor Refining. These record settlements covered one-third of domestic refining capacity. The EPA was moving at full throttle.

Regulation-by-litigation, at least in theory, can be seen as an end-run around restrictions on agencies' authority to use traditional regulation. For example, the Unfunded Mandates Reform Act of 1995 and the Regulatory Flexibility Act of 1980 constrain agencies in their issuance of new rules, and the Congressional Review Act of 1996 gives Congress the ability to block agency rules. These acts do not apply, however, to regulations imposed through lawsuits. Moreover, regulation-by-litigation frees agencies from the requirements of public participation imposed by the Administrative Procedures Act. In rulemaking, any citizen can comment and challenge an agency, but litigation allows only the agency, the regulated entity sued by the agency, and those others granted special permission by the court to challenge the agency's interpretation of the law and the substance of the new regulatory requirements. Thus, a political mechanism exists that can be used to rein in traditional regulators who are overly zealous. But Congress has

no explicit mechanism for reining in overly zealous litigators.

While the Justice Department continues to litigate against the targeted firms and industries and to obtain settlements, the Bush administration has proposed to eliminate New Source Review. In its place, the administration's Clear Skies proposal calls for significant cuts in sulfur dioxide, NO_x, and mercury emissions for all plants—new and old—and for the use of marketable permits to cushion the cost of achieving the reductions.

The Diesel Engine Episode

While engaged in the New Source Review suits, the EPA also went after manufacturers of diesel engines. Understanding the EPA's choice of reg-lit in this case requires some background on the regulation of diesel engines.

Starting in 1970, the Clean Air Act required the EPA to establish "national ambient air quality standards" (NAAQS) for a number of pollutants that are viewed as endangering public health or welfare. Unlike emissions standards, which measure the quality of direct outputs, ambient standards measure overall air quality. States must meet these standards by keeping the total emissions from all sources (including natural sources and reflecting population growth) sufficiently low. If air quality falls below one of these standards, states must have a plan to reduce emissions so that air quality will meet it. Failure to meet a NAAQS triggers costly nonattainment sanctions such as withholding mass transit and transportation planning funds.

The Clean Air Act has different regulatory regimes for emissions from stationary and mobile sources. Stationary sources, such as coal-fired electricity generators, are regulated through a combination of federally-mandated technology requirements and state-issued permits for emissions. Mobile sources are regulated through EPA-mandated technology requirements—with states left only the politically unpopular role of restricting vehicle use. As new eco-

nomic activity and population growth lead to new sources of emissions, the EPA and the states must regularly search for ways to reduce emissions to prevent the new sources from causing noncompliance with air quality standards. States have a powerful incentive to champion new technology controls imposed on mobile sources by the EPA rather than take on the job of restricting vehicle use or increasing the already heavy regulation of economically important stationary sources such as factories and power plants.

The EPA and the states depend primarily on environmental modeling rather than direct measurement to determine the impact of controls on ambient air. The predictions of models are used to establish command-and-control permits and regulations, but the models may not accurately predict actual emissions once the controls are in place. If laboratory measurements of a type of control do not accurately predict real-world results, the model's prediction will not match output. (This is exactly what happened in the case of heavy-duty diesel engine emission controls). As a result, model characteristics, rather than reality, can drive regulatory measures that turn out to be unrelated to improvements in environmental quality.

By statute, states must construct EPA-mandated implementation plans that satisfy the EPA's models of air quality, even though these may diverge from actual environmental conditions. When the relationship between model results and reality breaks down, then the EPA and the states are placed in a position of catching up.

In choosing how to "catch up," the EPA faces different costs and benefits from the three different modes of regulation. For example, federal laws place restrictions on the EPA's use of traditional regulation that make it costly from the agency's viewpoint. Some of these restrictions are designed to reduce regulatory uncertainty in an industry. This is especially important for industries with a long product design cycle, such as trucks and autos. Regulations can be very disruptive and costly if imposed in mid-cycle. Thus, the EPA cannot issue regulations tightening mobile source emis-

sions standards without providing a four-year lead time for manufacturers. Regulations cannot change for three years after each change and must be issued four model years ahead of their effective date. So if the EPA issues one change to those regulations, EPA's ability to issue additional changes is limited for a time.

Another factor affecting the EPA's choice of regulatory approach is the fact that the Clean Air Act relies heavily on "technology-forcing" regulations for mobile sources. That is, the law requires implementation of technology that does not exist at the time of the adoption of the regulations. By its nature, technology-forcing may lead regulators to underestimate the time necessary to produce the needed innovations. Technology-forcing creates an incentive to design vehicles to meet standards, rather than opening the door to all possibilities for reducing actual emissions. And it requires manufacturers to invest in developing features that customers have not demanded and may even reject.

Heavy-Duty Diesel Engines: Some Background

The history of regulation of heavy-duty diesel engines will help us understand why the EPA moved to regulation-by-litigation in 1998. Over the last four decades, regulation of heavy-duty diesel emissions has gone from being virtually nonexistent to a relatively easy opacity test for "smoke" and then through a series of increasingly stringent standards for NO_x, hydrocarbons, and particulates. The amount of NO_x emissions allowed has fallen, for example, from a combined 16 grams per brake horse power hour (g/bhp-hr) for NO_x and hydrocarbons in 1988 to separate limits of 0.20 g/bhp-hr for NO_x and 0.14g/bhp-hr for nonmethane hydrocarbons.

The Air Quality Act of 1967

Heavy-duty diesel engines are the engines used by large trucks. In the 1960s and 1970s, when air pollution first became a nation-

wide issue, they represented a relatively small part of the total truck fleet and made only a small contribution to U.S. air pollution. In the early 1970s, they represented only 1.75 percent of total particulates, 0.02 percent of carbon monoxide, 1.9 percent of hydrocarbons, 4.8 percent of NO_x, and 0.4 percent of SO_x.

The first federal regulatory efforts were a series of traditional regulatory restrictions on heavy-duty diesel engine emissions. The Air Quality Act of 1967 established a complex approach toward controlling air pollution, one based on national ambient air quality criteria and state ambient standards. Of most importance for our purposes, the act addressed a major concern of mobile source manufacturers: the threat of inconsistent state standards that could force them to outfit vehicles differently for sale in different states. Spurred by Los Angeles' smog problems, California had adopted auto tailpipe emissions standards for hydrocarbons and carbon monoxide in 1966, having begun regulating mobile source emissions in 1961. The 1967 act preempted all future state regulation except for California. Mobile source emissions standards would in the future be created only at the national level—and this time regulation included diesel emissions.

The initial concern with diesels was "smoke"—the heavy, black fumes visible from many diesel exhausts. The first smoke standards for diesel engines were applicable to model year 1970. An initial standard was set for model years 1970 to 1973, and a stricter level for model year 1974 and forward. These standards remained the same through model year 1973, even after the passage of the 1970 Clean Air Act Amendments. The 1967 Air Quality Act created the format that diesel engine regulation follows to this day: specific standards for specific pollutants, standard laboratory tests to measure the emissions, and standard sets of conditions under which the tests for emissions are to be conducted.

The Clean Air Act Amendments of 1970

The year 1970 brought major changes to air pollution regulation. The Nixon administration created the EPA, to which air pollution control was transferred from the Department of Health, Education, and Welfare. The Clean Air Act Amendments of 1970 established the basic approach to mobile sources that continues today. The statute mandated reductions in mobile-source emissions by 90 per cent for hydrocarbon, carbon monoxide, and nitrogen oxides, with an initial target of 1975. It also set the framework: Mobile source air pollution was to be primarily controlled through federally-mandated technology standards on new vehicles. States were left with the regulation of in-use vehicles, a politically difficult issue and an authority they were not eager to exercise.

Heavy-duty diesel engines continued to receive less stringent treatment through the early 1970s, with only smoke regulated until the 1974 model year. At that time, engine emissions of hydrocarbon, NO_x, and carbon monoxide would begin to be regulated.

Even then, however, the EPA was concerned with potential inconsistencies between test-cycle performance and off-cycle or actual on-the-road performance of engines, although not with respect to heavy-duty engines. The agency issued an advisory circular warning manufacturers of light-duty trucks and vehicles that sophisticated emission control systems could, under certain circumstances, be considered illegal defeat devices. The EPA apparently had an idea that electronic controls might allow vehicles to meet the tests but defeat them in actual practice on the highways.

The 1977 Clean Air Act Amendments

The 1977 amendments delayed until the 1980s the mobile source reductions that had been mandated in 1970 but not met; they required states to establish inspection and maintenance programs; and they added an explicit requirement that heavy-duty diesel en-

gines should achieve the greatest degree of emission reduction achievable consistent with cost, technical feasibility, noise, energy, and safety factors. The fact that the EPA had done little in the heavy-duty diesel sector may have prompted Congress to directly specify reductions. The amendments called for significant reductions of hydrocarbons and carbon monoxide (by at least 90 percent during and after model year 1983), oxides of nitrogen (by at least 75 per cent during and after model year 1985), and particulate matter (during and after model year 1981, or earlier, if practicable). Despite the tightening of the standards, the EPA's proposals in 1980 did not require new technology to meet them.

According to the statute, the new standards could be revised starting in 1979 and again every three years thereafter. Although the statute imposed more stringent standards, "escape valves" were also included, allowing the EPA to temporarily or permanently revise the statutory standards for several reasons, including reasons of cost.

When the EPA set out to implement its congressional mandate to further reduce diesel emissions, it proposed extensive changes in test procedures and instrumentation requirements to make the tests more closely resemble engine-use conditions. The most important development was EPA's creation of the transient engine test standard in 1979, designed to simulate urban driving conditions.

The transient system was designed to make the tests more representative of in-use conditions. EPA selected the specific test conditions based on a survey of a few trucks and buses driven in New York City and Los Angeles. However, the EPA did not attempt to validate its new test and even denied that validation was desirable. Engine manufacturers were critical of the EPA's proposal for transient testing and expressed concerns about the lead time necessary to implement new standards and procedures.

Over the next decade, the EPA continued to tighten heavy-duty diesel emission standards under the transient test. The regulations evolved into a complex and stringent list of regulations covering hydrocarbons, carbon monoxide, NO_x, and particulates.

Model year 1988 brought the first particulate standards for heavy-duty diesels, five years after the EPA imposed the first diesel particulate standards in the world on cars and light-duty trucks. Model year 1991 standards tightened the NO_x standard to 5.0 g/bhp-hr, and introduced an innovation—allowing the averaging and trading of emission credits, as long as engine families met certain levels.

Truck manufacturers managed to meet the increasingly tight standards through the 1980s by improving combustion rather than by adding post-combustion treatment of exhaust. Indeed, the first particulate standards, effective in 1988, required relatively minor actions to reduce emission levels.

One important result of the tougher clean air standards was the increasing reliance on electronic controls in mobile source engines to meet standards and improve performance. While the first electronic controls were simply add-ons to existing engines, during the 1980s engine manufacturers began to introduce fully electronic control systems, allowing increasingly sophisticated control of engine operations.

The 1990 Clean Air Act Amendments

The next set of major amendments to the Clean Air Act came in 1990, after more than a decade of political stalemate, a delay due in part to Michigan congressman John Dingell's attempts to weaken mobile source regulation and to political divisions over acid rain. Section 201 of the Clean Air Act Amendments of 1990 revised the standards for emissions of hydrocarbons, carbon monoxide, NO_x and particulates from heavy-duty vehicles or engines. The new standards pushed the envelope of technology and cost. The EPA was given the authority to revise heavy-duty vehicle or engine standards. The amendments also required that regulations would be stable for at least three model years and set a lead time of no earlier than the model year commencing four

years after promulgation of a revised standard. After the 1990 amendments, the EPA added regulations forbidding the use of defeat devices that would interfere with emission controls in automobiles and light trucks.

By 1997 EPA was reporting that heavy-duty diesels were the largest sources of particulates and NO_x among mobile sources. This assessment was made on a per-engine basis, not on the basis of comparing gasoline and diesel fleets. Although the proportion of diesels was rising, gasoline fleets were still a far larger portion of the entire mobile fleet, including trucks, automobiles, vans, buses, and other vehicles.

Regulation-by-Negotiation

While tightening standards during the 1980s, the EPA also attempted to accommodate the need for greater flexibility in engine and truck manufacture. First, the agency introduced delays in implementation because of poor economic conditions in the industry. Second, the EPA delayed tighter standards to give manufacturers more lead time. Third, the EPA introduced "noncompliance penalties" that allowed engines to be sold even if they exceeded the standards, as long as they did not pollute beyond an "upper limit" of acceptable pollution. The companies could pay these penalties rather than keep their products off the market. These noncompliance penalties were intended to address the difficulties manufacturers had in meeting the technology-forcing regulations. This innovation was the result of EPA's first negotiated rulemaking exercise. Agreement on the rule was reached in four months.

Regulation-by-Litigation

In 1998, the EPA sued the makers of over 95 percent of U.S. heavy-duty diesel engines. According to the EPA, diesel emissions were not declining—as the agency had predicted—but increasing.

In its suit, the EPA argued that the use of electronic controllers to increase fuel economy during non-urban driving conditions amounted to illegal "defeat devices" under the Clean Air Act. In essence, the EPA contended that the engines passed the EPA's test, but the electronic controls were then adjusted to increase long-haul fuel economy, which emitted higher levels of pollutants. EPA administrator Carol Browner stated that the engine manufacturers "programmed the engine so that it knew when it was being tested and when it was on the road."

The engine manufacturers denied the EPA's claim that the controller use was illegal and alleged that the EPA had known about their use of electronic controllers from the beginning and had at least tacitly approved it. A highly critical House Commerce Committee staff report, *Asleep at the Wheel*, also concluded that the EPA was aware of the engine manufacturers' use of electronic controllers as early as 1991. Nevertheless, on October 22, 1998, seven U.S. heavy-duty engine manufacturers settled the enforcement actions by agreeing to pay substantial fines and to devote resources to approved environmental activities. The total resources committed amounted to $1 billion.

Why Regulation-By-Litigation?

The EPA had a number of incentives to adopt regulation-by-litigation over other options in the case of diesel engines. Because of the legislated lead-time provisions, the EPA was unable to tighten diesel emission standards before model year 2007 through traditional regulation. Moreover, the EPA, the California Air Resources Board, and the diesel engine manufacturers had negotiated a Statement of Principles (SOP) in 1995 that was intended to stabilize regulatory initiatives. Any movement toward revisions of past rules, such as those related to emission testing and controllers, would have been seen as a violation of the SOP

and therefore resisted by the manufacturers.

The EPA had other incentives, too. First, the gap between predicted and actual diesel emissions was contributing to the failure of some regions to comply with ambient air quality standards. Inspection and maintenance programs around the country, part of the effort to come into compliance, were arousing popular unrest in several states. Second, the EPA and the Clinton-Gore administration could reap immediate political rewards by appearing "tough on polluters" during the runup to the 2000 presidential election. Third, the EPA faced relatively low risks of losing the litigation because the enormous leverage it had over the engine manufacturers made a settlement all but assured.

This leverage came about through the requirement for annual certification of engines. Mack's vice president of engineering and product planning, for example, told a reporter that the EPA "held a gun to our head by threatening to withhold certification for 1999." Other companies echoed this concern. The settlement negotiations took place after the EPA had issued "conditional" certificates of conformity for model year 1998 engines. These conditional certificates were not applicable to engines that employed defeat devices, which is to say that the EPA created considerable uncertainty about whether the current family of engines could be sold. At the same time, the engine manufacturers were seeking certificates for model year 1999 engines, and a related "show cause" order from EPA to the engine manufacturers was pending. Thus, the companies settled.

Regardless of the merits of the EPA's case, the EPA and the Clinton Administration reaped a publicity windfall from the settlement. Attorney General Janet Reno, for example, was quoted as saying, "Every polluter in America had better take note of these record penalties—if you pollute America's air, you are going to pay a very high price."

Since this settlement, the EPA continues to call for tighter emission standards for heavy-duty diesel engines, proposing in 2001 a

significant reduction for model year 2007. These standards incorporate elements based on the settlement. Japanese and European regulators are also tightening heavy-duty diesel emission standards, but the standards proposed for model year 2007 in the United States are significantly tougher than those proposed for Europe and Japan.

Anticipation and Results

We can now compare what may have been anticipated by EPA litigators when the 1998 consent was obtained and what has resulted. Taking a public interest theory approach, one would argue that the EPA chose litigation in order to obtain large reductions of NO_x and other emissions sooner than traditional regulation would have provided them and to force technical solutions that would eliminate the whole matter of defeat devices. These expectations also assume that engine producers would somehow meet the stricter emission standards on time and that truck builders and fleet operators would be eager to purchase the new engines when they emerged from the factories—that is, engine buyers would not dramatically change their normal buying patterns. Indeed, the consent agreement required that engine producers not engage in marketing activities designed to subvert the intentions of the consent agreement. The expectations would also assume that engine producers would leapfrog the electronic engine controller technology and adopt a new technology that could not be operated as a defeat device.

As it turns out, these expectations have not been realized and there is doubt that they will be. One result is a huge industry prepurchase response to the consent mandates, suggesting that the new engines that meet the tighter standards will not sell very well, so their impact in reducing emissions will be less than expected. To consider only one manufacturer, Detroit Diesel Corp., this firm has received so many preorders that its manufacturing plant is running at capacity 24 hours per day using three shifts. By con-

trast, its post-October 1, 2002, demand forecast indicates a 79 percent drop in engine production. Detroit Diesel's sales of model year 2002 engines have been more than double the normal sales volume, and it has had to reject more than 1,000 orders due to lack of capacity.

Apparently, consumers do not want to buy the new ones because they are more costly and they are untested in terms of performance. By some estimates, more than 70 percent of the clean air benefits are lost due to these pre-purchase effects. Thus, there will be a larger stock of dirtier engines operating than might have been the case had the consent agreement not been negotiated.

As to the "defeat device" (the engine controller), only Caterpillar has indicated that its engines will have a new design that avoids relying on the engine controller for emission control purposes. The other engine producers have not adopted new technologies. At some point in the future, some diesel engine producers could again be accused of using a defeat mechanism in the form of engine controllers.

In short, what might have been reasonably anticipated by EPA litigators if they were acting according to the public interest theory has not been achieved. At the same time, massive costs are being borne by trucking companies, truck producers, and diesel engine producers as they grapple with the EPA's efforts to short-circuit the route to cleaner engines. These costs will eventually be borne by consumers.

The Theory and the Facts

The EPA/diesel engine controversy can now be viewed in the light of more complex regulatory theory. Combining the history of diesel engine regulation, the facts about the regulatory framework, and the incentives as analyzed by regulation theory, we can identify the major reasons for the reg-lit strategy.

The basic stimulus for the EPA's decision to take additional regu-

latory action on diesel engines in 1998 was the danger that some states would not meet the ambient air quality standards, would be classified as nonattainment, and would have to make costly adjustments. Suits and petitions from northeastern states in risk of nonattainment status added urgency. A tough presidential campaign lay ahead in 2000, and the EPA's enforcement division was calling for a "get tough" policy. These forces demanded action.

The focus on mobile sources came about because the states generally want to meet air quality standards by EPA-mandated restrictions on vehicles, not by controls on stationary sources like plants and electric utilities. The states are caught in a competitive struggle for employment-generating stationary sources. If the EPA imposed stricter controls on diesel engine manufacturers, states might be able to avoid taking action against local plants and utilities.

The lack of an extensive, nationwide air quality monitoring system contributed problems, too. The EPA must rely on engineering models to forecast air quality outcomes and thus models, not actual conditions, drive much of the regulatory agenda. All model results have error terms; none gives perfect forecasts.

Initially, the EPA evaluates compliance with Clean Air Act requirements through models designed to estimate ambient air quality based on assumed emission controls. If the models overpredict controls, the EPA may approve a state's plan for meeting air quality standards. However, if the control measures do not lead to compliance with the NAAQS, the state and the EPA must figure out what to do. When the EPA realized that nitrogen oxide emission levels in urban areas exceeded the expected amount, action was called for. This galvanized and reinforced the political urgency of obtaining quick results.

Heavy-duty diesel use has been growing since the 1970s, increasing the importance of controlling diesel emissions and magnifying any discrepancies between the model predictions and ambient pollutant levels due to differences between predicted and

actual emissions. The EPA's modeling difficulties were confounded further by the growth in the population of heavy diesel-equipped trucks relative to those powered by gasoline engines. Significant improvement in diesel technology coupled with the engine's inherent fuel efficiency advantage over gasoline engines made the diesel engine more attractive to the highly competitive trucking industry. As a result of these forces, models for forecasting urban air quality underpredicted the diesel engine nitrogen oxide contribution to the problem, making diesel engines an apparent target for regulatory action.

Regulatory Choice

In the diesel engine controversy, the EPA had a choice of regulatory strategies. The agency faced different costs and benefits from regulation-by-regulation, regulation-by-negotiation, and regulation-by-litigation.

A decision to continue using regulation-by-regulation could be criticized by environmentalists because of the delay in getting results. In contrast, reg-lit offered the attraction of bringing a timely outcome in a politically visible way. Environmental groups, accustomed to using the courts in pursuit of their interests, would predictably support bringing suits against violators and penalizing them.

The diesel engine producers and their constituencies apparently lacked the political clout to deflect the action. At the same time, they were big and financially sound enough to pay the fines. They had an economically strong product. The increase in cost associated with litigation, which could be spread across hundreds of thousands of units, was not likely to be so large as to capsize the product in the market.

There was one other timing consideration. Actions under litigation are not likely to be interrupted by a new administration, while regulations in the pipeline can easily be stopped by a new

administration. Selection of reg-lit placed the action out of the reach of an opposing political party, should there be a change in administration.

The EPA was constrained by the dynamics of the marketplace when it sought to lower nitrogen oxide emissions from mobile sources quickly. This fact, too, encouraged the litigation choice. Only a small part of the stock of vehicles using diesel engines is replaced annually. Because of the long life of heavy-duty diesel engines, older engines continue to emit pollutants long after comparable car engines are scrapped. Furthermore, if newer engines are more costly and less fuel-efficient than older ones, more older engines will be operated for longer, and replacements will be purchased before the more costly engines arrive. These facts reduce the potential improvement from tighter standards under traditional regulation.

In a search to find potentially large reductions in NO_x, the EPA had previously identified heavy-duty diesel engine producers as the component of the industry that was most readily targeted. Eventually, regulation would bring the emission reductions the agency desired, and it was less costly to impose regulation on engines made by a few manufacturers and destined to be installed in trucks and other heavy equipment than to sue all those who might install or operate diesel engines in their equipment. With a favorable settlement, the agency would be able to trumpet the prospects of earlier improvements, no matter what the final accounting might render.

Changing technology also provided a rationale for the litigation strategy. We have seen that the Clean Air Act sometimes forces technology for mobile sources. Manufacturers must then invest in developing technology to which their customers are indifferent or even hostile.

Among the technologies "forced" by earlier regulatory efforts was sophisticated electronic control of combustion, making possible different modes of operation under different conditions

sensed by the controller. Such controllers allow engine manufacturers to offer customers enhanced performance in dimensions other than those examined directly by regulators' tests. At times, the customer may assign higher value to fuel efficiency than emission reductions. Thus, tradeoffs exist between regulator-desired engine characteristics (e.g., low emissions) and customer-desired engine characteristics (e.g., low cost, high fuel economy).

As diesel engine emission regulation evolved, the EPA took a performance standard approach in setting emission standards. That is, the agency did not specify the technologies to be applied to engines. Performance standards allowed the goals to be met in a variety of ways, and spurred producers to compete in the development of engines that would meet the standard.

However, the EPA used a technology standard in developing test procedures. While producers competed in the design of engines, each manufacturer's engines had to satisfy the same EPA-specified test procedure for emissions. A characteristic of diesel engine technology causes a tradeoff between nitrogen oxide (and other) emissions and fuel economy. At the margin, cleaner air comes at the expense of fuel efficiency.

Seeking to minimize the cost induced by regulation, diesel engine producers have an incentive to design engine controllers that enable engines to satisfy EPA-dictated tests for urban air quality standards but that also improve fuel efficiency when the engine operates outside urban environments. In terms of the relevant private interests, one part of the technology mattered little to trucking companies and their customers; the other part, fuel efficiency, mattered a lot. Apparent decisions to trade private benefits—fuel cost savings—for public benefits—cleaner air—played into a successful litigation strategy for the EPA. The engine controller, which could be described as a performance maximizer subject to an urban emission control constraint, could now be demonized as being simply a "defeat device."

Regulation-by-litigation prevailed.

Conclusion

Before the EPA engaged in regulation-by-litigation, it followed traditional regulation. Such regulation can be justified on the grounds that air pollution causes some harm to many individuals—but the harm is so small to each individual, and the numbers of individuals is so large, that no private action is feasible.[4] Assuming that this is the case, the government can act for the harmed individuals.

In the case of air pollution, the passage of the Clean Air Act and its amendments exemplified such government action. Regulations affecting diesel engine emissions evolved from the statute. When Congress debated the various statutes, the affected industries and all other interested parties had access to the debate. When the EPA engaged in regulation-by-regulation and regulation-by-negotiation, the industry and all other interested parties had access to the regulatory process and to the courts if the regulatory process was seen as improper. Everyone had the same number of bites at the apple. In the process, some modicum of regulatory certainty was assured for the industry and for all who favored stricter standards. The process was transparent to the participants and to the monitors of the regulatory process in the legislative and executive branch.

EPA's decision to litigate did not necessarily represent a second bite at the apple for those who support cleaner air. As we see it, the EPA, as a regulator, faced a political challenge. The agency was confronted by northeastern states who faced the cost of nonattainment status; it recognized that past estimates of improvements in air quality were faulty; it was part of an administration that wished to be recognized as being tough on polluters; and the regulatory process constrained fast action.

By employing reg-lit, the EPA took its own bite from the apple.

Unfortunately, this regulatory shift has caused uncertainty to rise within the diesel-engine manufacturing industry. The cost of

uncertainty may far exceed the amount of penalties imposed by courts or through settlements.

The EPA's recent and extensive employment of regulation-by-litigation has set a new precedent in the already controversial annals of federal regulation. It remains to be seen if reg-lit will become a dominant form of regulation or if the EPA's expansive and recent use of the process will bring about its demise. We have no reason to predict that reg-lit will end any time soon. Indeed, the various theories we have employed to explain this episode suggest that when the conditions that triggered this episode arise again, then reg-lit will just as surely emerge again.

Notes

1. This *Policy Series* paper is adapted from a longer and thoroughly documented paper available from PERC (see Yandle, Morriss, and Kosnik 2002).

2. This is the interpretation of politics found in most civics textbooks. For discussion of the other theories mentioned here see Bernstein (1955) for the capture theory; George Stigler (1974) for the special interest theory; McChesney (1999) for the extraction theory; and Yandle (1983) for the "bootlegger and Baptist" theory.

3. Criteria pollutants are the key air contaminants regulated by the Environmental Protection Agency.

4. See Center for Legal Policy (1999) for more discussion of conditions under which regulation is justified.

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