MAKING READY FOR THE CLEAN AIR ACT

David Harrison, Jr., and Paul R. Portney

THE CLEAN AIR ACT, flagship of the environmental fleet, is up for reauthorization this year. Since its 1970 amendments, which fundamentally altered and enlarged the federal role in air quality management, the act has grown more prominent and more controversial. According to its critics, it stands in the way of economic recovery, regional growth, and energy independence. According to its defenders, it protects the rights of all Americans to clean, breathable air at reasonable expense. Yet both critics and defenders are eager to modify it—some stopping at minor changes, naturally, and others preferring to rethink the act altogether.

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Five areas of the Clean Air Act have become particularly controversial. The first four date from the 1970 amendments: EPA's national ambient air quality standards (NAAQS), its emissions standards for new or substantially modified sources, the system of local control of air polluters under state plans filed with EPA, and the automobile emissions standards (which Congress itself specified in the statute). The fifth area, introduced in the 1977 amendments, is that of prevention of significant deterioration (PSD) in parts of the country where air quality exceeds the national standards.

Although these five appear to be the most troublesome, they are by no means the only areas attracting attention. For example, the visibility protection called for in the act may prove extraordinarily expensive (see Perspec-

tives, p. 12). Other provisions that have raised hackles are those calling for mandatory vehicle inspection and maintenance and protecting the jobs of eastern coal miners (Readings, p. 51). And policy regarding particularly toxic airborne substances, especially carcinogens, may well become a major issue in the future.

But the five areas cited top most reformers' laundry lists. In considering them here, we briefly review the history of each provision, discuss the logic behind the approach that Congress or EPA took, identify the problems that have resulted, and suggest some ways of dealing with those problems. We then take up the larger issue of how economic balance and incentives can best be brought into air quality regulation.

Air Quality Standards

The 1970 amendments directed EPA to establish uniform national air quality standards for common (or "criteria") air pollutants. The next year EPA set standards for six pollutants: sulfur dioxide, nitrogen oxides, carbon monoxide, photochemical oxidants (later changed to ozone), hydrocarbons, and particulate matter. The agency was instructed to set the standards at a level for each pollutant that would provide an "adequate margin of safety" against "significant adverse health effects." Unfortunately, Congress provided EPA with little guidance on what it meant by "adequate" or "significant." Equally important, courts came to rule consistently that costs could not be taken into account in establishing the national standards.

EPA's mandate, then, was clear. It was to identify for each pollutant that concentration below which exposures were safe, even for sensitive subgroups of the population such as asthmatics or angina patients. Once EPA had identified that threshold concentration and added a margin of safety, the standard followed directly, since no balancing of benefits against costs was permitted. This approach appealed to Congress for two reasons: first, when all regions met the standards, all citizens would be guaranteed healthful air; second, a uniform numerical standard would provide a convenient benchmark against which to measure progress. Moreover, the act's implicit prohibition of unseemly comparisons between dollars and air quality testified to the seriousness of purpose with which Congress was pursuing clean air.

Both science and economics have ensnarled this seemingly straightforward process. Health studies conducted since 1970 strongly suggest that there is *no* threshold concentration of pollution below which exposures are safe. As pollution is reduced to very low concentrations, adverse health effects probably diminish but do not disappear entirely. Thus the health of the most sensitive individuals can be protected with a margin of safety only by setting the standards at zero pollution, which nobody proposes. EPA now struggles with this realization by ignoring certain health effects it considers "insignificant," as with hemolytic anemics in the case of carbon monoxide. But this is really no more than a sub rosa way to consider costs in establishing the air quality standards.

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Science proved troublesome in other respects as well. It came to be questioned whether the list of criteria pollutants should be expanded beyond the original six (lead was later added), whether interactive effects between them should be considered, and whether the pollutants were being measured properly. Using the Jacobs-Hochheiser method to measure concentrations of nitrogen oxides, EPA initially found 43 of its 247 air quality districts to have unhealthful air. When this method yielded "unhealthy" readings in unpolluted areas like national parks, EPA investigated and found that the method systematically overestimated levels of nitrogen oxides. It then adopted a more accurate measurement technique which revealed that only three areas exceeded the standard. Nevertheless, EPA did not revise the standard itself, even though it too was based on the discredited method.

The problem posed by economics is simpler: ignoring costs in standard-setting has turned out to be costly. According to the Council on Environmental Quality, the nation spent

$22 billion in 1979 to comply with the Clean Air Act, and may spend as much as $38 billion annually by 1988. In spite of this, the National Commission on Air Quality recently estimated that about two-thirds of all Americans still live in counties where the ozone standard is being violated, one-third still live in counties where the particulate standard is being violated, and one-fourth still live in counties where the carbon monoxide standard is being violated. In fact, some cities like Los Angeles and New York may never be able to meet the carbon monoxide and ozone standards without imposing strict transportation control plans that many residents would resist.

What can be done about the unrealistic way in which air quality standards are currently set? It may be time to scrap the uniform national standards altogether. The threshold concept is in disrepute, and the prohibition on balancing costs and health effects is a luxury we can no longer afford (if we ever could). Moreover, the current "uniform" standards are not really uniform at all. The prevention-of-significant-deterioration areas enjoy (or are saddled with) much stricter standards than the rest of the country, and many of the metropolitan and other areas not now meeting the current standards will never do so regardless of the number of state implementation plans that are filed, rejected, revised, and approved. Given both de jure and de facto departures from uniformity, why not take official notice of local variations and preferences in setting air quality standards?

Another approach would be to preserve the uniform national standards but continually relax the compliance deadlines in areas where, for economic or other valid reasons, the current standards cannot or should not be met. Although this is what has been done in the case of auto emissions standards, the approach has little to recommend it. Regulatory goals ought to be realistically established and then vigorously enforced. Standards that are too high or rest on a discredited scientific base tend to be ignored and may produce less progress than more realistic goals.

Alternatively, uniform national standards might be set taking some overall calculation of costs and benefits into account. This would be a clear improvement over the current approach, but it would still be less than satisfactory. Why presume that the standard appropriate for a remote windswept region with little population and no agricultural activity or scenic vistas is equally appropriate for a busy metropolitan area surrounded by productive farms and subject to frequent summer temperature inversions? There simply is no reason for such a presumption. Better to let EPA or the states themselves (which really administer much of the act now) set standards that vary from region to region depending on population, meteorology, ecological or scenic characteristics, and other local conditions, as well as the cost of alternative control practices and plant locations.

While we are not proposing specific alternatives to the current standards, our guess is that for most areas the new standards for carbon monoxide, nitrogen oxides, and ozone should be weaker than the current ones. This is not necessarily so, however, for sulfur compounds and fine particulates, which appear to pose more of a health threat in long-term exposures.

New Source Performance Standards

The 1970 amendments also directed EPA to establish limits on emissions from all new or substantially modified industrial sources of the "criteria" pollutants. These new source performance standards, as they have come to be called, were to have three important characteristics. First, they were to require the same controls on all new industrial sources regardless of their location, so as not to steer industrial development into any particular region. Second, the standards for a particular industry were to be based on technological feasibility and the financial strength of the industry, rather than on an assessment of where emissions could be reduced least expensively. Finally, it was understood that the standards for new sources would be stricter than those established for most existing sources under state implementation plans. This was based on the simple and commendable (if also naive) notion that it would be less expensive to incorporate pollution controls in the design of new plants than it would be to "retrofit" controls on older existing sources. Here, at least, Congress appeared to recognize the very cost considera-

tions it wanted EPA to exclude in setting air quality standards.

But establishing the new source standards has been no easy job. More than ten years after the 1970 amendments EPA has yet to develop performance standards for a number of important sources—coal-fired industrial boilers, to take but one example. The absence of a standard adds uncertainty to any decision to construct such a source or significantly modify an existing one.

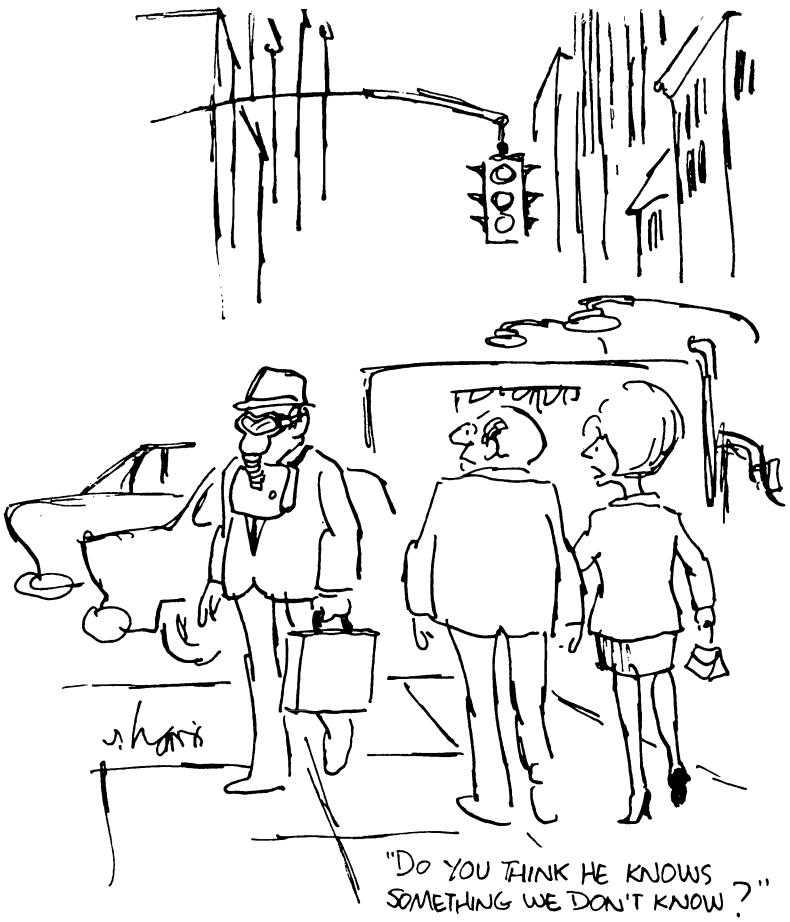
There are other, more troubling aspects of the congressional approach to new source control. For example, by requiring geographically uniform controls we appear to be indifferent to location, when in fact we are not. Surely we believe that a new power plant in New York City should be controlled to a greater degree than one on the plains of Nevada. Since the damaging effects of pollution depend upon local conditions, so too should the controls to which sources are subject.

The technological basis of the new source standards is also illogical. A ton of pollution emitted by one industry is no less harmful than an identical ton emitted by another. Why, then, require—as we now do—that new sources in some industries spend many times more to remove an additional ton of pollution than new sources in other industries? Why not try to prevent as much pollution as we can for what we spend? This environmentally benign approach is foreclosed by the current law.

The new source standards create a foolish bias even within a particular industry. After all, a pound of sulfur dioxide from an ancient plant is no less harmful than one from a bright spanking-new plant. Why make the latter install very expensive controls if the former could achieve the same reduction much less expensively, as studies have repeatedly shown to be the case? Here too we are paying more for pollution control than we must, or getting much less pollution control than we could for what we are spending.

Moreover, where controls on new sources are much more stringent than those on existing sources, companies have an incentive to keep their older, dirtier plants limping along. Paradoxically, this not only may be inhibiting the modernization of industry's plant and equipment, but also may be *increasing* the total amount of pollution to which we are exposed each year! Surely this is a most perverse consequence of a well-intentioned approach.

The stringent new source standards may also be penalizing the faster growing areas of the country. And regardless of geographic location, the standards are to some extent protecting existing firms and plants from the competition that might arise from newer ones. In fact, Brookings economist Robert Crandall has argued that this may not be an unintended consequence of the new source standards at all, but rather a sophisticated form of protectionism by certain legislators and business interests. Whatever their motivation, the actual effect of the differential standards may be quite at odds with the intended one.



It is time to rethink the controls on new sources. To begin with, controls should vary from region to region. We do not want industrial polluters to be indifferent between densely and sparsely populated locations. Within a given region, new source controls ought to be based on cost. We should not "soak" financially robust industries for pollution control when the same pollutants can be removed for less money in other industries. This means abandoning the "best available technology" approach to which both air and water policy have been wedded.

Finally, this may be the time to consider whether policy should differentiate at all between new and old sources. If, for economic or other reasons, we decide to require stricter control of new sources than old, we should at least narrow the gap. This would reduce possible disincentives to plant construction and might, incidentally, increase the competition faced by older firms which have so far had to install few if any controls.

In short, by allowing for local variation, comparing control costs across industrial categories, and reducing the bias against new sources, we can improve the effectiveness of the new source performance standards and blunt the disincentive to new growth they may now pose.

Mobile Source Controls

Congress took automobile pollution control into its own hands in the 1970 Clean Air Act Amendments, rather than delegate standard-setting authority to EPA. The amendments called for mobile sources to reduce their emissions of hydrocarbons, carbon monoxide, and nitrogen oxides by 90 percent each. The 90 percent figure was apparently chosen because that degree of emission reduction, if achieved by the 1980 model year, would allow the most polluted cities—Chicago for carbon monoxide and Los Angeles for hydrocarbons and nitrogen oxides —to meet the expected national standard by 1990. However, the timetable that was specified required a 90 percent reduction by the 1975 model year for carbon monoxide and hydrocarbons and by the 1976 model year for nitrogen oxides. This timetable was termed "technology forcing," since the technology to achieve the 90 percent reduction was not then available. Fines for noncompliance were set at $10,000 *per car*, reflecting Congress's determination to force action.

The auto emissions program has been the source of major controversies over the last decade, at least some of which could have been anticipated. The combination of technology-forcing standards on a tight time schedule and Draconian penalties for falling short virtually guaranteed showdowns between Detroit, EPA, and Congress. The net result of each confrontation was to delay the standards. Penalties in gas mileage exacted by the technology used to control emissions placed the program in conflict with energy objectives. In addition, auto makers cite the emissions controls as among the causes of their current financial problems (although their foreign competitors must meet the same standards).

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Perhaps most important, cost-benefit analyses have generally found Congress to be overregulating auto emissions. This is true even though the controls have had considerable success since 1970 in reducing emissions of carbon monoxide, hydrocarbons, and nitrogen oxides. The reason that this progress does not translate into large benefit estimates is that these three pollutants appear not to be related to long-term, irreversible health damage. The discomfort and aesthetic losses they cause, unpleasant as they are, do not justify the $8 billion we spend annually for their control.

There are two changes that would improve the auto emissions control program. One is simply to relax the standards, at least for carbon monoxide and nitrogen oxides. The latter pollutant does contribute to the formation of smog, but continued controls on hydrocarbons will help in addressing that problem. Relaxing the standard for nitrogen oxides, incidentally, will facilitate the development of diesel engines —a point that is discussed below.

The mobile source program could be improved even more if geographic variation were allowed. This is so because most of the benefits that do result from current controls occur in

large metropolitan areas where heavy traffic and meteorological conditions make for serious air quality problems. If New York City, Los Angeles, Chicago, Riverside, and some other metropolitan areas could impose stricter controls on autos than are applied nationwide, most of the benefits of reducing emissions would be captured while the residents of less polluted areas would be freed from substantial control costs. As one of us (Harrison) has pointed out elsewhere, such a "two-car" strategy would work to the particular advantage of low-income households.

The growing popularity of diesel vehicles raises a number of concerns that Congress might do well to address this time around. The National Academy of Sciences is conducting a study of the health effects, particularly the carcinogenic potential, associated with the emission of airborne particulate matter by diesel engines. We should not continue down the diesel road if the ensuing increase in airborne small particulates is going to be seriously damaging to health. In addition, diesel fumes smell bad and contribute to haze and smog, factors that also ought to be considered in setting standards.

Local Control and Long-Distance Pollution

Although the 1970 amendments greatly enlarged the federal role in air pollution control, they also preserved an important role for the 247 local air-quality control regions. States were to impose whatever controls on local sources proved necessary to ensure that the national air quality standards eventually would be met within each of their regions. Unfortunately, one easy way to ensure that local air quality is preserved and that local residents are protected is to allow plants having major sources to build tall smokestacks. These tall stacks "air mail" pollutants beyond the boundaries of their own air quality region, enabling the plants to avoid expensive control measures like sulfur scrubbing or particulate removal. Even without tall stacks, emissions can be transported across regional boundaries.

This creates two problems. First, violations of the air standards in one control region can be caused by sources in another region over which the first has no control. EPA is empowered to disapprove a state's implementation plan if its pollution contributes to violations elsewhere, but proving culpability in interregional pollution cases is difficult. Second, when sulfur and nitrogen oxides remain aloft for days at a time, they can undergo complex chemical transformations and return to earth in precipitation as mild sulfuric or nitric acids. These are the "acid rains" of which we have heard much, and they are quite probably a direct result of the dispersion approach to local air quality management. Dispersion may sometimes be a sensible way to protect people or places located near polluters. But only if adverse effects in other areas, such as soil or lake acidification and materials damage, are taken into account in emissions standards for individual sources. One possible approach is to expand the jurisdictional boundaries to reflect pollutant transport. But this conflicts with the goal of enhancing local control over the setting and maintaining of air quality standards.

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In areas where mobile source emissions can be linked to acid precipitation, the controls should be strengthened accordingly. This will probably not be necessary in most areas, because cars do not pollute from tall stacks. But where it does happen (as perhaps in the Los Angeles basin), controls must suit the potential damage.

Prevention of Significant Deterioration

Once the national air quality standards were set, states were obliged to take corrective measures in areas where the standards were being violated. But what about the areas that enjoyed air quality better than the standards? Would their air be allowed to deteriorate to the level of the national standards? The Sierra Club sued EPA to ensure that that would not happen, that air quality in pristine areas (particularly in national parks and recreation areas) would remain superior to that elsewhere. The suit was successful, and the courts suggested (and Congress codified in the 1977 amendments) a method to limit the degrada-

tion in air quality that would be permitted in clean air regions.

The Byzantine system that resulted is a maze of maximum allowable increments, preconstruction reviews, background modeling of base-line air quality, and determination of best available control technology. It is roundly condemned by industrialists, state control authorities, and indeed many environmentalists as unworkable, unwieldly and, perhaps most damning of all, apparently unnecessary. It has been accused of inhibiting energy development in the coal- and mineral-rich western states and of intensifying the bias against new industrial growth there and in other clean air regions. The effect has been to exacerbate the already bitter interregional conflicts arising out of differential energy and labor costs and the natural ebb and flow of population.

There is little reason to retain the special protection the Clean Air Act affords to or imposes upon all unpolluted sections of the country. Air quality standards in these regions should, like those elsewhere, be based on comparisons of benefits and costs, the benefits including not only health, materials damage, and ecological effects but also enhanced visibility. The latter is a particularly important benefit of pollution control around national parks and is likely by itself to justify discouraging industrial activity near the parks. Lowering the cost of locating in clean but unexceptional areas, while preserving strict controls in or near parks, will steer development into areas where it will harm neither people nor important environmental resources. That ought to be one of the major goals of air quality policy, even if one side effect is to make some areas dirtier.

Cleaner Air, Lower Costs

At first blush, our recommendations may seem specific to certain features of the Clean Air Act and unrelated to each other. We believe, however, that three themes stand out. First, both ambient and individual source standards ought to be based on a rough balance between the benefits and costs of additional control. Moreover, these benefits should be viewed not in terms of compliance percentages or even emission reductions, but rather in terms of the health and other environmental improvements that will occur when air quality is protected.

A second theme follows directly. Since, for any given level of air pollution control, benefits will vary from region to region, so too should both ambient and discharge standards. We can both save money *and* protect health by relaxing standards in areas where air quality is good while tightening them in areas where it is bad. Where visibility or other values are important, standards for certain pollutants might be strict in some clean areas as well.

A third implication is less obvious, but still inherent in the above recommendations. It is that we can make better use of economic incentives in air pollution policy in the future. By doing so, we would reduce the costs of meeting any standard, freeing up resources for environmental or other policy goals. In the last four years, to its credit, EPA has modified the traditional command-and-control system to include various innovations that it calls by the name "controlled trading." EPA began to consider such flexibility in 1976, when it faced a dilemma: industrial growth was effectively prohibited in nonattainment areas because it would worsen already substandard air quality. Rather than stopping new growth altogether, EPA decided to permit additional emissions as long as the firms involved arranged for more than offsetting reductions in the same pollutants from existing sources in the area (see "The Emerging Market in Air Pollution Rights" by Bruce Yandle, *Regulation*, July/August 1978). This "offset policy" was given formal congressional sanction in the 1977 amendments.

More recent is EPA's "bubble" policy, which permits a firm to meet an overall emissions and air quality target for many sources taken together rather than having to meet individual targets for each one of many sources. Large savings are expected to result from the bubbles that are or soon will be approved.

Even more use can be made of economic incentives, although new applications should not be approved hastily until information accumulates from the programs now in place. One area where more "trading" could help is that of emissions standards for new sources. Once these standards are set, why not allow new sources to exceed them provided they secure equivalent (or greater) reductions from existing sources in the region?

Another such area is that of long-range transport. If it should be decided that emis-

sions from a broad geographic area must be reduced because of their harmful effects elsewhere, we should establish an emissions ceiling for the region, apportion the necessary reductions to existing sources, and let them trade amongst themselves to determine who will actually do the cutting back.

The use of marketable permits can and should be pushed further. For example, pollutants like chlorofluorocarbons and hydrocarbons mix freely in the atmosphere. Hence it makes little difference where in a region (or in the case of chlorofluorocarbons, where in the world) they are emitted. Thus once it is decided how much of these pollutants to permit, the rights to those emissions could be auctioned off with no fear of overloading one area. This is not the case with nitrogen or sulfur oxides or carbon monoxide, for which the location as well as the quantity of discharges is important. What is important is that the use of marketable permits be expanded where science and economics suggest it makes sense.

We should also consider effluent charges, by which the price rather than the quantity of pollution would be fixed by the agency. The theoretical case for charges is strong where control costs are highly uncertain but likely to rise sharply as control is tightened, and where there are no large thresholds of damage. Also, charges may be preferred where there are so many polluters that a permits auction becomes impracticable, as in the case of auto owners. EPA should consider an experiment with effluent charges to complement its experiments with permit systems.

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EPA has opened the door to the use of economic incentives in air quality management. The task before us now is to open that door wider without tearing it off its hinges in frantic pursuit of ever broader applications. We should concentrate on areas where the experience we have gained so far offers guidance and where there are special problems best addressed by an innovative approach.

ONE PLAUSIBLE CHARGE often leveled at recommendations like ours is that they are fine in theory but will prove unworkable in practice. How can EPA set standards that balance costs and benefits when scientists cannot agree on health effects or available technology? How can a system that requires balancing of costs and benefits escape a quagmire of endless litigation and continual revision of standards? Would it not be simpler to stay with the existing system?

We believe that such difficulties can be overcome. Remember, the current system is extremely complex. Eliminating the prevention-of-significant-deterioration requirements would simplify it enormously. But even the setting and enforcement of standards might prove simpler under our proposals. For one thing, we are recommending not a counsel of perfection but only a rough comparison of costs and benefits. Moreover, EPA already collects most of the information needed to set standards in the way we have suggested. For example, the agency accompanied its recent proposal to revise the carbon monoxide standards with a detailed regulatory analysis of costs and benefits. Most important of all, the complexities of balancing are already present in the system; they are simply encountered at a later stage, when standards are implemented and enforced.

We believe the approach outlined above will invigorate air quality management. No longer will states or regions feel, as many do now, that the goals they are expected to pursue are unsuited to their circumstances. Rather, these goals will reflect both local circumstances and the cost of preserving the values those areas hold dear. Having chosen appropriate goals, air quality authorities would more vigorously enforce the controls required to meet them.

Members of Congress face a great temptation as they turn their attention to the Clean Air Act—the temptation to patch up the act with bandaids and baling wire. If instead they rethink their present approach to air quality and face up to the shortcomings of the act, they will have helped to further both environmental and other important goals. That would be a worthy legacy to us all. ■