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Cloudy Evidence about Air Pollution

Many environmentalists campaign against pollution with a moral fervor reminiscent of evangelists crusading against sin. And perhaps this tone is appropriate, for environmentalists too must often rely more heavily on faith than fact to win converts. Despite the general cogency of their warnings about disrupting the ecological balance, and despite the value of their sensitivity for natural beauty and diversity, environmentalists can muster little solid evidence to support many of their claims. The technical literature in the field, which is saturated with qualified guesses and predictable rebuttals, reveals a startling lack of agreement as to the real dangers, sources, and even definitions of pollution. Indeed, given the ever-expanding volume of research and the enormous publicity devoted to the environment, it is nothing short of miraculous how little is actually known about the subject—and, still more frightening for policy formulation, how little is known about how little is known.

An indication of the problem emerged during the furor over catalytic converters and the attending adjustments of interim automotive emission standards. The 1970 Amendments to the Clean Air Act established stringent new limits on the three principal pollutants emitted by motor vehicles—hydrocarbons, carbon monoxide, and nitrogen oxides. By 1975, there was to be a 90% reduction in hydrocarbon and carbon monoxide emissions below the allowable level of 1970 cars; and by 1976, a 90% reduction in nitrogen oxide emissions below the average level of 1971 cars sold outside California.

Confronted with these deadlines, American automobile manufacturers decided on one basic approach—the catalytic converter. They believed that only catalyst technology could both reduce emissions to the required levels in time and protect their investments in the conventional internal combustion engine. Others, including the National Academy of Sciences, criticized this method as not durable or economically sound, but the time constraints diminished the possibility of more novel or experimental technology being attempted by the automakers. As Allen V. Kneese and Charles L. Schultze conclude in *Pollution, Prices, and Public Policy*, a different "strategy that set less rigid deadlines, tried to deal specifically with some especially bad local situations, but provided incentives for phasing out the internal combustion engine would almost certainly have been preferable and more likely to achieve longer-run objectives."

But that, of course, was not the strategy Congress adopted, as the current reliance on oxidation catalysts demonstrates. Catalysts were employed and have undoubtedly worked to a degree. Hydrocarbons, carbon monoxide, and nitrogen oxides have indeed been reduced, albeit by rather inefficient, cumbersome, and generally troublesome means. Unfortunately, however, there is now evidence that in the process of removing these three pollutants from auto emissions, the catalysts actually accelerate the production of another. Before the era of the catalytic converter, the small sulfur emissions from cars, which were released primarily as sulfur dioxide, were of minor concern. But it now appears that catalysts are converting this previously innocuous by-product into much more dangerous substances—sulfuric acid and highly toxic sulfates. Problems, in other words, have been traded off—for one "solved," one has been "created."

What's to be done? Citing this newly discovered health hazard (or potential health hazard), Russell E. Train, Administrator of the Environmental Protection Agency, announced in March 1975 that he would request a delay in imposing mandated emission standards until 1982 —much to the consternation of many devout environmentalists, who view the postponement as a tricky evasion, a reneging on the public commitment to clean up the air. They ask if it is really necessary, if the new emissions really pose such a threat to public health and property as to warrant the suspension. On the other hand, of course, it might be asked whether the original pollutants posed such a threat as to warrant the rather rash measures legislated in the first place.

No one is sure of the answers—not a unique dilemma in this area. While it is generally accepted that heavy concentrations of carbon monoxide are a danger to human health, especially for people with heart disease and emphysema, and that hydrocarbons and nitrogen oxides produce smog which corrodes materials, irritates the eyes, engenders respiratory diseases, and aggravates heart and lung conditions, the detectable threshold of harm for any one pollutant depends on many factors—air movements, concentration of emissions, exposure, and sensitivity of the receptor. The 1974 annual report of the Council on Environmental Quality (CEQ) notes, "Very complex conceptual problems arise when one attempts to equate the presence of one or more pollutants with a corresponding quantitative estimate of resulting damage"; and *Pollution, Prices, and Public Policy* cites the problem of establishing "the relationship between environmental conditions in a particular location and the source of the... emissions that caused the conditions." In sum, Kneese and Schultze observe, "Policy making... must operate in a world of imperfect knowledge, in which the relative cost and effectiveness of various abatement devices, and the interaction of pollutants with the environment, are subject to great uncertainty."

That is an understatement. Disagreement on all sorts of environmental questions is rampant in the scientific community. In an article appearing in the *Journal of the Air Pollution Control Association* (March 1973), for instance, Lyndon R. Babcock, Jr. and Niren L. Nagda of the University of Illinois compare five conflicting opinions as to the relative hazards presented by major air pollutants. They rank the pollutants according to the "severity factors" assigned to them by different studies, including their own, and note that while "CO is considered least deleterious [by unit] on all scales,... the scales vary considerably." Very considerably: The severity factors assigned to hydrocarbons is 2 on one scale, 124 (using the same unit) on another; those for nitrogen oxides range from 22 to 100. Dr. Babcock of course defends his own scale—faulting the others as either overweighting or underweighting different chemical reactions.

There is a similar want of consensus as to the dangers presented by various sources of air pollution. Because equal amounts of different pollutants do unequal amounts of damage (e.g. one gram of nitrogen oxide is more deleterious to health than one gram of carbon monoxide), everyone seems to agree that measurements of air pollution emissions should be adjusted according to their effects. But no one seems to agree as to *how* they should be adjusted. Motor vehicle emissions constitute roughly half of all air pollutants *by weight*—industrial processes, solid waste disposal, stationary fuel combustion, and other miscellaneous sources supply the rest—but for what percentage of the *total harm* done by air pollution are they responsible? In 1972, Dr. E.G. Walther, Coordinator of Environmental Studies with the Museum of Northern Arizona, calculated that transportation sources accounted for 39.1% of all harmful air pollution effects, but Babcock and Nagda countered with the much smaller figure of 16.4%. In stating that "Babcock's method probably underestimates the adverse impact of transportation sources," the CEQ's 1973 annual report acknowledges the speculative nature of such figures.

Given all this doubt, it would seem very difficult indeed to establish effective priorities and policies for air pollution control. Yet this is the stuff that environmental laws are made on—and one cannot help but wonder if some of the lawmakers are not "rounded with a sleep" when they vote.

As suggested above, the "knowledge gap" plaguing the pollution control in-

dustry is nowhere more palpable than in the spate of research attending the catalytic converter controversy. The "technical findings" and "scientific recommendations" which led to Train's announcement are truly comical. An EPA "Issue Paper," which was released on January 30, 1975, and which summarizes the results of a number of studies the agency commissioned on catalytic converters, states: "A detailed benefit-risk analysis was performed to estimate the trade-offs to public health in using oxidation catalysts by comparing increased sulfuric and exposure dis-benefits [*sic*] to benefits associated with reduced exposures to carbon monoxide and oxidants (unburned hydrocarbons are the key precursors). Although the comparison of health benefits and risks is difficult to precisely quantify, the results of our recent analysis suggest that... the continued use of oxidation catalysts... would result in a net public health risk...." This qualified conclusion is further qualified by a note that it "is based upon assumptions about dose responses and human exposure about which there still remain uncertainties."

Many of those uncertainties are strikingly revealed in "Estimates of the Public Health Benefits and Risks Attributable to Equipping Light Duty Vehicles with Oxidation Catalysts," one of the studies to which the "Issue Paper" refers. Though the authors of the report concede that their "best efforts allow only a rough approximation" of benefits and risks traceable to catalysts, they urge policy-makers to forge ahead with the air pollution control effort anyway. "It is unlikely," they argue, "that major national decisions affecting public health, energy and transportation can wait until our ability to make benefit-risk analysis of motor vehicle emissions is significantly improved." To await such an improvement before attacking environmental problems would "leave a rather large but poorly defined residual of continuing ill health."

Such a sweeping warning arises primarily from concern over air pollution's effects on acute and chronic respiratory disease. On this very subject, however, the report offers us little information that is particularly enlightening. We are told that "laboratory studies in animals indicate that exposure to elevated levels of photochemical oxidants are likely to increase the risk for excess acute respiratory disease in man," but that "existing epidemiologic studies have not yet been able to disentangle oxidant effects from the other major determinants of such illnesses." As for persistent cough, production of sputum, shortness of breath, and other more severe complaints, we learn that "at present there is not a substantial body of laboratory or epidemiologic evidence indicating that either photochemical oxidants or carbon monoxide constitutes a risk factor for chronic respiratory disease. However, responsible scientists *will not be surprised* if future studies reveal a contributing role for photochemical oxidants in these disease processes" (italics mine). The authors also intimate that they would not be surprised to find photochemical oxidants causing a wider "variety of systemic changes that constitute adverse health effects." Nor would they be surprised by as-yet-undiscovered but "substantial benefits associated with the control of carbon monoxide and hydrocarbons."

And so it goes—best judgments based on tentative assumptions about imprecise and unreliable evidence, which are then denounced by opponents on equally flimsy authority. The muddiness is by no means confined to automotive emissions or even air pollution more generally; it characterizes much of our "knowledge" about the environment. While pollution is undeniably a very great evil, it is not as yet an especially well-defined one.

There is a huge discrepancy between environmental rhetoric, which is deceptively clear, and known environmental fact. The public and policy-makers alike should be aware of this discrepancy and be duly cautious, for as laws are passed, costs escalate—most estimates for the cost of reducing automobile emissions in the late seventies to currently legislated levels hover between five billion and ten billion dollars annually. More than righteous intentions are needed to justify such a great price. □

Alan Reynolds

Government Can't Create Jobs

Few government policies enjoy such wide support as does the idea of alleviating unemployment in the private economy by creating public service jobs. Some such scheme has been enthusiastically endorsed in such diverse journals as the *New Republic* and *Fortune*, and by economists as different as the liberal Melville Ulmer and the conservative William Fellner. Not one of the various boosters of federal job creation, however, has really grappled with a rather fundamental question: Where is the government going to get the money to pay these people?

Suppose the government payroll is expanded by increasing the taxes paid by individuals. With the higher tax burden, those taxpayers would clearly be unable to spend as much on, say, housing and cars. The inevitable result is less private employment.

It may be objected that those employed by public service jobs will use their higher incomes to buy new houses and cars, or whatever, and workers in the industries that benefit from this spending will spend more too, sending ripples of new income through the economy. The net addition to the incomes of public service employees (above whatever they were living on before) will indeed increase *their* spending, but only by as much as the spending of taxpayers is reduced. There is no obvious net effect on total demand or employment. Taxpayers are simply buying the services of new government employees (services which were not considered worth their cost in the best of times) rather than buying products and services of their own choice. Moreover, the nature of spending by public employees would probably be quite different from that of the average taxpayer. Because the incomes of public service employees are lower and less permanent than average, relatively more will be spent on nondurables, such as food and clothing, and on used cars. The notion that this spending will somehow "trickle up" toward the depressed markets for costly new houses and consumer durables is not terribly persuasive.

Suppose we instead finance the added public payroll with higher business taxes. If businesses pass the expense along in higher prices, sales and employment will fall. If the tax is shifted to stockholders, stockholders will have less to spend. If businesses can't shift the added tax, other costs will have to be reduced—namely, investments, purchases, and payrolls. Again, private employment contracts as public employment expands.

Suppose we finance the public service jobs by reducing other spending—perhaps closing a military base, canceling a defense contract, or firing local police and firemen. In these cases, there is a decline in government employment to finance an increase in government employment. The only evident effect is to switch the nature of government employment, or of employment dependent on government purchases, into activities which were previously considered less essential.

Suppose we finance the added public payroll by increasing federal borrowing. As the government peddles more of its Treasury bills and bonds, it causes interest rates to be higher than otherwise. The government has to offer a return that will induce savers to put their money into government securities rather than into stocks, corporate bonds, or savings ac-