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Control of Automobile Emissions

After a decade of efforts and the expenditure of more than a hundred billion dollars to protect and clean its environment, this country has achieved only little. Air pollution continues, most of the rivers are still dirty.

Legislation was enacted at a time when the nature or toxicity of the crucial pollutants was unknown, and no great effort was mandated to discover them. The laws placed the major burden of abatement on industry. But everyone pollutes; industry could perform perfectly and pollution would still abound. Mainly as a result of partial abatement by industry, some rivers are cleaner. However, many municipalities have been slow to meet their responsibilities. Pollution from distributed sources (agriculture) continues.

An example of weaknesses in our pollution abatement efforts is in the handling of automobile emissions. Laws have been enacted and regulations have been issued in the absence of a solid scientific basis. The burden of attaining and maintaining low emissions has been placed on the automobile industry. In most states, the owner of a high-polluting jalopy is untouchable.

Automobiles are an important contributor to urban air pollution. Photochemical reactions occur among the hydrocarbons (HC's) and the nitrogen oxides (NO_x) and other constituents of the air. Reaction products that are damaging include nitrogen dioxide, oxidants whose major component is ozone, nitric acid, and nitrates, However, the mechanisms and crucial factors are not well established. A recent National Research Council report* states, "To formulate cost-effective oxidant and NO_x abatement strategies, some understanding is required of the processes and factors that influence the conversion and transport processes and the interaction of NO_x with atmospheric oxidant/HC. The present state of knowledge is very incomplete and urgently needs improvement. . . ."

One hypothesis is that in urban situations the rate-limiting factor in production of oxidants is hydrocarbons. Were this to be proved true, it would simplify the abatement problem. However, in 1977, 7 years after the Clean Air Act, we still do not know with certainty the circumstances in which HC's or NO_x are rate-limiting. Even so, in 1970 a law was enacted calling for an arbitrary 90 percent reduction from the 1970 levels of emissions of hydrocarbons and carbon monoxide and the 1971 levels of nitrogen oxides. To meet the 90 percent reduction will require a complex and costly system. The current California experience indicates that fuel economy will suffer.

The present reluctance of Detroit to meet the exacting requirements is based not so much on cost as on an inability to guarantee that their output will meet the standards. After all, costs of installing pollution-abating equipment are passed on to the customers. Guaranteeing reliability is another matter. Once the customer obtains the car, the situation is out of control. New Jersey, one of the few states that has an emissions inspection program, has found that in 10 percent of the automobiles seen, the emissions control system had been tampered with.

It is important that Detroit produce low-polluting cars, but that is only a small fraction of the problem. What matters is the performance of automobiles on the road. This will vary with age, wear, and maintenance. A relatively small percentage of high-polluting vehicles can negate the low pollution of a fleet of cars whose characteristics were obtained through the expenditure of tens of billions of dollars. Until a nationwide inspection system is in being and fines are levied on large polluters, there will be limited progress toward clean urban air.

During the next decade we will spend hundreds of billions of dollars on pollution abatement, but most of it will be wasted unless there is better scientific understanding of the problems, a better analysis of costs and benefits, and an enforcement system applicable to all polluters.

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**Implications of Environmental Regulations for Energy Production and Consumption* (National Academy of Sciences, Washington, D.C., 1977), vol. 6, p. 100.