Letters

Automotive Emission Standards and Fuel Economy

The Clean Air Act of 1970 (PL 91-604) requiring reduction of automotive emissions by a rather arbitrary 90 percent by 1976 has until recently enjoyed considerable public support, despite the grumblings of the automotive manufacturers and the bitter complaints of new car buyers about poor performance and gas mileage. However, with a serious threat of gas rationing and drastically increased prices facing us, we must reexamine the consequences of proceeding in this direction (*1*).

The rather simple steps taken before 1971, such as crankcase blow-by control, evaporative controls, leaner mixture ratios, and minor engine modifications to improve burning efficiency were successful in reducing carbon monoxide emissions by 41 percent and hydrocarbon emissions by 73 percent (*2*). These steps added negligibly to the cost of an automobile and did not result in any loss of performance or economy.

By 1973 all the easy fixes had been used. Further reductions required more drastic and uneconomical measures. Since nitrogen oxide emissions are directly related to wall temperatures, which in turn are related to thermodynamic efficiency, there does not appear to be any way to significantly reduce these emissions without sacrificing efficiency. The steps taken in 1973 to lower the compression ratio and recycle exhaust succeeded in reducing nitrogen oxides by 54 percent, but at a cost of approximately 30 percent in fuel economy. Family-sized automobiles (4500 to 5500 pounds) that averaged from 12 to 14 miles per gallon (mpg) in 1970 now average from 8.3 to 9.7 mpg. Even the new engine designs (such as the Wankel engine and the Honda stratified charge engine) that are reportedly capable of meeting the 1976 emission standards, do so by sacrificing efficiency.

It is estimated (*3*) that addition of air pollution control devices on a new car in 1975 will cost $314. If we assume that 10 million cars are sold each year, the total cost for these devices will be $3.14 billion per year. Replacement of catalytic converters every 50,000 miles requires an amortized cost of $40 per year for each car. The total annual cost will thus be $4 billion. The fuel consumption of cars manufactured in 1973 is already 30 percent higher than that of 1970 models and we are nowhere near meeting the 1976 emission standards. Even if we assume that these standards can be met with no further sacrifice in economy, the cost of the 30 percent increase in fuel consumption is more than $12 billion at current prices. Thus, we can estimate that the implementation of the 1976 automotive emission standards will cost approximately $20 billion per year.

What will we actually accomplish as a result of this expenditure? Certainly the automobile will become a negligible polluter. However, to require a 90 percent reduction of emissions from a source that is responsible for less than half of the pollution seems somewhat disproportionate. The Los Angeles area already has one of the lowest rates of automotive emission per square mile of any major city in the United States. Its air pollution problem is due to its peculiar geographical location and the resulting high incidence of inversion conditions. Even without automobiles, there would probably still be an air pollution problem in the Los Angeles area from home heating, power generation, and the petrochemical industry. In cities where there is more heavy industry, the reduction of automotive air pollution would produce even less of an improvement in the quality of the air.

There appears to be little evidence that automotive air pollution produces any widespread deterioration of the environment in nonurban areas. Wouldn't it be more reasonable to invest the $20 billion we are about to pay for emission controls in mass transit for the cities, where the population density is high enough to make it practical, and reserve the use of automobiles for small towns and rural areas, where mass transit is not feasible? Furthermore, the requirement by the Clean Air Act that automotive emissions be reduced by 90 percent should be replaced with a provision that every effort should be made to reduce automotive emissions that does not interfere with fuel economy.

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References and Notes

1. The U.S. Senate has already voted to postpone until 1977 the requirement that automotive emissions be reduced by 90 percent.
2. These percentages were obtained by taking the values for automotive emissions reported in the 1968 inventory of the National Air Pollution Control Administration and dividing them by the total number of miles driven to get the average grams per mile. These values were then compared with the 1970 emission standards.
3. H. E. Hesketh, *Understanding and Controlling Air Pollution* (Ann Arbor Science Publications, Ann Arbor, Michigan, 1972), p. 162.

Marine Advisory Programs

In her report on the RANN (Research Applied to National Needs) symposium sponsored by the National Science Foundation (NSF) (News and Comment, 7 Dec. 1973, p. 1006), Constance Holden writes that, according to NSF's Frank Hersman, "the Agriculture Department's extension service represents the government's only effective effort to get the results of new research out into the field, where it counts. RANN wants to follow this example by developing an 'environmental extension system,' an information dissemination system for local governments, and a consortium of major cities to see how RANN and other research can be used to serve urban needs." I commend this technique as a valuable and useful method of assuring that research results reach the intended consumer.

The Cooperative Extension Service is not the only effective effort to get results of research out into the field. The National Oceanic and Atmospheric Administration (NOAA) sponsors a ma-