

Nitrogen oxides, autos and power plants

The scientific establishment appears to be ahead of environmentalists
as it suggests radical solutions for urban smog—including restriction of autos

by Richard H. Gilluly

"... Air pollution ... like so many other related problems of modern society—may be controllable only by drastic changes in our national patterns of private, commercial, and industrial activity."—From a report by the White House Office of Science and Technology on the economics of auto emission control.

"... We may have to find a new mode of transportation."—Philip Handler, president of the National Academy of Sciences.

These are strange times. The statements above came from the scientific establishment. Yet in a sense they are more radical than anything Ralph Nader ever said. It appears, in fact, that Nader and Sen. Edmund Muskie have yet to learn the new language of environmental economics which the establishment seems to have learned overnight.

The first quote comes from a Feb. 28 OST study. Although the study vacillates some in drawing obvious conclusions from its own data, still it goes further than any official report ever has in recommending fundamental changes in the nation's economic orientation—or, at the least, studies of such changes. Both Nader and Muskie attacked the report as a sellout to automobile companies. They apparently did not read it carefully. The Handler statement came on March 27 at a Senate hearing where he was defending the NAS recommendation that auto companies be granted a one-year extension in meeting 1975 emission standards. That recommendation, too, was seen by liberals as auto-company generated. In fact, Handler made explicit what was partly implied in the report: That any broad systems study of the urban impact of automobiles would probably dictate that the nation find better ways to transport people in cities.

There are two main conclusions in the OST report: Meeting 1976 auto emission standards for nitrogen oxides (NO_x) would not be cost effective, and accomplishing the goal would not do much good in some regions anyhow, because of high levels of NO_x emissions from stationary sources. The first conclusion is amply supported, while the second seems questionable, especially in view of yet another new report,

a study by the National Academy of Engineering and National Research Council on abatement of NO_x from stationary sources. There are two clear general implications to be drawn from the two reports: 1) Automobile traffic must be severely restricted in many urban areas if ambient air standards and their public health goals are to be met, and 2) An expanded program for research and development for coal and oil gasification is necessary to abate NO_x (and other pollutants) from power plants and other stationary fuel-burning sources.

Nader and Muskie, strangely, are the ones manifesting faith in the unlimited potential of technology alone to solve pollution problems. Their position may be a carry-over from Nader's crusade for auto safety in which he said safer cars could be produced without prohibi-

"The OST report makes clear that technology alone cannot solve pollution problems."

tive costs. Now he and Muskie believe the same to be true for auto-caused pollution. The OST report makes it clear this is not so and strongly suggests that the solutions will be in part nontechnological.

The OST report says that for three major air pollutants—NO_x, hydrocarbons and carbon monoxide (CO)—only the CO ambient air goal can be met by the early 1980's under current conditions. But restricting automobiles in cities could enable the CO goal to be met earlier, says the report, adding that such an expedient would also help cities in meeting goals for the other pollutants. (It says this is the *only* way these goals could be met in Los Angeles.) The report goes on to suggest that NO_x from stationary and mobile

sources, along with the high-cost of NO_x abatement from autos, is a prime obstacle to clean air in cities.

"... The cost of preventing one ton of NO_x from reaching the atmosphere from automotive sources ranges from \$190 to about \$1,200—a factor of 3 to 20 times as great as the highest estimated cost for accomplishing the same NO_x removal from stationary power plant sources," the report continues. The higher figure for automotive NO_x control comes at the higher levels of control, such as those prescribed in the 1976 standard. Basically, two alternative approaches are offered in the OST report: Accept a lower level of automotive NO_x control alone, or restrict automobiles in cities. The report does not sustain the first alternative, and the NAE-NRC study makes such a course seem even more doubtful. It seems obvious that if the lower level of control of automotive NO_x emissions is to be accepted, it can be effective only if accompanied by traffic restrictions. It is here the OST report vacillates, sometimes agreeing with this conclusion, but sometimes suggesting otherwise.

It argues, for instance, that in the New Jersey-New York-Connecticut Air Quality Region, NO_x emissions from stationary sources are so great that the partial abatement of automotive NO_x emissions would be acceptable because the NO_x from automobiles would make only a small difference in over-all levels. But OST concedes this analysis does not hold for Los Angeles, where the "present NO_x problem is strongly dominated by the emissions from mobile sources, which exceed stationary-source emissions by well over a factor of 2.5." And the NAE-NRC report suggests that the East Coast is not representative of the nation as a whole. Nationwide, it says, mobile sources of NO_x make up nearly half the total, and, it adds, stationary-source NO_x can be significantly abated. The OST argument for only limited abatement of automotive NO_x is apparently based on two incorrect premises: that in its sample East Coast region, total stationary-source NO_x cannot be significantly abated in the long haul, and that

therefore the lower auto standards are justified because ambient air standards cannot be met anyway. In fact, the lower auto standards recommended for this region (1.25 grams of NO_x per vehicle mile instead of the 1976 goal of 0.4 grams) would have automobiles in 1990 contributing more than half of the amounts of NO_x that would cause the ambient air standards to be exceeded. This auto-generated amount of NO_x seems small only on an OST graph that assumes limited abatement of stationary-source NO_x . In order to meet ambient air standards, it is clear that in many regions, NO_x will have to be abated from both sources. Because of the high costs of the stricter auto abatement, restriction of auto traffic would appear to be the only answer for this source. Of course, the partial abatement of automotive NO_x would be desirable, too.

Abatement from stationary sources, says the NAE-NRC report, can best be achieved by burning natural gas in a controlled combustion process—rather than through scrubbing of flue gases. A realistic goal for new natural gas-fueled boilers in 1980, says the report, "is a reduction in NO_x concentration to about 100 parts per million from present-day values, which are about 350 to 400 ppm uncontrolled, but range as high as 1,400 ppm." However,

abatement from oil- and coal-fired plants is more difficult, and "natural gas may not be available as a fuel for utility boilers very far into the future." The obvious need: Synthetic natural gas from coal and oil, which would also eliminate much sulfur oxide and particulate pollution. Although levels of funding for research and development for coal and oil gasification are higher than a year ago, more is needed. Another important approach is a slow-down in the rate of growth of electric energy consumption. With electric demand doubling at the current rate of once every 10 years, it would take only 20 years' proliferation of fossil-fueled power plants to bring NO_x emissions back to current levels even if the 100 ppm goal could be met starting now. (This apparently is the basis of the OST report's projection of continuing high stationary-source NO_x .)

* * *

According to an NAS spokesman, Handler's remark came from a much broader perspective than just a concern over air pollution. Although NO_x and hydrocarbons from automobiles are a major source of photochemical smog—which is, at best, an esthetic problem and an annoyance—Handler believes the evidence for urban morbidity and mortality from smog is not conclusive. His remark was aimed at broader and

more easily measured detrimental effects of the automobile: 60,000 people killed and 200,000 maimed annually in accidents, for instance, and the high, often hidden, costs of today's present automobile-dominated system of urban transportation.

Handler is not alone in these concerns. An NAE study to be released soon calculates a real cost of driving an automobile in the city at \$1 a mile, according to one authoritative source (SN: 10/9/71, p. 250).

William Vickrey, a Columbia University economist, recently spoke out about large hidden subsidies to the auto. "To provide the transit rider a subsidy per trip comparable to that enjoyed by the peak-hour [urban] motorist and thus enable him to make a fair and unbiased choice between the two modes, it would be necessary not only to let the transit rider ride free but also to pay him a bonus," says Vickrey in a letter in the March 31 SCIENCE. But the resistance to making motorists pay these real costs of the automobile will be immense. The District of Columbia, for instance, has proposed a parking tax on suburban automobiles that come into Washington. Congressmen representing the affluent suburbanites are vigorously opposing the new tax. This kind of opposition can be expected nationwide. □



**Teach light properties
this modern laser way...
for less than \$250!**

With Bausch & Lomb's low cost helium-neon gas Laser and Laser Experiment Kit you will teach optical principles most effectually. Furthermore, you'll find your students cooperating most energetically.

Operation of the Laser is uncomplicated and dependable for classroom use. Just plug it in and it begins to lase. Power is .1mw, multi-mode, producing a monochromatic beam at 6328 Angstroms. It's about the size of a shoebox and weighs approximately three pounds.

The Experiment Kit contains all necessary components to conduct impressive demonstrations. There are set-ups for 13 experiments from reflection to a Michelson Interferometer. Even for making and reconstructing holograms. A comprehensive manual and treatise on laser theory and practice are included.

Just write for our catalog 41-2325 and you will have all the facts on this contemporary teaching tool.

BAUSCH & LOMB 
SCIENTIFIC INSTRUMENT DIVISION
83804 Bausch Street, Rochester, New York 14602