

Source Distribution for Selected Air Pollutants in
Millions of Tons per Year—1965

	Carbon Monoxide	Sulfur Oxides	Nitrogen Oxides	Hydrocarbons	Particulate Matter	Totals
Motor Vehicles	66	1	6	12	1	86
Industry	2	9	2	4	6	23
Power Plants	1	12	3	1	3	20
Space Heating	2	3	1	1	1	8
Refuse Disposal	1	1	1	1	1	5
Totals	72	26	13	19	12	142

U.S. Public Health Service—1966

AIR POLLUTION CONTROL

Costs versus benefits

Balancing high costs against health benefits sets the pace of cleaning up the country's air

Despite the estimated \$3 billion to \$4 billion a year that will be spent on air pollution control in the U.S. over the next decade, the atmosphere at that time will be no cleaner than it is now.

The battle against air pollution will go about that fast and no faster because of two factors:

- Costs skyrocket as higher levels of cleanliness are aimed at.
- Health evidence on the effects of dirty air aren't specific enough to support any faster pace.

Although estimates vary on the price tag for the complete air-cleaning bill, analysts agree that costs increase exponentially with increased rates of control. Roger Revelle of the Center for Population Studies, Harvard University, estimates that pollution control and rollback can cost the United States \$4.1 billion per year for 15 years. James Hanks and Harold Kube of Resource Development Associates in Washington, D.C., estimate \$3 billion per year for the next 35 years. But there are no solid figures.

As directed by the Clean Air Act of 1967, the Federal Department of Health, Education and Welfare is making the Federal Government's first detailed study of the overall cost to Government and industry of all air pollution control efforts. The HEW report is not due out until 1969.

On a smaller scale, a committee appointed by the President's Council of Economic Advisers looked into the cost of reducing sulfur oxides and particulates which come largely from power plants and industrial installations and

account for about 30 percent, by weight, of all air pollution. The committee reported that the cost to industry and Government of reducing sulfur oxides and particulates by 65 to 70 percent over present levels would be \$750 million per year. HEW figures show that it would take maximum control of sulfur oxides emissions to eliminate 20 percent of the pollutants by 1975 and 70 percent by the year 2000.

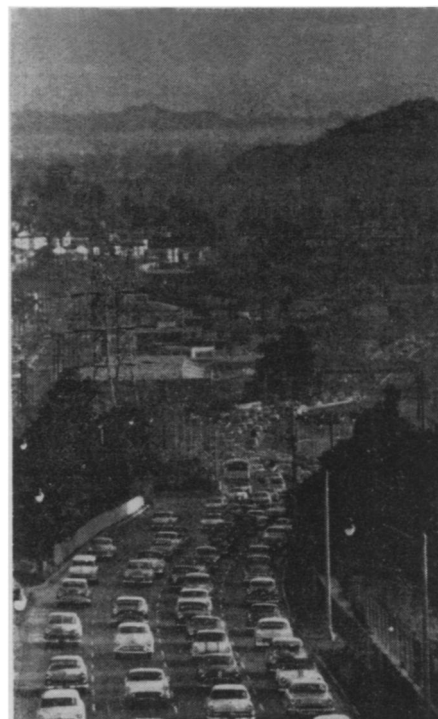
But whatever the ultimate bill, the rate of control is going to depend on a kind of cost-effectiveness approach to the problem: how serious the problem is and how much can be gained in human health and comfort for the dollars to be spent.

This is the position emphasized by Rep. Emilio Q. Daddario (D-Conn.), chairman of the House subcommittee on research.

"The laws presently on the books for pollution control," Daddario says, "express the intent of the Congress to balance the cost and benefits of maintaining and restoring air and water quality in a highly technical industrial economy."

But to assess the benefits of controlling air pollution, its effects have to be determined. And here the facts and details are even more hazy than those in the arguments between the industry and public health officials over the effects of tobacco on health.

On the one hand, the Department of Health, Education and Welfare has told Congress that, "The main thrust of the evidence is clear and conclusive—the types and levels of air pollution which



Los Angeles County
Cars cause 60 percent of dirty air.

are now commonplace in American communities are an important factor in the occurrence and worsening of chronic and respiratory diseases, and may even be a factor in producing heightened human susceptibility to upper respiratory infections including the common cold."

Yet, an almost direct contradiction comes from the Environmental Policy Panel of the President's Science Advisory Committee, which says: "While we fear and many believe that long-continued exposure to low levels of pollution is having unfavorable effects on human health, it is heartening to know that careful study has so far failed to produce evidence that this is so, and that such effects, if present, must be markedly less noticeable than those associated with cigarette smoking."

The health evidence available is based largely on epidemiological studies which show the correlation between the incidence of disease and levels of air pollution. For example, HEW officials find that respiratory diseases are higher in urban areas than in rural areas, and that research evidence tends to show that air pollution is a primary reason. HEW statistics show, for example, that lung cancer deaths among nonsmokers in urban areas are some 25 percent higher than in rural areas, and that the mortality rate from emphysema is twice as high in urban areas as in rural areas.

In spite of health damage claims by HEW, the Government has embarked on a less-than-crash program for control. Under the program, air pollution levels, on a total weight basis, will con-

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. . . air cleaning pace

tinue to increase for seven or eight years before peaking, and in three or four years after that will be back down to present levels, according to HEW.

But, according to the industries which are going to have to pick up a hefty piece of the bill, the health-improvement hopes may be overblown. Dr. R. E. Eckardt, director of the medical research division of Esso Research and Engineering Co., in testimony before Congress, said: "I think we are going to clear up every city to a certain degree, but I am concerned that this is going to have no effect on the health of the people of the United States, because I am not convinced that, other than the episodic area, the health effects have clearly been demonstrated for low level, long-term air pollution."

A basic disagreement with Dr. Eckardt's statement comes from Dr. Harold MacFarland of Hazelton Laboratories, Inc., Falls Church, Va., an independent life sciences research firm doing contract research for both Government and industry. Testifying at the same Congressional hearings, Dr. MacFarland said: "I agree that the direct cause-and-effect relationship between low levels of pollutant and health effects has certainly not been convincingly demonstrated at the present." However, MacFarland adds, as more research is done, "the evidence will become clear that there is a relationship."

But the data on which such a conclusion must rest have not yet been developed. Dr. Richard Morse, chairman of the Commerce Department's pollution-oriented Panel on Electrically Powered Vehicles, testifying before the House this year, said, "The general case is pretty well supported to show that pollution is bad for you. There is no question about that. But we can't say that X number of people died from nitric oxide, or X number of people died from carbon monoxide; we don't have reliable information in that specific sense."

This is unfortunate because it makes air pollution control efforts on individual pollutants stabs in the dark. For example, carbon monoxide and sulfur oxides account for approximately 70 percent by weight of all air pollution, and probably 70 percent of the cost of all the money being spent on air pollution control. But there is no evidence to show whether these two pollutants cause 70 percent of the health effects.

To a large extent, sulfur oxides control can be justified on the basis of the damage it causes to buildings and plant life, which has been estimated by HEW to run as high as \$2 billion a year. On the other hand, control of carbon

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. . . health debate

monoxide, which is 50 percent by weight of all air pollution, can not be so justified, since its non-health damages are negligible.

Yet control efforts on individual pollutants are roughly proportional to their percent of the total weight of all air pollution. In a report prepared for Congress this year, HEW states, "Air pollution control and abatement efforts to date have centered upon controlling the most abundant pollutants with minimum consideration of relative toxicity."

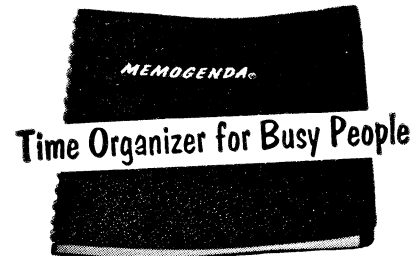
Since 92 percent of carbon monoxide comes from motor vehicles, one way to increase the overall pace of air pollution control would be to put control devices on used cars, rather than controlling only new car emissions which is the current plan. Control devices are available that would cost around \$100 to \$200 per car, or a national bill of about \$8 billion to \$16 billion, and instead of waiting ten years for air pollution levels to be reduced back down to present levels, the time would be cut almost in half. This degree of control might be justified if the health evidence on carbon monoxide were more conclusive.

An effort to determine more specifically what is already known about the health effects of carbon monoxide is now being made by the National Research Council. The NRC is reviewing the health research projects that have been done on carbon monoxide by Government and industry over the past several years. It will summarize what the accumulated data show the health effects to be, and point out what additional research is needed to determine health effects more accurately.

The NRC study will attempt to isolate the effects of carbon monoxide, but other components of the atmosphere will be considered as they relate to it.

Says the Division of Medical Sciences of NRC, "It is difficult to deal solely with any one component of atmospheric pollution because the effects are complicated by possible synergism with other components. Contaminants that alone may be innocuous in given concentrations may react or cause reactions to produce concentrations of contaminants that are harmful to man. Another complication is that persons vary markedly in their pathologic response to contaminants."

The NRC will issue its carbon monoxide report in about six months. At some late point, it hopes to broaden its study to include more detailed consideration of such common pollutants as oxides of nitrogen, sulfur dioxide, ozone, hydrogen sulfides and hydrocarbons, plus particulates such as lead.



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