REDUCING AUTO EMISSIONS: SOME RELEVANT FACTS

An Address by
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This is an important conference. We are setting in place the last part of the regulations and policy framework to clean up mobile sources so that ambient air quality standards can be met in 1975 or 1977.

In our progress we have passed at least two major milestones:

--the Clean Air Act amendments of 1970; and

--the Administrator's decision last April not to extend the 1975 deadline for the auto manufacturers.

Now we approach the third milestone--the implementation of transportation controls--vehicle emissions inspection systems, vehicle modifications, and mass transportation alternatives. These must be implemented in 28 AQCR's in 18 States, by 1977 at the latest. Appropriately, the last part of the framework will be set in place by local and state officials.

Before we embark on the discussions of the next three days, we should take notice of criticisms of our past decisions, of those who question whether we are on the right path. Some of our major periodicals

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and almost every industry leader has, within the last few months raised serious questions about whether our actions in carrying out the mandates of the Clean Air Act amendments are correct. There is no question that our actions have far-reaching implications, affecting in some form half of the American population who drive the more than 80 million US vehicles. What is our response to these criticisms?

The first issue is whether we have defined the problem correctly. Is the automobile a major polluter?

It is estimated that on a nationwide basis, in 1970, gasoline powered motor vehicles contributed 50% of the hydrocarbons (HC) 70% of the carbon monoxide ($CO_,$) and 30% of the nitrogen oxide (NO_x) emitted to the air. In many individual cities, however, motor vehicles contributed even more--in the 90% range in some cities. In short, the automobile is the single most important source of these air pollutants in this country. The Clean Air Act of 1970, which mandates that the automobile industry reduce these emissions by at least 90% by 1976 will go far in removing automobiles from the pollution picture.

Some have criticized our goals by comparing the potential for damage from automotive pollutants to potential damage from non-automotive pollutants:

-- one critic acknowledges that approximately 40% of man-made pollutants by weight come from the auto but contends CO is only 1/30th to 1/20th as harmful as other pollutants such as SO_x.

This type of statement assumes the quantification of all the effects of air pollution on man. All of the harmful effects have yet to be identified, let alone quantified. As for the comparison of CO and SO_x, it is true that, for example, calculations can lead one to the conclusion that on a pound-for-pound basis SO_x is potentially more dangerous than CO. A crude way to obtain a relative index of toxicity is to compare the primary standards for each. Although there is no one exposure time common to both pollutants, such comparisons show that the toxicity ratio might range from 8:1 to an upper limit of 30:1, but not above 30:1. But this crude analysis is not sufficient, because until we know what the dangers are beyond the concentrations level in the standard, we can't say whether one pollutant will have a greater impact than another once the standards are exceeded. It does not appear logical to control one pollutant and not another just because the former might be more toxic. They both should be controlled.

Another criticism we hear is that the carbon monoxide blood levels of people in major cities across the country are well below the level at which there is any health effect.

We are presently co-funding a sampling program to determine the carboxyehemoglobin (COHb) levels of people in major cities throughout the United States. Over 14,000 samples have been taken and the results of the study are now being tabulated. One set of preliminary results shows that the mean COHb level of non-smoking males, ages 39-49, living in Chicago, is 3 percent. Because the carbon monoxide air quality standards are designed to protect against levels in excess of 2 percent COHb, we must reject this criticism. [Incidentially, the levels for smokers are substantially higher at 5 to 7 percent.]

Another criticism of the automobile standards is that natural sources emit more pollutants than automobiles. It has been stated that natural sources emit ten times as much CO worldwide as all industrial and automotive sources combined.

Although this may well be true, it is irrelevant to the problem at hand. Because man concentrates his emissions in metropolitan areas, he is exposed to pollutant concentrations far beyond natural background levels. Because we recognize that natural removal processes exist, our primary goal has not been to eliminate all emissions, but to reduce the density of emissions in all regions to levels such that natural dispersion and removal processes can prevent the buildup of unnaturally high pollutant concentrations.

Yet another type of criticism is to contrast the emissions from the 1975/76 automobiles with emissions from man's other activities. We examined these criticisms with the following results:

-- We heard that the 1975 standards would result in an automobile that emits as much HC as an average residential yard. We checked this out, only to find that the appropriate comparison would be to a forest (not a yard) at least three orders of magnitude as large as a 40 sq. ft. yard. Again critics have missed the key point: automobiles lead to high contributions of pollution because thousands of them concentrate in small areas, exceeding nature's dispersing and absorptive capacities.

-- Along this same line, I have heard that if we burn a log in our fireplaces a day we will equal CO allotment for our 1975 car. True. But we could each have a roaring fire all day with a pre-controlled car allotment, and if these fires could be concentrated as automobiles can, we would have a serious pollution problem.

-- We are also told the 1976 standards are on a daily basis equal in NO_x terms to three gallons heating oil per person.

Our analysis bears out this relationship, but it also shows that the everage person consumes a BTU equivalent load of 8 gallon per day for all residential uses of fossil fuels. Thus, the 1976 NO_x standards are equivalent to 2.5 times the NO_x emissions from the average person's daily BTU consumption for non-transportation uses.

-- These criticisms don't stand up to close scrutiny. The automobile is a serious pollution problem.

Nevertheless, we know the automotive standards must stand up to criticism. EPA is fully aware of this requirement. We are willing to change our minds if an error is found. For instance, we found our NO_x measurement techniques could have caused us to overestimate ambient air concentrations and thereby overstate the degree or at least the scope of applications geographically of automotive control required to protect the public health and welfare. As we announced in June, we have undertaken an extensive program using new measurement techniques to either validate our requirements or change them.

This brings me to the second major milestone: the Administrator's May decision to deny the auto manufacturers' extension request.

Thus, the question arises, even if these emission goals are desirable is the technology available to achieve them in 1975 and 1976? One of the most important roles of EPA is to create the

the regulatory and other incentives for industry to push technology as fast as possible. This is a controversial role. But it is vital. I was one of many economists who was very skeptical of the Limits to Growth thesis. It is hardly reasonable to say bad technology grows exponetially while good technology grows linearly. But as critics of this thesis we must ask ourselves, what incentives are there for clean growth? The 1975/76 auto standards are such a regulatory incentive.

The Administrator's May, 1972, decision denying the auto manufacturer's request for an extension was in my view an important impetus to the development of a cleaner internal combustion engine technology.

The rate of technological advance has risen sharply. I am encouraged to see that industry is making progress. Some of the data we have seen indicate that 1975 cars may meet the 1975 standards and consume no more gasoline and be as driveable as cars currently being sold.

We must not blindly pursue technology. We must determine if it be acceptable in terms of cost and energy requirements. What are the facts? Some manufacturers have consistently claimed that the incremental cost of an automobile due to EPA's pollution control efforts will exceed $600. Our estimates show that the increased sticker price of an average US automobile in 1975 should be on the

order of $150 to $300 over the price of a comparable 1968 car. This estimate was confirmed by industry testimony before the EPA public hearings in May of this year. It is also clear that the cost will be even lower for cars with four and six cylinder engines. We are confident that these cost increases can be further reduced through continued development, engineering and optimization of the basic systems, as well as through the development of new power systems with inherently better emission characteristics. Even accepting current costs one calculation I have seen that includes both investment and maintenance cost yields a total cost to the consumer in the range of about 40¢ to $1 per week.

Energy consumption is another standard by which this technology has to be judged. And, the question of fuel penalties from emission control devices has also received considerable recent attention in the press. Our research in this area does indicate that on the average current model year vehicles show poorer fuel economy characteristics than did vehicles manufactured before emission control devices were required. Our figures indicate an overall fuel economy decrease from pollution control devices of 7% in 1973 model year vehicles over pre-1968 vehicles. But let's put this 7% into perspective. The automotive industry has indicated that there is a 5-6% fuel penalty associated with the introduction of automatic transmissions. There

is an average of about 9% fuel penalty associated with an automobile air conditioner, but this can range up to 20% in urban driving on hot days. And, factory air conditioning is installed on over 60% of all new cars on the market.

The type of engine used in the automobile is also a significant variable in terms of fuel consumption. The available data on diesel-powered automobiles show a 70% increase in fuel economy over an automobile of the same weight using the gasoline, spark ignited, reciprocating engine which dominates the American market. On the other hand, data available to EPA on the Wankel shows a 35% decrease in fuel economy. The stratified charge engine which is a prototype low emissions engine being developed jointly under Army and EPA funding, shows a 12% increase in fuel economy over the average 1973 vehicle of similar weight at a significantly lower emission level.

But the largest impact on fuel economy is associated with the general industry trend toward heavier vehicles. The fuel economy of the upper and lower bound of vehicle weights commonly found in the US varies by 150%. The average current model 5,000 pound vehicle achieves approximately 10 miles per gallon under simulated urban driving conditions compared to 25 miles per gallon for 2,000 pound vehicles. Thus, the car buyer has a direct and effective method of

achieving better fuel economy through his choice of the weight of the vehicle he purchases.

In summary then, we have found some fuel penalty associated with the introduction of pollution control devices. However, this increase is relatively minor when viewed in the light of Detroit's and the consumer's trend toward cars with increased weight, air conditioning, power equipment, automatic transmissions and now the Wankel engine.

With the energy crisis upon us, much can and must be done to minimize energy consumption from mobile sources--sources using about 40% of the petroleum resources in this country. The stratified charge engine, or the diesel, or a shift to smaller cars--all these measures--would have substantial fuel economy advantages. Surely, these alternatives should be at the top of our list of measures to save energy, and an easing of our emission goals at the bottom.

In sum, the evidence available to EPA indicates the technology to meet the 1975 standards is available and can be had at a reasonable cost to the consumer and with energy penalties much less severe than those associated with a broad range of conveniences.

I have reviewed criticisms of the program to remind us as we begin this conference that we must weigh the choices facing us in

the area of transportation controls carefully. Our analysis must be as precise as possible and we must weigh social and economic impacts.

During the next three days we will be considering three major transportation control alternatives: Motor Vehicle Modifications, Emissions Inspections, and Transportation System Controls.

Determining the proper mix of these options...Determining how they would perform under varying conditions in the various localities... Calculating the percent of relief we could expect from each and off-setting beneficial effects against economic costs and social burdens... These are the Conference objectives.

Let me briefly examine each option in turn. Vehicle modification appears to be a feasible and readily available alternative open at present.

Emission requirements could be extended to our pre-1968 vehicles and made more stringent on 1968 to 1974 models. Currently, approximately 60% of the nation's automobiles--all those manufactured prior to 1968--have no form of exhaust pollution control device. The possibility of modifying or retrofitting older models has strong appeal in light of the fact that, depending upon age and degree of maintenance, they often emit many times more pollution than new models, and that in the next few years they will continue to contribute disproportionately to air degredation.

Retrofit systems have been developed and generally follow a similar approach of combining carbureator and distributor modifications and adjustments, vacuum advance, and raising the engine operating temperature. Catalytic retrofits are also available.

Certainly retrofitting could be an effective, short-term solution even though older vehicles are being phased out of use at a rate of approximately 10% per year.

Emission Inspection systems are the second transportation control alternative. Any mechanical device must be maintained. To assure maintenance, as well as identify high emitters, periodic inspection appears to be required. Sections 110 and 210 of the Clean Air Act provide for such inspection if deemed necessary and practicable, and EPA's recent decision on the allowable maintenance on 1975 and later emission control systems assumed reliance on inspection systems.

Further progress toward creation of such a program depends upon satisfactory resolution of such key issues as who will set up and operate the required facilities; which test cycle would be the quickest, cheapest and most accurate; and questions of relative costs, manpower requirements, and implementation times.

Along with vehicle modifications and inspection the third option of transportation systems controls has been advanced as a pollution reduction approach with considerable, and as yet, largely unexplored potential.

Evaluating these claims is considerably more difficult than evaluating modifications hardware, and our knowledge is correspondingly less complete. At present we have a fairly good idea of what the short-run alternatives are, some very gross estimates of their likely effectiveness, a good deal of information on what some of the key variables that influence effectiveness are, and a very poor understanding of the monetary and social costs.

Furthermore, the improvements that can be achieved are likely to vary considerably from city to city, depending on such things as urban structure, the dispersion of origin and distination points, the extent to which mass transit is already used, etc.

Most non-hardware transportation control alternatives--e.g., higher parking fees--require mass transit improvements because if auto use is discouraged, alternative transportation will be needed. Leaving aside for the moment coercive means of encouraging mass transit use, the most important mass transit improvement that can be made is to decrease door-to-door travel time. Travel time is a more important determinant of transit ridership than cost. And direct access time may be more important than linehaul time. This means that transit improvement is likely to require not only the use of express bus lanes and the like, but also improved collection and distribution systems.

It may be, however, that to be most effective in reducing emissions, mass transit will have to be associated with vehicular restraints or pricing policies designed to discourage automobile use. Without such measures, it may be that no mass transit system can sufficiently attract enough drivers from their cars to achieve the necessary reduction in auto trips.

Answering questions such as those I have just raised is the purpose of this conference. Local and State officials will labor hard over these issues in the next few months. The public must be involved.

EPA has asked the States requiring transportation controls to submit plans by February 15, 1973. In the next few weeks, we will be issuing guidelines describing what constitutes an acceptable plan, defining maximum feasible technology, and so forth.

While the measures discussed here are the last part of the regulatory framework to be put in place, they are among the first that will impact on the public. We must achieve our air pollution goals. But, we must do so with minimum cost to society. The chief value of this Conference will be in devising ways of accomplishing these objectives.