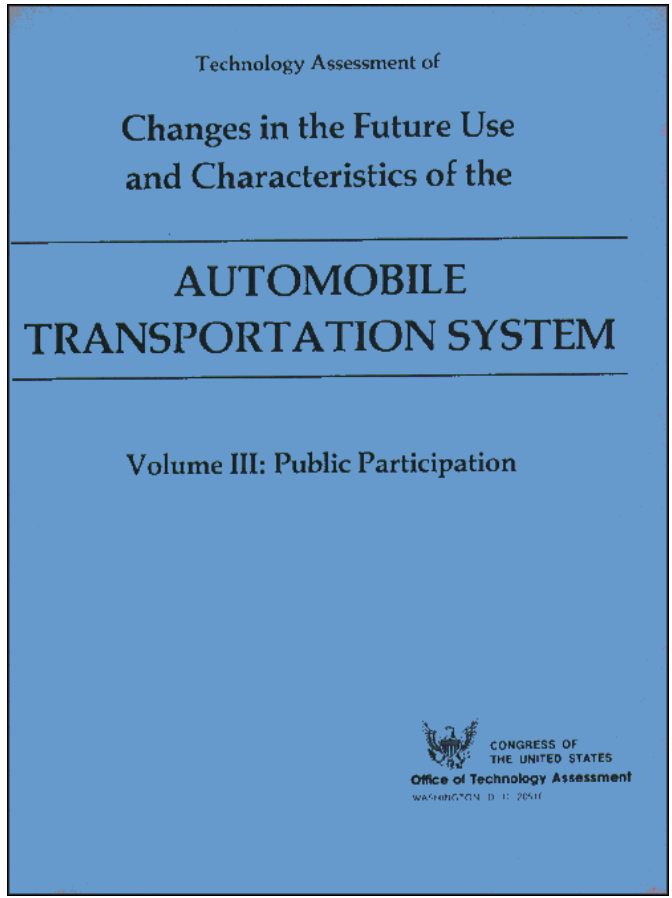
Technology Assessment of Changes in the Future Use and Characteristics of the Automobile Transportation System—Volume III: Public Participation

October 1979





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Foreword

An assessment of the future use and characteristics of the automobile transportation system was undertaken (1976-78) by OTA at the request of Senator Warren G. Magnuson, then Chairman of the Senate Committee on Commerce, Science, and Transportation. The study addressed issues and policy options pertaining to mobility, energy, environment, safety, and cost and capital. The time frame was both near-term (through 1985) and long-term (into the next century).

The specific objectives of the study were:

- to describe the factors that influence the characteristics of the automobile system, its use, and services supporting its use;
- to identify and characterize potential changes in automobile use and characteristics;
- to assess the potential near-term and far-term effects of various alternative Federal Government policies relating to automobile use and characteristics; and
- to present the findings in a form useful to Congress and the public.

The results of the technical analysis, carried out by the OTA Transportation Program with the help of an advisory panel, consultants, and contractors, were published in February 1979 in a two-volume report. The first volume is a summary of the findings. The second contains a detailed discussion of issues, policy options, and estimated effects. Volume II also contains a description of expected technological developments through 1985 and by the end of the century.

This report—volume III—presents the findings of a nationwide public participation effort conducted in 1978 in conjunction with the assessment. The intent of the public participation program was twofold:

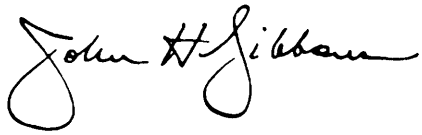
- to solicit commentary on the issues, alternatives for personal transportation, and Federal Government policy options; and
- to facilitate the public's participation in OTA's technology assessment process.

Essentially, this report is a synopsis of what people said. It is illustrative of attitudes and viewpoints of a wide variety of Americans. The discussion is deliberately informal, and verbatim quotes are used frequently so as to capture both the substance and the tone of the respondents' remarks as accurately as possible.

Chapter 1 highlights the major viewpoints expressed on issues and options in future personal transportation. Chapter 2 contains background information on the "car culture," the origin of automobile assessment, and the role of public participation in the technology assessment process.

The core of the report—chapters 3 through 7—is a compilation of comments about mobility, costs, energy, environment, and safety from people throughout the country. The order in which they are presented is indicative of the degree of concern expressed by the respondents, i.e., comments on mobility appear first since this issue appeared to be the primary concern of most of the participants.

The last part of the report—chapter 8 and appendixes—describes the rationale, methodology, and materials used in the public participation program for the automobile assessment.



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The OTA Automobile Assessment Advisory Panel provided valuable advice, critique, and assistance to the OTA staff throughout this assessment. Their participation, however, does not necessarily constitute approval or endorsement of this report. OTA assumes sole responsibility for the report and the accuracy of the content.

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SUMMARY OF VIEWPOINTS

CHAPTER A

Mobility, as viewed by the respondents, is an indicator of American freedom and independence and a right of the whole citizenry, rather than the privilege of a few. For most people, mobility seems to mean the ability to go where you want, when you want—usually by automobile. The desirable attributes of a personal transportation system most often cited by respondents were convenience, proximity, accessibility, physical comfort, cleanliness, privacy, and safety from crime.

Because mobility is viewed as a right, the participants primarily discussed measures to ensure that it could be enjoyed by all, especially those individuals who might not have adequate mobility now or in the future. A variety of solutions were proposed—such as transportation "stamps" (the equivalent of food stamps) and increased public transportation and paratransit services.

To increase access to jobs, homes, recreation, and services, a multifaceted approach was broadly supported. Such an approach should incorporate, but not be limited to, the development of additional transportation modes, improved use of existing modes and services, im-

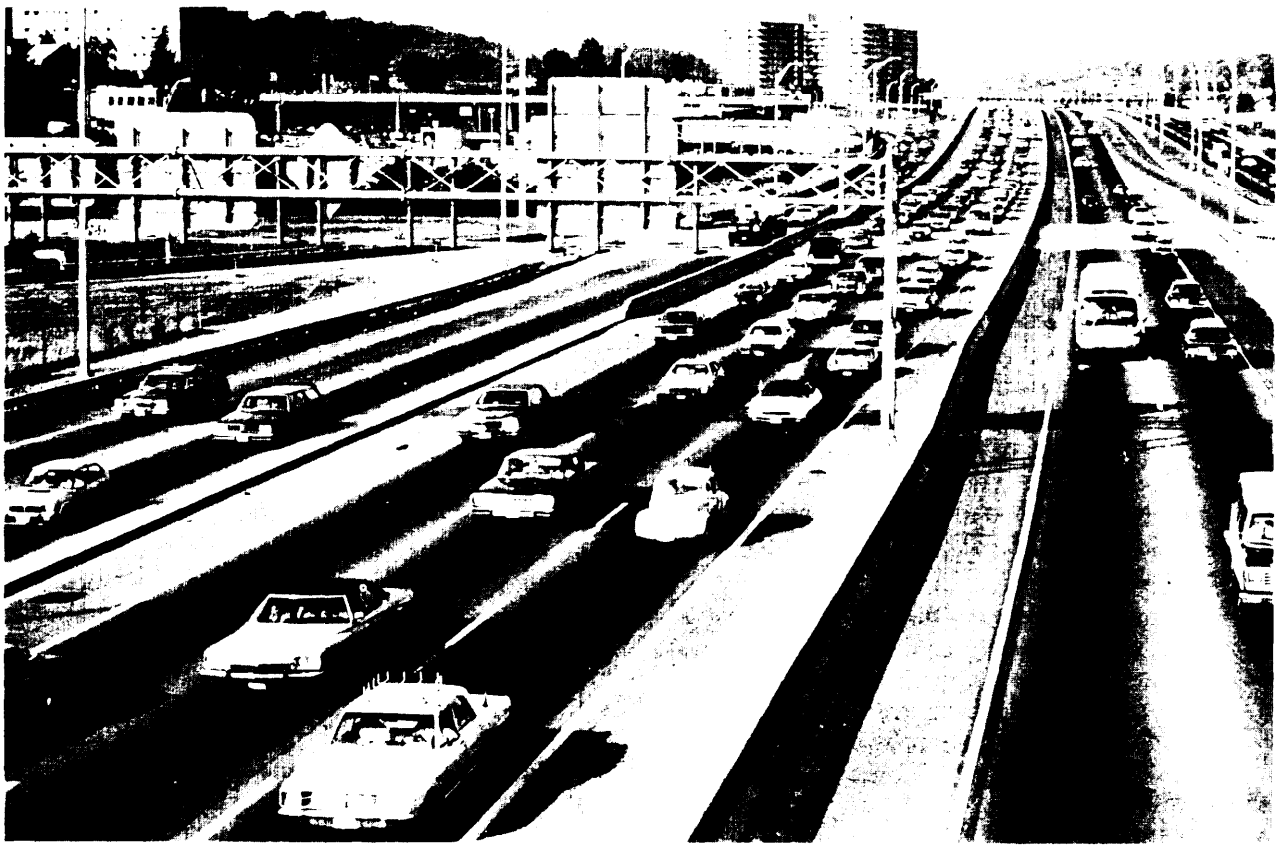


Photo credit Sylvia Johnson 1979

Homeward bound commuters at the beginning of the rush hour on Shirley Highway, Northern Virginia (note bus and carpool lanes)

plementation of varied and flexible work schedules, and changes in current land use development patterns.

Many people felt that the "psychology of mobility" should be closely examined in order to understand the relationship of mobility to people's lives, and, ultimately, to develop better ways to meet these human requirements. At the same time, the "psychology of automobility" should be addressed to determine driver and occupant attitudes and behavior. In the opinion of the respondents, this could lead to the development of appropriate improvements in existing cars and their usage, and eventually, to development of better modes and transportation systems for the future.

The vast majority of the respondents viewed cost as the major constraint to automobility. At the household level, this includes purchase price, maintenance, repair, taxes, parking insurance, and fuel. At the national level, the concern about cost centered primarily on road repair and maintenance. Congestion was also considered a potential constraint on auto travel and a major irritant, particularly in urban areas during peak commuting hours, in their estimation.

Energy, safety, and environmental problems were viewed as short-term difficulties that could be rectified through technological and institutional changes. The "energy crisis" was seen as a political dilemma, rather than a true resource shortage. To offset a supply shortage, whether the cause is political or natural, a number of actions should be taken, among them deregulation of fuel prices, development of alternative fuels and more fuel-efficient modes, and gas rationing (in the case of severe shortage). Participants indicated that no tradeoffs are necessary or wanted in the attainment of national energy and environmental goals.

While automobile use controls were thought to be a potential multipurpose solution by the respondents (i. e., to reduce congestion, pollution, and fuel use), such controls were not generally endorsed because they were viewed as a limitation on mobility. Because the automobile provides over 90 percent of today's personal transportation, to reduce automobility was perceived as a reduction in mobility-a highly undesirable consequence, according to the participants.

While respondents expressed concern about death, injury, and property damage due to traffic accidents, these problems were not viewed as a constraint to automobility. Instead, they were considered hazardous byproducts of car travel. To reduce accidents, the primary necessity is driver improvement, said the respondents. This should involve a major national effort to eradicate drunken driving, and stricter, more uniform enforcement of traffic laws and lower speed limits.

The barriers 10 innovation and problem solving are institutional, not technological, they claimed. To the participitants, the credibility of Government and industry is weak. The public, according to the respondents, doesn't know what or whom to believe More information with wide public distribution is desired. Additionally, the respondents viewed the Federal Government as inept and cumbersome. It enacts too much legislation which it is then unable to enforce. It ignores the potential of local initiative in relieving societal difficulties, they complained.

Profit, almost to the exclusion of societal well-being, motivates the automobile industry, many respondents charged. The industry has not done enough to eliminate the adverse impacts of its products and is sluggish in innovation. It is manipulative of the public through advertising and the Government through extensive, high-pressured lobbying. A greater play of free market forces might alleviate some of these institutional difficulties, the respondents said.

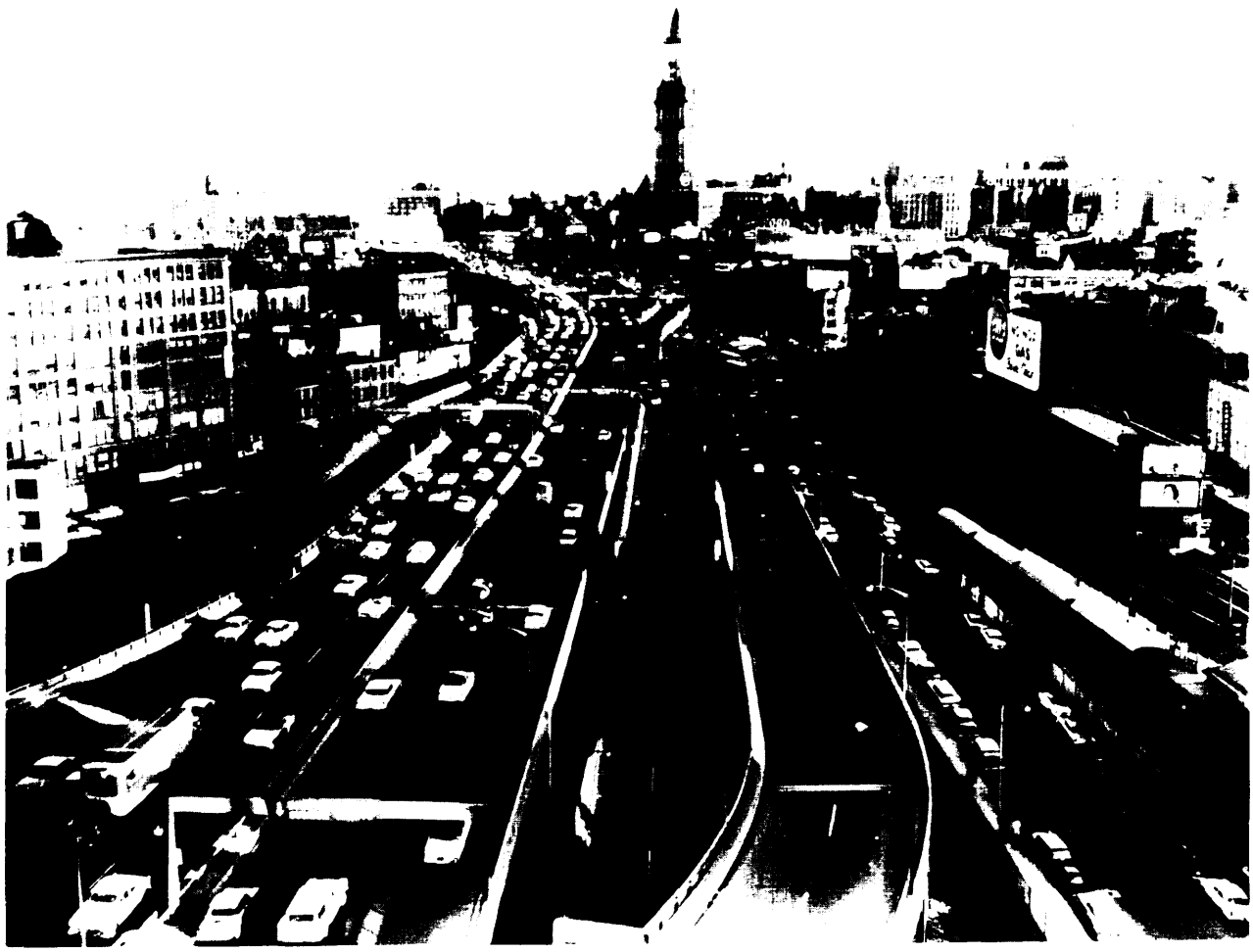
The automobile is almost the sole mode of personal transportation in the United States today, they noted. Mass transportation accounts for less then 2 percent of national travel, and therefore, is considered neither a viable alternative nor a sufficient complement to the existing personal transportation system. Because of problems arising from an essentially one-mode system (i. e., what happens when the car breaks down?), energy and environmental concerns, and spiraling congestion, participants stressed the need for a multimodal system with well-coordinated intermodal connections for the future. No one mode should dominate the system, they said, and system components should be energy efficient, nonpolluting, safer, more durable, less costly (financially and socially), and quieter than today's vehicles.

INTRODUCTION

CHAPTER

2

Americans are always "on the go," m os tl y i n automobiles. Following the invention of this horseless carriage, car ownership rates and vehicle miles of travel per year c1imbed rapidly, and continue to do so. In the process, the automobile has become the focal point of American life, and automobility has become almost synonymous with mobility. The automobile may face serious constraints i n the future, however, because of the tenuous fuel situation, heightened environmental sensitivity, and 1essinging tolerance for growing congestion.



m g B M

When the automobile was first introduced in the 1ate-1800's, the United States was an agricultural country with about 2.4 million miles of roads, most without hard-surface pavement. Roads were used primarily for the movement of agricultural goods, freight, and the mail. Personal travel was limited, difficult, and costly. The country now has 3.8 million miles of well-paved roads used primarily for the movement of people, due in the large part to the widespread availability of the automobile.

Until the early 1900's, Americans relied largely on railroads and other "mass" carriers for their personal mobility. The number of registered vehicles at the turn of the century was 8,000. Today, the American public is almost solely dependent on the privately owned automobile for travel. U.S. manufacturers are currently producing 40,000 cars daily. The registration figures have soared to 118 million, or approximately one car for every two people in the United States.

Our once agricultural economy has changed into a technological one, heavily dependent on the automotive and supporting industries. About one in six American jobs is related to the automobile. Transportation costs (mostly automotive) represent one of the largest household expenditures, along with housing and food. All transportation accounts for about 20 percent of the gross national product (GNP). Estimates of the portion of the GNP attributable to the automobile system range as high as 10 percent.

Reflecting national desires for increased and improved mobility, public policy has strongly supported the growth of the automobile transportation system. The interstate highway network was financed with public dollars. Price controls and subsidies kept the cost of fuel and other raw materials used by the automobile artificially low. This helped make automobile travel affordable to increasingly larger numbers of people. Land development patterns geared to reliance on automobile travel were encouraged by various Government policies. Mass transportation was largely ignored by both the traveling public and the Government. The subsequent decline of mass transit further stimulated the rising dominance of the car for personal travel.



Photo credit Sylvia Johnson 1979

Interstate construction in an urban area financed with public dollars

The popularity, availability, and pervasive use of the automobile resulted in a "car culture" -a lifestyle dependent on the car to provide access to widely dispersed jobs, homes, and services. While the car is appreciated for the mobility i t offers, its use has created problems, such as environmental degradation, energy depletion, death, and injury.

Congress requested OTA to study the future of the automobile in 1976, this request was stimulated by a variety of concerns:

a) The 1973-74 oil crisis had occurred, and threats of a worsening energy shortage loomed.

b) Lawsuits were pending in several parts of the country as diverse groups of citizens attempted to block further construction of highways which were seen as a threat to community cohesion and an inducement for ircreasedlow-occupancy automobile travel.

c) Criticism of automotive travel focused on harmful emissions, noise, excessive land consumption (for parking and servicing as well as roadways), and depletion of resources.

However, growing concern about the adverse effects of automobile usage has not dampened Americans' desire for mobility nor has it decreased the amount of driving.

Edward Cornish explains in his book on the study of the future:

> In addition to discounting the future, most people tend not to recognize gradual change. For example, a 2 percent increase per year in air pollution might attract little notice, yet it means that air pollution will double in 34 years! The doubling of the population of a city over the course of a generation means a drastic transformation of the life of that city for better or worse. Futurists generally want to identify such gradual changes, so that they can be monitored and timely action taken to avoid painful crises.

Essentially, this is the thrust of OTA's research effort-to help Congress identify technologically induced changes and to evaluate policies that could enhance the benefits and alleviate the disadvantages.

1 The Study of the Future An Introduction to the Art and Science of Understanding and Shaping Tomorrow's World [din, ard Cornish, World Future Society \Washington D C 1977 (This particular excerpt was contained in an article entitled Towards a Philosophy of Futurism *The Futurist* December 1977)

During the auto assessment, OTA examined issues and policies pertaining to vehicles, roadways, and related industries, services, and institutions, Issue areas identified for study were:

- Mobility—how to provide adequate mobility for all citizens. Despite the high automobile ownership figures, i t is estimated that 40 percent of the U.S. population is "transportation disadvantaged" or, in short, without access to an automobile. This encompasses mostly the low-income, elderly, handicapped, and young people.
- Energy—how to conserve fuel supplies, and to develop and convert to new ones. As a Nation making up 6 percent of the world's population, Americans consume a third of all the oil used in the world every day. Automobile transportation alone in the United States accounts for 30 percent of that consumption.



photo *Credit S ylvia Johnson 1979*

Gas station closed during 1979 energy crunch

- Environment—how to reduce the adverse impacts of automobiles and highways on the environment. Automobile emissions are a major source of air pollution, but the environmental impacts of cars are not limi ted to atmospheric degradation. Noise, disposal of solid wastes (scrap vehicles and parts), water and soil contamination, and land consumption are problems also.
- Safety—how to reduce death and injury due to traffic accidents. Since *1900, 2* million people have died as a result of automobile crashes—three times as many as have been killed in all U.S. wars. In 1977 alone, almost 48,000 people died and over 4 million individuals were injured in motor vehicle accidents.

- Cost and Capital —how to control the individual and societal costs of the automobile transportation system, and provide the necessary capital to maintain the Nation's private and public investment in the system. Over 80 percent of all American households own one or more vehicles. The individual cost of owning and operating these vehicles includes purchase price, fuel, repair and maintenance, taxes, insurance, and storage. On a national scale, the public cost of the system is most readily seen in Government (at all levels) expenditures on the highway system, which amounted to *$28* billion in 1977. As for the U.S. automobile industry, it faces a major task in meeting Federal Government mandates for vehicular improvements, and the smaller companies may face severe financial difficulties as a more competitive, less differentiated automotive market evolves.

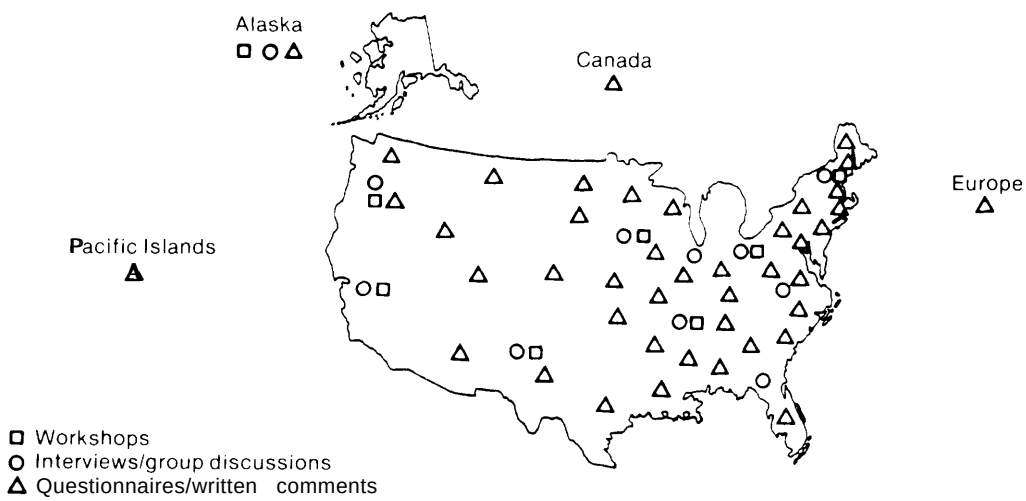
With issues identified, the OTA staff analyzed present and potential Government policies related to these issues. Among the tasks carried out during the study was a public participation program designed to gather commentary on the substantive material covered in the assessment from people throughout the country,

While there has been general acceptance of the need to incorporate public participation into the OTA research effort, there has been less agreement about who constitutes "the public" and what are the best mechanisms for gathering and incorporating the "public's views. " During the automobile assessment, an attempt was made to reach a broad cross section of people by using several outreach techniques.

The divergent needs and views that characterize the public and their attitudes toward the automobile were sought and examined to give the OTA staff a better understanding of the problems and concerns inherent in automobile transportation. Also, it was felt that public commentary would help focus attention on specific points of interest. The resultant public participation program was an attempt to reach for and encourage comment from a wide variety of the U.S. populace.

Ultimately, about 1,300 people participated in the public participation program (see figure 1). They included unionists and corporate managers; members of public interest organizations and civic groups; academicians; local, State, and Federal Government officials; professional and trade association representatives; and individuals from the general, unorganized, unaffiliated public. Homemakers, technical experts, inventors, a sprinkling of teenagers and octogenarians, urban designers, educators, car enthusiasts, and veteran cyclists—men and women from across the country graciously took the time to share with the OTA staff their thoughts on the future use and characteristics of the automobile transportation system.

Figure 1.—Response Location



MOBILITY

CHAPTER

3

An auto is a headache. There is always something wrong with it. I would be immobilized without my car.

The automobile is the only reliable local transport, but the roads are so congested that much time is lost driving.

The automobile provides excellent mobility for all members of *my family. However, because* of it, *there is no alternative type* of *transportation, so we are stuck* if *the car breaks down.*

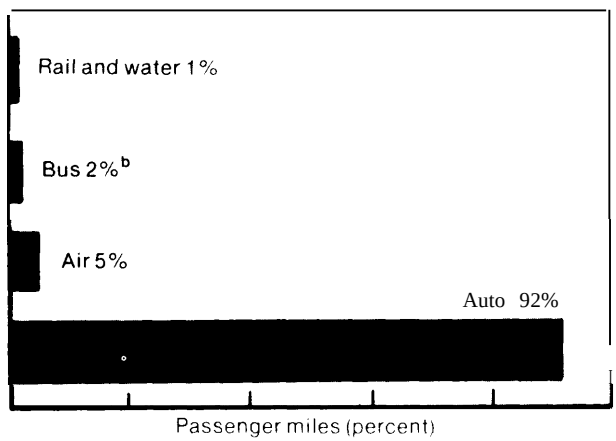
The auto provides the lowest cost transport for my *family, but it still costs too much* for us.

The car is part of our *American heritage. It is the symbol* of freedom *and independence.*

We are slaves to this gas-guzzling, air-polluting, noisy monster of technology.

These are a few of the commments heard throughout the country about the advantages and disadvantages of the automobile. They typify the competing needs and the conflicting values individuals sometimes hold. Social and economic well-being are primary goals commonly held by Americans. Essential to the attainment of these goals is the ability to reach jobs, consumer goods and services, recreation areas, and other desired activities— in short, mobility. It became apparent, in listening to the comments of individuals in many parts of the United States, that American society is not having a love affair with the car so much as it is having a love affair with mobility. To the extent that the car provides that highly valued service, it, too, is a target of much American affection (see figure 2).

Figure 2.—Modes of Personal Transportation [a]



[a] 1975 data
[b] Excludes school buses.
SOURCE: *National Transportation Trends and Choices (to the Year 2000)* (Washington, D.C.: U.S. Department of Transportation), p. 85.

Mobility, of course, is the basic purpose of the automobile, and the widespread desire for mobility provided the impetus for the rapid and widespread development of the automobile transportation system. The magnitude of the effects of this system cannot be measured solely in terms of mobility, though. It is one of the largest employers in the country. It is the largest consumer of petroleum. It is a major land user and contributor to air pollution in urban areas. Traffic crashes are a leading cause of death and injury nationally.

Because the system is so pervasive, to lack an automobile in the United States today is to lack mobility. The problem is particularly acute for four segments of the population-the old, the poor, the handicapped, and the young-who do not have or cannot use a car and who are sometimes referred to as the "transportation disadvantaged." Their incomes are typically low. With the possible exception of the young, many live in areas served poorly, or not at all, by public transportation. Where public transportation is available, service is infrequent, physically inaccessible, too costly, or not close to desired destinations. Estimates of the size of this segment of the public range as high as *40* percent of the population,

While concern was expressed for the needs of the "transportation disadvantaged" during the public participation effort, attention was focused mostly on the transportation needs of society in general. "When my car breaks down, I am 'transportation disadvantaged, ' too, " a labor union official told us. "When my husband takes the car to work, my kids and I are without transportation, " said an Ohio homemaker. "The rich can afford any kind of transportation they want. The Government subsidizes transportation for the poor. What about the middle-income people, like me, who are barely able to make ends meet in the face of rising car costs, bus fares, housing, etc.?" asked another.

Discussion frequently centered on whether mobility is a right or a privilege. The consensus appeared to be that mobility should be a right of the American public. In the midst of one such discussion, however, a Massachusetts resident asked, "Are we just assuming we must be mobile? To get a promotion, people often must move. The Government is guilty of this, as is industry. Why must one move to advance in employment?" In Alaska, a woman remarked, "Too much mobility traps us—really takes up time. " An elderly Iowan suggested that, perhaps, "mobility should be redefined. "

For the auto assessment, no attempt was made to redefine mobility; rather, the staff accepted the traditional definition of personal mobility as the physical movement of people from place to place. In considering mobility, some technological substitutes for physical movement were examined, such as telecommunications, and lifestyle and land use changes that might reduce the need or desire to travel.



Photo credit Sylvia Johnson 19799

Mobility: a right or a privilege?

Most of the respondents felt that it was not cost-efficient to retrofit mass transportation systems with equipment to make them more accessible to the handicapped or infirm. This was also the feeling of many of the elderly and handicapped people to whom we spoke. Common views were that needed equipment changes should be incorporated as existing systems are updated or replaced; separate and more flexible transportation services (such as dial-a-ride and minibuses) should be made available for people with special needs, and "transportation stamps" or a similar fare subsidy be provided to low-income people. It was never once suggested by any of the 1,300 people we heard from that subsidies for the "transportation disadvantaged" be discontinued. Instead, respondents concerned themselves with the problem of how to increase mobility for everyone.

Ironically, many of the middle-aged, middle-income, and nonhandicapped people we talked

to stressed the need for public transportation for the "transportation disadvantaged, " while many of the latter felt that public transportation was more appropriately the mode for the former. A wheelchair-bound California woman told us that even if buses were easier for her to board, she probably wouldn't use them. Why? "Because by the time I wheeled uphill several blocks to the bus stop, I would be too tired to get on the bus, " she explained. Her car, on the other hand, was far easier and less time-consuming for her to use. Elderly people said they felt safer from crime when using their own cars than they did when walking to and from and riding the bus. Low-income people pointed out that the public transportation systems that do exist were designed to move higher income suburbanites to downtown areas. Rarely were these systems able to accommodate the destination requirements of inner city, suburban, or rural poor.

In a number of places the OTA staff visited, there was debate about the seeming discrepancies between the beliefs and actions of individuals. While there was almost unanimous desire expressed for alternative modes in addition to or in place of the car, there was less agreement about who would use these modes. "Sure, people want buses—for somebody else, " a shopkeeper claimed. "There ought to be more buses. No, I can't use the bus because . . . . ," quite a few people said.

Despite these types of comments, it must be kept in mind that the overwhelming majority of the respondents indicated a desire, and more importantly, a need for additional modes of travel or ways to increase accessibility to their various activities. It is also necessary to remember that there is currently very little public transportation available, and what does exist, for the most part, does not even come close to offering the amenities of an automobile—convenience, comfort, availability, and more. As respondents were fond of pointing out, there really aren't any "viable" alternative modes at present, certainly not on a large scale.

A variety of reasons were offered for the present popularity of the car. The main one was, as previously mentioned, "There are no alternatives. " "It is a necessity, especially for emergencies, " is another comment we heard frequently. "It allows me to live and work where I choose, and to travel to places inaccessible by other means of transport. " "Riding public transportation rather than using a car is a step down in status." Industry or Government has "forced us to depend heavily on the car. " "We have cars because we want them. " "It beats walking. " Some people we heard from said they had to use the car because they were physically unable, due to age or handicap, to ride public transportation.

In some States, people commented that racist attitudes often guided modal choice and development. The ' respondents who made this claim —all of whom were white—said that public transportation has evolved in a "Catch 22" atmosphere. On the one hand, they said, public transportation was viewed as a welfare issue, and since "it is commonly believed that only minority races are on welfare, white {officialdom ignores public transportation, just as they ignore minorities. " On the other hand, "The public transportation systems that have been developed have been designed to meet the needs of higher income whites, rather than the lower income of any race. Those whites, then, won't ride public transport t ion because they consider it beneath them, so public transportation fails all the way around. "

The most frequentl, mentioned attribute of the car was convenience. In the words of one person, "You can go where you wish to go when you wish to. " "The car is there when you need it, the bus isn't, " said another. Despite time-consuming traffic delays, respondents noted that a major advantage of the car over other available modes was that car travel is faster. Additional attributes listed were flexibility, comfort, freedom, privacy, and independence. Many people said they liked the autonomus feeling of traveling in their own cars.

The load-carrying capacity of autos was often mentioned. Architectural students who had large projects to transport to and from class, homemakers who shopped for their families, traveling salespeople who carried samples of their wares, all appreciated the space a car provided for their "freight, "

Ease and dependability were also favorite attributes, as were route choice and choice of company. The **latter** evoked an array of complaints about "gum chewing, " "foul smelling, " "impolite" individuals with whom the respond-



Phota Credit Sylvia Johnson 1979

The load carrying capacity of autos is a help to this suburban homemaker

ents had had to share public transportation at one time or another. Many people claimed that the car provided the most economical form of travel. Those who made this claim invariably added that they traveled in groups, i.e., with their families on vacations or in carpools for commuting.

For many of the respondents, efficiency, cleanliness, and adaptability were important aspects of a car. A handful of individuals, mostly homemakers, claimed additionally that a drive in the car was the only place "to get away from it all."

In describing those aspects of the car they appreciated the most, people commonly coupled their remarks with, "I need the car for work." This was particularly true for commuters who lived at the fringe of suburbia or residents of rural areas where distances between home, employment, and recreation areas are great, and public transportation is either unavailable, minimal, or poor. Others indicated a need for the car to carry out the responsibilities of their jobs.

Occasionally, pleasure was cited as a plus for automobiles. The pleasure derived from the

Table 1.—Passenger Car Use*

Purpose of travel	Percent distribution: Percent of trips	Percent of travel (VMT)	Average trip length one-way (miles)
Work, including commuting	36	42	*10.2*
Family business, including Shopping	31	19	5.6
Educational, civic, or religious	9	5	4.7
Social and recreational	23	33	13.1

'1969 data

SOURCE Federal Highway Administration Nafionwide Personal Transportation *Study* Report No 10. Purposes of Automobile Trips and Travel 1974 p 13

"pride" or "luxury" of ownership, "ego satisfaction," "power behind the wheel," "pleasant sensations when driving," and "prestige of owning a fancy vehicle." An Ohio businessman told us, "It's fun to drive and be in command of my Spaceship Capri with all its gadgets—CB, AM/FM radio, central window and door lock controls, odometer . . . ."

A similar viewpoint which surfaced repeatedly in the discussions on mobility focused on the "psychology of mobility." "We must understand why mobility is so highly valued in order to develop viable alternatives to the car should it be-

come necessary to do so. " "Is mobility fun in itself, or just a way of getting from one place to another?" "Attitudes should be examined. " "The influence of affluence should be considered. " "What is the collective interest as opposed to the collective individual interest?" "social contact is lost in cars. " "Teenage morals are lost in cars. " "The little car is destroying us socially. I can't stand my kids on long trips in a small car. " "Our inclination is to say that the individual car is here to stay and should be, but we're not sure — is Detroit influencing our wants and desires?"

A related perception was the need to understand the "psychology of automobility, " or-, as one person succinctly put it, the "you-are-what-you-drive syndrome. " A vehicle's size and style often compose a partial profile of the owner. For example, "I believe in conservation and helping to improve the environment, so I drive a Volkswagen and carpool to work, " an urban New Englander told us. A young Maryland man stated, "I want to impress my friends with my toughness, so I drive a 'muscle' car. " A midwesterner said, "I *grew* up in a poor section of town and have worked my way up. My old friends and family know I'm making i t when drive i n my expensive, new car. "

The OTA staff did not attempt to do a detailed behavioral analysis during the assessment of the future of the automobile, nor were the various amenities compared —beyond the mobility offered by each—of currently available modes. As a frame of reference in the technical part of the analysis, the staff developed a "base case" which projected general automobile system characteristics and use under two assumptions: 1) the automobile has a continuing role in satisfying travel demand, and 2) current Federal Government policies and programs would continue in substantially their present form until 2000. This allowed the staff to estimate adverse and beneficial effects that could result from pursuing present policy and provided a reference point for comparing alternatives to current policy. It was not intended that the base case be



Photo credit. New York City Transit

Public transportation in New York City

interpreted as the auto staff's idea of a probable, or even possible, future.

Some of the base case projections were that:

- the automobile would remain the dominant form of transportation,
- the number of autos would increase by 50 percent,
- vehicle miles traveled (VMT) would increase 75 percent,
- road construction would diminish substantially, and
- congestion would triple.

To enhance mobility, the following policy options were considered:

- increase in funding for public transportation, including paratransit,
- auto disincentives to encourage public transportation ridership,
- implementation of transportation system management techniques (such as improved vehicular flow and increased ridesharing) to reduce congestion, and
- change in land use development patterns to minimize travel requirements.

To a limited degree, the potential impact of technological substitutes for travel (such as telecommunications) and lifestyle changes (such as alternative work schedules) were considered also,

A major finding of the technical analysis was that only a severe petroleum shortage or gasoline rationing would result in major reductions in automobile travel. A fivefold increase (over 1975 levels) in Federal funding assistance to public transit could increase transit ridership by up to 50 percent in dense urban areas. Current ridership is so low, however, that even a **SO** percent increase would have little overall impact on auto travel. (Mass transportation now accounts for less than 2 percent of total passenger miles traveled. A ridership increase of 50 percent would raise that total to only about 3 percent.)

Perhaps, as a Virginia respondent suggested, the goal here should be to decrease congestion by *50* percent, rather than to concentrate on increasing transit ridership by 50 percent. By focusing on lowering congestion, she claimed, there would probably be more efficient utilization of existing facilities without the necessity of major capital expenditures. In her opinion, the existing facilities that could be used more effectively included transit (higher ridership; better intermodal interface) as well as highways (increased ridersharing; improved traffic flow, especially for high-occupancy vehicles). OTA's study of this question concluded that transportation system management, which is essentially what the Virginia respondent had in mind, would have useful application only in the short run, and even then, would have minimal impact on reducing auto travel. Respondents, in general, appeared to feel otherwise.

Like the elderly Iowan who suggested that a redefinition of mobility might be in order and the Virginian who implied a need for redefinition of goals, many respondents said that the Federal Government should "rethink its approach" to transportation. Our current approach, as interpreted by these respondents, is "to concentrate on modes and not needs. " The Government tends, they claim, to concentrate "on how much money to give a particular mode, " instead of "how much money or other support is necessary to ensure mobility, regardless of the mode. " More simply, the travel needs of people should dictate the approach to transportation system development, rather than the capital needs of various modes. "Transportation planning should not be done in Detroit, " stated a Tennessee man.

It was also apparent from the responses of many people that they felt a variety of actions was needed to alleviate the adverse effects of auto travel and to facilitate overall mobility. The actions they suggested ranged from nontransportation options (land development changes, alternative working patterns, improved communications) to a multiplicity of modal options (from improved cars to advanced public transportation systems).

The OTA technical assessment concluded that changes in lifestyle, land use patterns, or the development of advanced communications systems as a substitute for travel could have significant impacts on auto travel, but probably not before *2000.* This is due, mainly, to the long leadtimes needed to implement such changes on a large enough scale to have a major impact.

Many respondents interpreted the phrase—"change of lifestyle''—as meaning a "decrease in

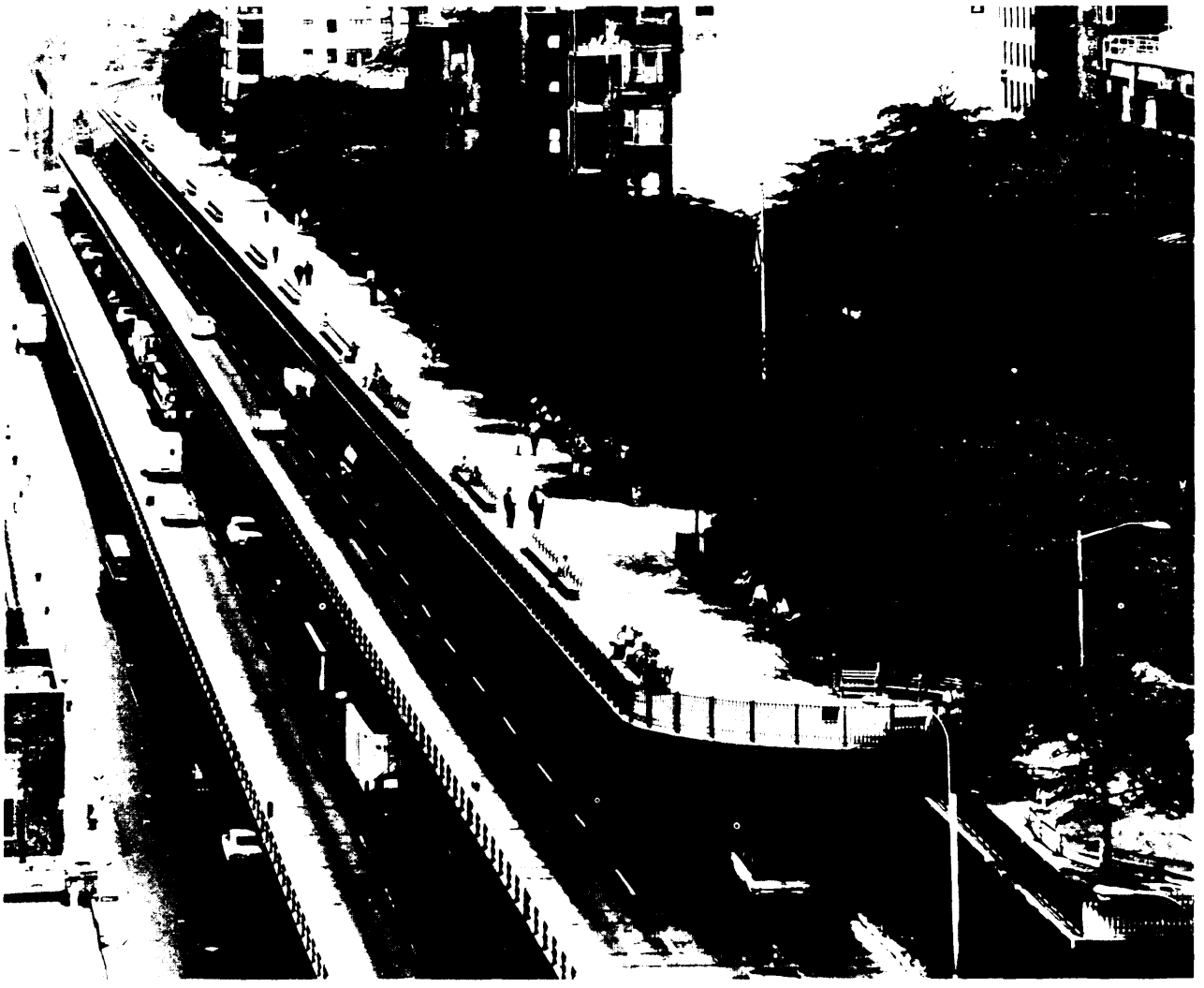


Photo credit David Plowden

Land use planning—The Brooklyn-Queens Connecting Highway at Columbia Heights, N.Y. No extra land in addition to the freeway right-of-way had to be bought to create the promenade in Brooklyn— and the right-of-way for the freeway itself is only 50 feet wider than the old street over which the entire structure is set

the comfort index. " They viewed it, for the most part, as a lowering of their standard of living, a "return to primitive living. " They did not think that any reduction in "quality of life" was necessary insofar as mobility and the adverse impacts of automobility are concerned.

Technology was not the constraint, they maintained, to the alleviation or resolution of societal problems, such as mobility. It is, instead, institutional arrangements (Government regulations, for example) and a lack of basic understanding of human behavior and needs that constrain the availability of mobility. "The Federal Government must do away with barriers to innovation, " a city dweller in Alaska said. "Carpools are not active here due to insurance restrictions, " said another person. "All of us need to be thinking about the psychology of mobility, " stated a Portland, Oreg., resident. "Kids shouldn't be expected to ride buses, if adults won't. "

Because mobility and automobility have become almost synonymous, attempts to restrict use of the automobile have been regarded generally as infringements on mobility. It is now recognized, however, that unrestrained automobility may conflict with other national goals and that reducing automobile travel may be an important means of achieving major energy, environmental, and safety benefits.

Respondents in a variety of locations stated that the "reasons for the search for alternatives to the automobile are congestion, pollution, and land waste. " We were often told that more is at issue than roads in the many highway fights throughout the country. In one area, a resident said that neighborhood cohesion and the sense of community were at stake, The controversial highway "would create a Chinese wall in the midst of the community . . . local streets would be cut off and the neighborhood chopped in half. " In other places, respondents said it was "corporate economic interests vs. people's interests; " "urban vs. rural interests;" "suburbanites pitted against city dwellers;" "entrenched roadbuilding bureaucrats vs. fanatic environmentalists;" or, "the perpetuation of the automobile to the detriment of transportation. "

The prospect of reducing automobility to promote other social goals raises many questions. Can the American public modify its preference for automobility —a preference encouraged by the Government for decades and fostered through billions of industry advertising dollars? Will the intended reductions in automobile usage actually occur, and will projected energy, environmental, and safety benefits materialize? Will, for example, parking restrictions for commuters merely result in more auto trips by family members using; the cars that are left at home? Will a higher gasoline tax or a special tax on fuel-inefficient cars discourage their purchase, but actually increase the distances driven per car owner as consumers begin switching to fuel-efficient automobiles? Knowledge of how the automobile best functions in a transportation system is imperfect, and it is not known at what point increased automobile use becomes self-defeating or, conversely, at what point decreased automobility might lead to increased mobility.

Limiting automobility and increasing overall mobility are not necessarily incompatible goals, particularly in urban areas where two-thirds of the population now lives. "All reports, from the local to the national level, conclude that something has to be done about transportation problems, so it's just a matter of what and when, " a Tennessee man told us.

The overwhelming consensus of the respondents was that there must be "viable alternatives" to the automobile transportation system. By "viable" they meant additional modes that were "truly competitive with the automobile" in terms of availability, comfort, and cost. "We should never get tied to one system, because when it breaks down, we are in serious trouble. "

While there was strong support for alternatives, opinion diverged on whether or not the alternatives should be developed as "supplements" to automobile transportation, as an Ohio transit official felt, or as actual "substitutes" for auto travel, as other respondents (including many car enthusiasts) advocated. The respondents were almost unanimous in their support for a multimodal system, however, and the multimodal system often included an "improved car. "

OTA's study of trends in automotive technology indicates that the car of *2000* will be smaller (due to downsizing for energy efficiency) and lighter (due to materials substitution). The use

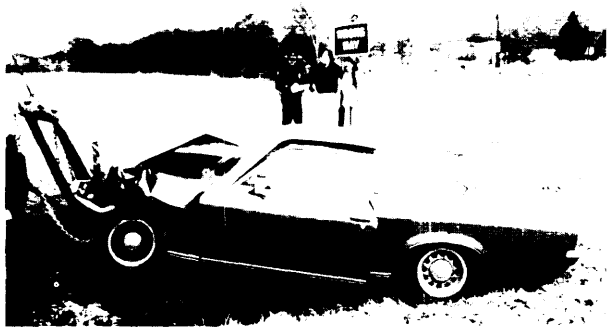


Photo credit University 01 Tennessee



Photo crdit: Sylvia *Johnson 1979*

Mobility at a standstill
The risks involved--accidents and parking violations— note the boot on the front wheel of the car on the right for violating parking restrictions in an urban neighborhood

of plastics and aluminum will increaser while the use of steel and cast iron will decrease. Fuel economy is expected to increase, averaging 27.5 mpg by the year 2000 (the fleetwide average is now 15 mpg). Production of alternative fuels probably will be limited, so gasoline would remain the predominant form of energy needed Additionally, if manufacturers meet emission standards specified by the Clean Air Act, the "improved car" would also be cleaner in 2000, but pollution would continue to be a problem in congested urban areas.

"We are not married to the Detroit auto, " said an auto club official. The "improved car" of the future, according to the respondents, should be smaller, lighter, safer, energy efficient (preferably fueled by something other than gasoline), nonpolluting, cheaper, and more durable. Objecting to the trend of downsizing, an Alaska respondent quipped, "Next year I'm gonna buy a small car, and the following year, I'm gonna buy one for the other foot. "

Worried about the use of lighter weight materials in automobiles, a California fleet manager said he hoped more thought would be given to safety because "building foam rubber dodgem cars won't protect us" from bad drivers. He noted, however, that "3, **000** lbs of machinery to move a 200-lb person horizontally in a seated position represents the ultimate in overkill. " On the east coast, a similar comment was made by a young art student: "It is silly to have **2** tons of metal to move 100 pounds of me. "

A variety of owner-ship arrangements was discussed by respondents. *Some* individuals preterred a rental car option. Others suggested municipal or neighborhood ownership of a car fleet. Still others mentioned the possibility of wide-scale joint ownership of vehicles (a practice that appears to be slowly growing now, especially in the purchase of recreation vehicles, such as boats and campers). Most of the respondents who talked about an improved car said they felt either that it should be or that it would continue to be an individually owned mode. As one person said, "People will drive as long as fuel is available. " "Americans are willing to risk the hazards and expense of driving for the convenience, " a businessman told us.



Photo credit Sylvia Johnson 1979

A **sightseeing shuttle bus is one transportation alternative for tourists**

Should the auto be the major form of transportation in 2000? Yes and no was the "clearcut" answer we received. Of those who responded affirmatively, more than half said, in essence, "yes, but . . . ." Some of the more common sentiments were:

- The car should be part of a multimodal transportation system.
- The car will dominate, but it will be an improved car.
- The car will continue to be the major mode in rural areas, but certainly not in cities.
- Autos shouldn't be the major mode, but probably will be.
- Cars should be used for recreation, not cormmuting.
- If substitute fuels are found and costs are lowered, autos will continue to be the majpr mode.
- Cars will be the major mode unless something better is found.

The "something better" most frequently su - gested was a form of mass transportation. "Americans enjoyed the privilege off commuting by mass transportation before autos infested our country, " a railroad buff wrote us. Both respondents who said that the automobile would continue to dominate and those who said that the automobile should not be the dominant mode stressed the need for a for a multimodal system.

When asked how they would design the personal transportation system of 2000, about half of the respondents described a multimodal system with a car (in some, the automobile dominated; in others, mass transportation dominated). About half described a multimodal sys-

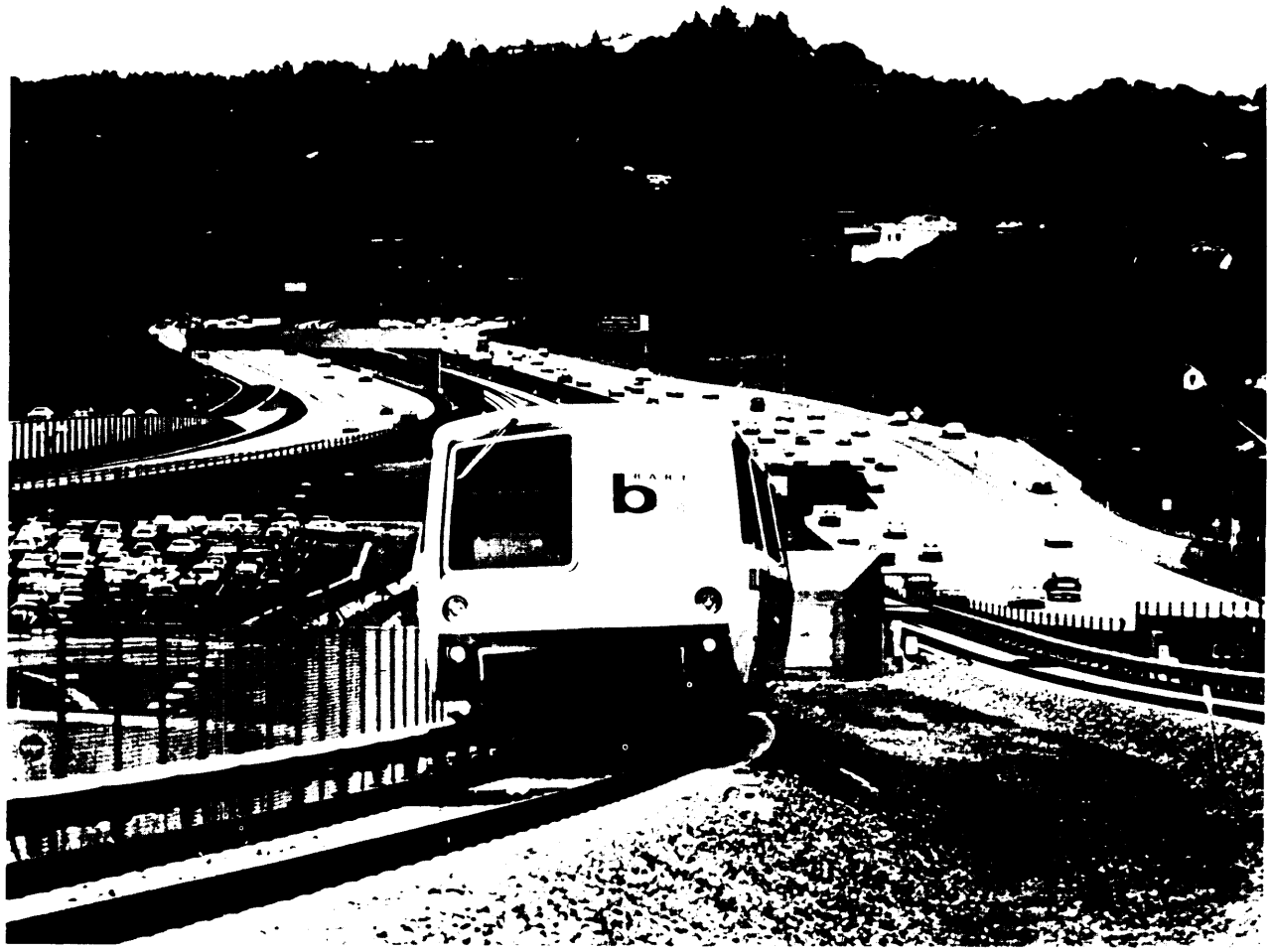


Photo credit: U.S. Department of Transportation

Subway systems: "something better?"

tern without a car. A very small number of respondents said the system should remain as it is now. Whatever the components, plans should be designed "for moving people, not moving vehicles, " according to most respondents.

In general, the respondents—pro-car, no-car, and those who took the middle ground—emphasized the desire for increased mobility for all segments of society. They stressed the importance of good intermodal connections. "If a transbus can accommodate wheelchairs, why not bicycles?" a group of cyclists asked. "All the time I save flying from one city to another is lost in trying to get from the airport to my place of business, " a salesman noted.

Clear and concise information about fares and routes would be readily available and easily obtained in these futuristic systems. Vehicle designs would be more practical and changed less. Buses, for example, would have "wider doors and seats, lower steps and floors, and windows that open but don't blow you out of your seat. " A surprising number of people said they would separate cars and trucks.

The mass transportation of their collective design would be economical, environmentally sound (quieter and nonpolluting), widely available, efficient, frequent, convenient, demand-responsive, fast, safe, clean, comfortable, and dependable.

Of the additional or substitute modes suggested, fixed guideway systems appeared to be most popular. A wide variety was mentioned—conventional train, rapid transit, trolleys, advanced group rapid transit, monorails, and automated highways. "Railroads were viable

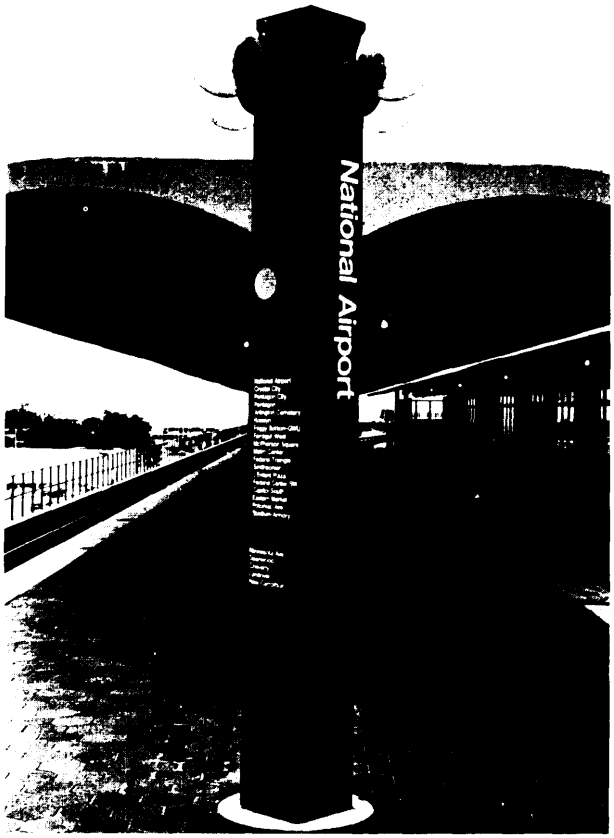


Photo credit Sylvia Johnson 1979

A route sign for public transportation, National Airport, Northern Virginia

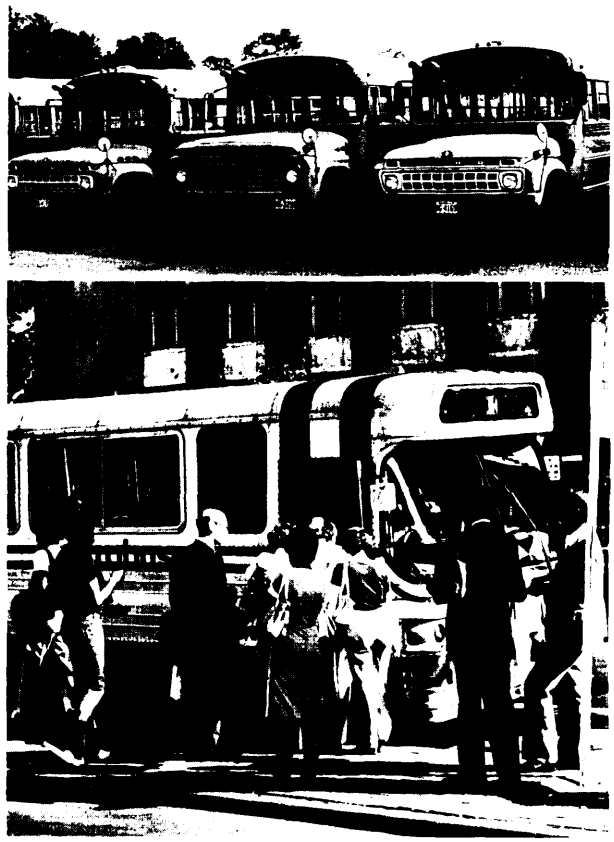


Photo Credit Sylvia Johnson 1979

A popular mode: buses. School buses could be used to meet general transportation needs

when we had less population, " a northwesterner pointed out, "but opponents today would have us believe that present high densities are not enough to support rail. "

The next most popular mode was buses. Recognizing the need to reduce congestion, officials from one State auto club said they were encouraging members to ride a bus at least once a week. "You may like it, " they are telling members. Just as they stressed the need for improvements in the car, respondents stressed the need for improved buses.

"A bus is just a bus now. There's no choice in types and styles like cars and trains. Maybe we need a variety of buses—some with champagne service, for instance, and some without, " an urban designer said. Buses shouldn't be on "wandering goat routes" either, a New Mexico man complained. Many respondents claimed that advertising for buses was needed to counteract the "sex appeal advertising for cars. " Much to the amusement of those around her, one workshop participant wondered aloud what a "sexy bus would look like. " Other respondents felt that more use should be made of school buses for general transportation. A southerner suggested a "quick change" bus—one that could be used for carrying people during the day and converted to a freight carrier during the night.

Air transport was the third most favored form of future travel. "Hovercraft," "flying cars, " "commuter helicopters, " and "antigravity machines, " were among the new forms suggested by respondents, in addition to expanded use and improvement of conventional modes currently available.

Cycles—primarily bikes, but also motorcycles and mopeds—were frequently included in the future transportation system designs. "A bicycle with a bubble to protect me from rain and cold weather would be ideal, " a Washington, D, C., woman said. There was considerable discussion about whether there should be separate pathways for bikes and motorized vehicles. Cyclists argued that separate pathways would limit their travel, unless the network was

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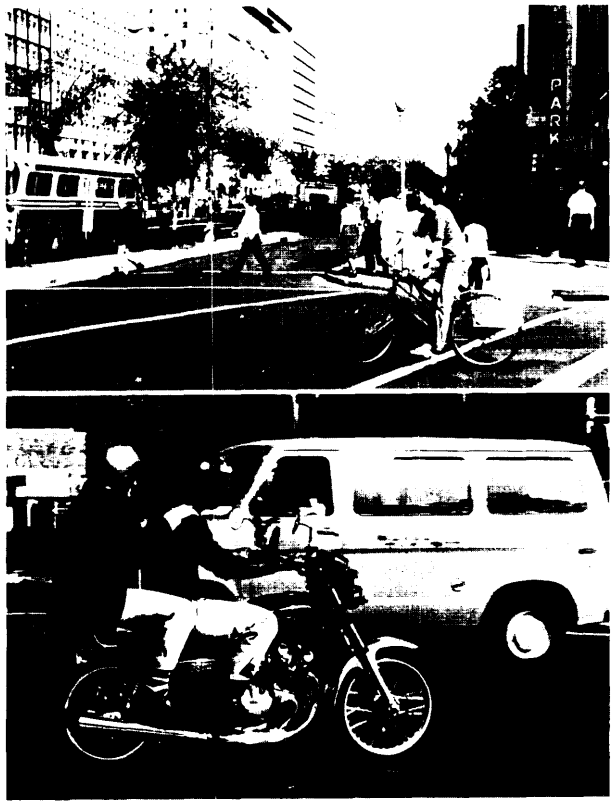


Photo credits *Sylvia Johnson, 1979*

Cyclists, pedestrians, and motorists

as extensive as roadways, They seemed to favor dedicating more existing road space to cyclists, rather than using up additional land for bike traffic. In making provision for increased biking in their year *2000* plans, respondents often noted the physical benefits that would derive from cycling.

For the same reason, walkways were often included in the respondents' plans. The following brief exchange, which took place in Alaska, was similar to what we heard in other parts of the country:

First person:	"Walking is a viable alternative now. "
Second person:	"No, it's not, not now. It's very dangerous. "
First person:	"Yes it is. Inconvenient, yes, but also viable. "
Third person:	"Well, kids walk all over the place. The viability of walking is probably more a matter of attitude than space. "
Second person:	"But providing space might change those lazy attitudes . . . ."

Non-transportation options were invariably part of the schemes. Of these, "land use change" was the most frequently mentioned. "We need a Marshall Plan for the United States. We're a mess, d sprawling mess, " an Oregon respondent stated. Other options often discussed were alternative working patterns and telecommunications.

Not surprisingly, congestion was eliminated in all personal transportation schemes for the future. "Let's not waste time trying to cure congestion after the fact, let's prevent it in advance, " said one individual, reflecting the views of many respondents.

The OTA study projected that congestion would almost triple by the year 2000, despite improvements in traffic management. Buses probably will remain the backbone of urban public transportation and the principal alternative, though a limited one, to the automobile for intercity travel. There will be some minor improvements in comfort and ride quality, and some advances in increased accessibility (lower steps and wider doors, for instance) for the handicapped and elderly. In general, however, no major changes in bus technology are expected. Some shift from heavy to light rail for new urban transit systems may occur. Automated guideway transit will see only limited application by 2000. Overall, the technical research findings show that an auto-dominated system (with some improvements in engine technology, fuel efficiency, and pollution control) will continue in the year 2000.

Whatever the system, respondents insisted on a "consistent mobility policy, " not a "continuation of the car vs. transit policy. " "There is no such thing as private transportation any more, " a northern man remarked. "The car is not private transportation. Even though private individuals may own them, the public pays for them—from the subsidies for research to improve them; to the roads they ride on; to the bad effects of their usage, such as natural resource exhaustion, pollution, and congestion .-We have to have public consistency in our transport policy, " he explained.

The OTA technical analysis indicated that the major threat to mobility was the supply of affordable energy. The majority of the respondents, however, viewed cost as the principal threat to mobility. As one individual said, "Economics got us into the car; economics will drive us out. "

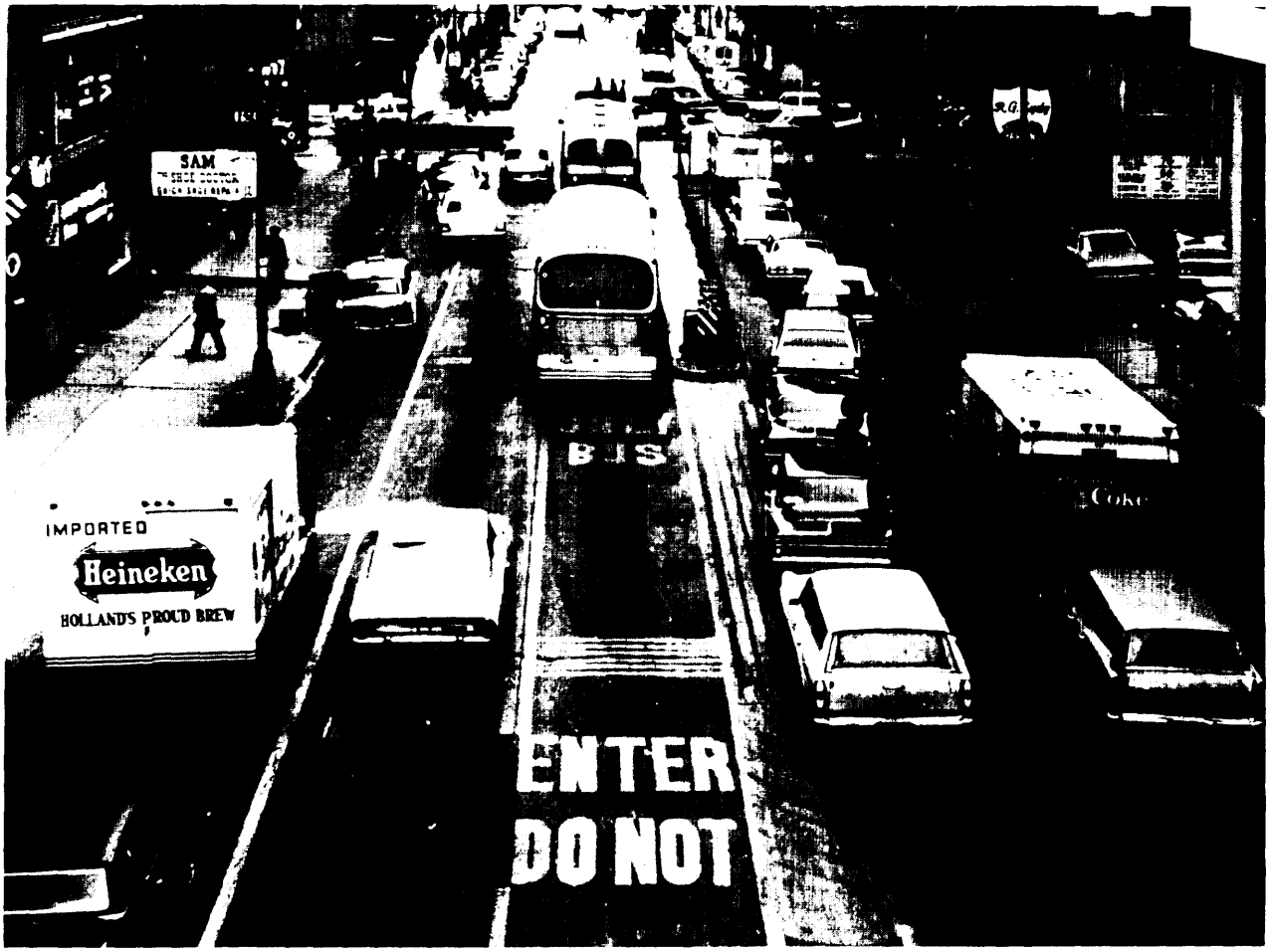


Photo credit: U.S. Department of Transportation

A "consistent mobility policy" is needed, not a "car vs. transit" policy

COST

CHAPTER 4

One point became abundantly clear during the course of the public participation effort. There is little knowledge and even less understanding on the part of the public, including Government officials, about the actual costs off the American transportation system and its various components. There is also a lack of understanding about the way costs are computed and compared. In short, as many respondents said, "There is lots of confusion over what is and isn't on costs. "

"If costs were figured accurately, roads might not always be built, " remarked a highway official from a northern State. A southern rail employee said, "Highway planners have always compared the costs of highways to the cost of public transportation, and never included the cost of the automobile. Automobile costs must be included; otherwise, the cost comparison will not be fair. "

From nontransportation workers we heard: "The cost of municipal services for the auto should be included in statements about the cost of the automobile transportation system. " "We need information on the true costs of the car system (cost of health care, roads, parking, pollution from cars) to make accurate cost comparisons with other modes. " "What is the cost of reglation?"

A misperception of many respondents was that motorists, through highway users' taxes pay all the costs of the automobile transportation system. In actuality, these taxes cover *70* percent of the cost of road construction and maintenance, administration and research, safety (including highway police), interest, and debt retirement. The remaining support comes from government revenues drawn from property and miscellaneous taxes, bond proceeds, investment interest, and general fund appropriations.

The OTA technical analysis shows that approximately *$28* billion was spent for highway purposes by all levels of government in *1977.* The Federal Government provided about one-quarter of that amount. Federal financial support is not limited to highway projects, however. It included such things as special tax allowances for the fuel and materials industries, and R&D programs.



Photo credit Sylvia Johnson, 1979

Major road construction in urban Virginia

A substantial number of respondents viewed the Federal Government as "so heavily involved in the cost structure [of the automobile transportation system] that to back out would cause chaos. " When some individuals would say, "Let's hope we don't turn to Government financing for personal transportation, " the aforementioned respondents would counter with, "We're already there. Do we dig in further or get out?"

The confusion over what an individual pays and what the Government contributes to personal transportation stimulated discussion on private versus public financing of transportation systems. "Government interference in the automobile manufacturing industry should be discontinued at once. Let the manufacturers get back to competing for the marketplace. Free competition will lower consumer costs. " "Government mandates elevate costs, said one



Photo credit U.S. Department of Energy



Photo credit Sylvia Johnson 1979

Confusion exists on the individual and public costs of personal transportation

group. Another said, "The Government must protect the consumer from industry price-fixing and price-gouging. "

There appeared to be a slight preference among the respondents for "marketplace control of the costs" of the automobile (or "individual") transportation system. Some respondents thought this would bring car costs down. Others, however, felt that "full cost pricing" would cause substantial price jumps, and as a result "might change the face of personal transportation in the United States. "

Opinion was about evenly split, however, on whether mass transportation should be publicly owned and operated, or owned and operated by private enterprise. There was wide agreement that mass transportation should be "cost competitive" with the car. Disenchantment with the Federal Government's management record, rather than the use of public funds for transportation, was the main bone of contention in the discussions.

Table 2.—Costs of Owning and Operating an Automobile, 1976 (cents per mile)

	Type of auto		
costs'	Standard	Compact	Sub-compact
Depreciation	49	38	32
Maintenance, accessories, parts and tires	42	34	31
Gas and 011 (excluding taxes)	33	25	18
Garage. parking, and tolls	22	21	21
Insurance	17	16	15
State and Federal taxes	16	12	09
Total costs per mile	179	146	126

" Based on driving 10000 miles per year
SOURCE: Federal Highway Administration. Costs of Owning and Operating an *Automobile. 1976. p 2*

The use of public funds to provide mobility for the transportation disadvantaged met with no opposition, and there was little discussion on the amount of funds being or to be spent. The topic hat did stimulate debate was the application of such funds. Do you provide separate transportation facilities for- the disadvantaged, or do you provide transportation subsidies for disadvantaged individuals and let them choose which mode best suits their needs? Do you make **all** transportation accessible to all segments of the population?

Some individuals felt that mass transportation was a "welfare" issue and, as such, was appropriate for all "transportation disadvantaged. " Welfare is thought of primarily in economic terms. The "transportation disadvantaged" from whom we heard most often were not as concerned about their ability to pay for services as they were concerned about the accessibility of transportation facilities. In many instances, they pointed out how much easier and more practical it was for them to travel in a car than on public transport. "Most public facilities—whether it's restrooms, movie theaters, or buses—are not built to accommodate short people (like children), slow-moving elderly people, people on crutches or in wheelchairs, " they noted. The same is true of mass transportation. Low-income people pointed out that public transportation systems rarely served their destination requirements. In other words, said the "transportation disadvantaged" among the respondents, "public transportation is designed to accommodate the 'transportation advantaged'. "

Because they are now predominantly dependent on the autombile, most of the respondents spent time discussing their worries about the out-of-pocket expense of cars. For the most part, the respondents perceived the purchase price of automobiles as higher than ever and rising rap idly. They were partially right. In fact, the cost of automobile ownership and operation (in constant dollars) decreased steadily from 1960 to 1973. Since then, however, the trend has reversed, due primarily to the increased costs of fuel, repair, maintenance, insurance, and emissions control and safety features.

With regard to repair and maintenance, the general feeling was that the industry should be encouraged by the Federal Government and pressured by consurncrs to make more durable, less complicated vehicles with less frequent exterior design changes and more practical internal design. “Detroit controls the auto industry and should be encouraged to develop a better product. ” “Obsolescence is a goal to be done away with. ” The complexity of equipment is exacerbated by Gov e r n m en t regulations, many respondents charged.

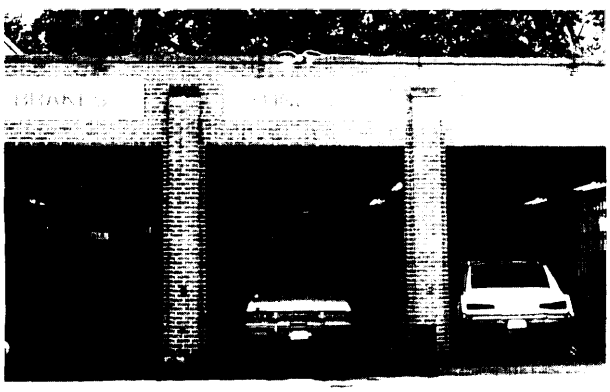


Photo credit Sylvia Johnson 1979

Repair and maintenance services

Feeling “ripped of f,” respondents complained bitterly about “inadequate,” “poor-, ” “overpriced, ” and sometimes “fraudulent” maintenance and repair services. Mechanics should be required to pass a “competency test’ and be “licensed to practice, ” some individuals said. “There should be more public trade high schools or more vocational training” to} increase the number of mechanics and improve their skills. “Car repair shops should be regulated” to ensure good and reasonably priced services.

Those who were annoyed by both the cost and shortage of parking —Washington, D. C., residents, in particular—often pointed an accusing finger at the Federal Government for not adhering to rules it mandated for many jurisdiction across the country. While Federal agencies are pressuring States to raise parking fees and reduce parking spaces, these same agencies are providing their employees with free or low-cost parking. Parking cost was often a factorr in a respondent’s opinion that the car was an uneconormical form of travel. In addition, many respondents were bothered by the “necessity” of owning more than one car, the decreasin finan - cial value of vehicles after purchase, and the increasing operation costs.

Insurance was occasionallly mentioned because of concern over rising premiums and the need for financial prpoectio in case of acciden t. The four most common suggestions made by the respondents were that the Government should control insurance costs, "nationalize" the insurance industry, inst itute a nationwide no-fault insurance pollicy, require all drivers to have insurance.

The OTA study found that insurance costs have declined in real dollars since 1950. It is unlikely that such declines will continue because the number of accidents is expected ti increase, and the cost of medical care and car repair are rising. Consequently, the OTA staff briefly examined three policy options to control consumer costs: national no-fault insurance and other modifications in insurance practices, Government regulation of repair practices, and Government incentives or standards to increase automobile durability and maintainability.

Respondents most frequently suggested increased mass transportion and increased ridesharing to relieve congestion. The OTA study considered an additional measure—pricing —as a curb on congestion. Under a congestion cost-pricing scheme, motorists would be charged a fee to drive in specific areas during peak travel times. Theoretically, the fee would be propertionate to what a driver contributes to the total congestion of the area. A successful demonstration prograrm of congestion cost-pricing was carried out in Singapore in 1975. The traffic restraint scheme included parking fees, area licenses, and a park-and-ride system to provide motorists with an alternative mode of transpor-

tation. To enter a designated area where congestion was to be reduced, a driver had to display a supplementary license that could be bought in the post office or other public service areas. Mass transportation, including carpools, was exempt from the additional license requirements. Within 6 months after implementing the program, the volume of traffic entering the restricted zone had been reduced by 40 percent.

The economic structure of the automobile industry was briefly examined in the OTA assessment in terms of the number of jobs involved and the impact of the estimated costs of Government regulation. Many of the people we talked to preferred less Government regulation and more marketplace control over products and prices. A large number, however, were critical of what they perceive as "sluggishness" on the part of industry in innovation and quality control, attitudinal manipulation through advertising, and unwarranted profits. "Big industry has too much control. We should be more observant of industry impact on our lives, " we heard many times.

Respondents felt that, in addition to looking at industry structure and performance, OTA should also consider the structure and performance of the Federal Government. The majority of the respondents were very critical of Government's management record. "The Federal Government should coordinate its activities better. " "The Federal Government needs to do a better job leading, clean up its management efforts, and waste less money. " "It is institutional, not technological, problems that constrain the development of decent transportation. " "We feel that the Government should be an activator, not a controller. " "The Government shouldn't own and operate anything; it should broker services, "

"The Federal Government belongs in the picture, " a New Hampshire man told us, "but they've just mishandled things so far. " He went on to explain that the "railroads are screwed up because they end up in congressional committees concerned with regulation. The highway program **was** successful because it was handled by a construction-oriented committee. If railroads had been the responsibility of the Public Works Committee instead of the Interstate Commerce Committee, railroads would be in good shape. "

Others claimed that Government policies have distorted the development of an adequate personal transportation system. An Oregon man wrote, "Through your office, I appeal to our Federal Government to create a politico-economic environment wherein the intrinsic merits of each mode determine the nature and extent of its use. Unless Government ownership of roads and facilities for navigation and aviation ceases to distort relationships, equalization of opportunity to demonstrate merit demands comparably heavy public investment in railway facilities. " Another said, "Federal money influences States to do wrong things, like building unnecessary interstates that they can't maintain, when the State road system is good enough. "

Public investment in and the financing mechanism for the Nation's roadway network were examined by the OTA study. It was projected that road construction would taper off, and maintenance and repair activities would grow. In general, respondents indicated little desire for major new road construction anywhere in the country. "The Government shouldn't provide roads we don't need and can't afford, " Instead they felt that efforts should be directed at "protecting the current investment" in the roadway network by promoting more efficient usage and better repair and maintenance. The OTA analysis highlighted the future need for highway maintenance and its spiraling cost. It was noted in the analysis that there is confusion over what actually constitutes "maintenance" and how such activity could be best financed. Some individuals felt that the Highway Trust Fund should be used to provide incentives for more efficient use of the Nation's highways and pay the costs of repair and maintenance. Many individuals opposed trust funds, saying that: "Trust funds are too rigid in long-range planning. They don't give Congress the flexibility to change according to needs. " Such funds "tie us to one technology too much. "

In sum, respondents felt that the cost structure of the American personal transportation system is so complex, and the Government's involvement in it so intricate, that it merits a far more detailed examination than the OTA study was able to give it. "The Federal Government should re-examine its overall transportation funding policies in order to discover and understand the inequities, before it attempts to modify or transform the system. "

ENERGY

Chapter 5

"The Federal Government's credibility is not too good on the energy issue, " a midwestern farmer told us. "One agency announces one thing on Monday, then another Federal agency announces just the opposite on Tuesday, " Similar remarks were heard throughout the country. Most respondents felt the energy situation was more a political problem than a supply shortage at present, although they readily acknowledge concern about the limitations of all natural resources.

An Alaska workshop participant voiced a recurrent comment we heard: "When there is an abundance, we waste the i tern, whatever it is. " The often expressed desire for conservation measures stemmed, of course, from the concern about supply limitations. The prevailing opinion, however, was that the "energy crisis" was contrived by industry to justify increased prices.

Fuel cost was the central theme in discussions about energy. Several respondents urged that consumers and Government policy makers

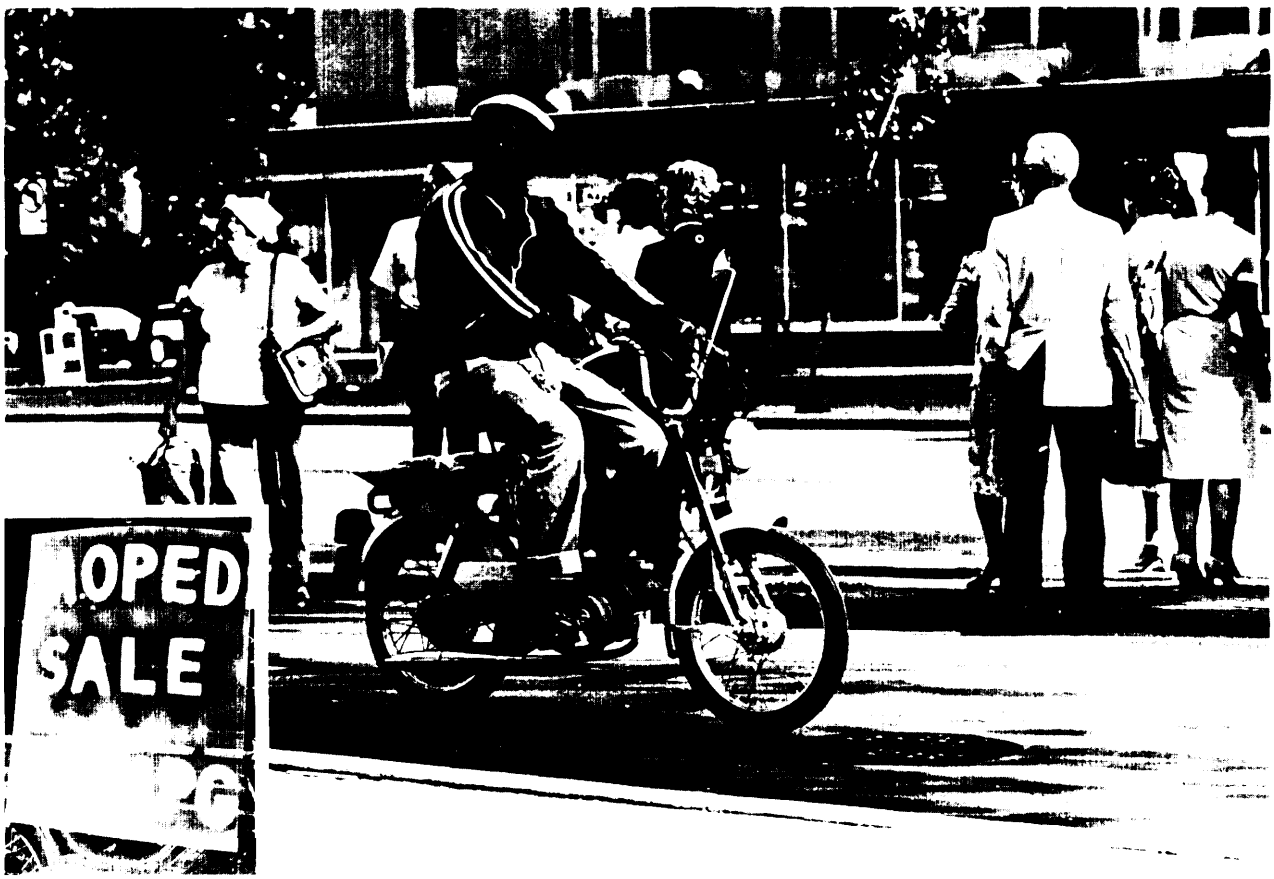


Photo Credits Sylvia Johnson.1979

Miles per gallon is a selling point for this transportation mode

"look at the cost, not the price" of fuel in their deliberations on the subject. Despite respondents' annoyance a t what they perceived as unfair fuel price increases by the oil industry, they most often suggested deregulation of gas for seemingly contradictory reasons.

There was a belief that deregulation would encourage more competition within the fuel industry and consequently serve as a control on price levels. "We feel strongly that the free market should be allowed to set the price of fuel . . . . This would be a strong form of control," a group of southwesterners said. "There would probably have to be some allowance made for the poor, though." It was also believed that deregulation would result in the surfacing of the "true cost" of fuel which would most likely be higher than current levels. These higher leves would then induce supply conservation -- higher prices wouldd encourage less purchasing and more efficient use of petroleum. In line with this second belief was the oft-repeated request that the Federal Government raise gas taxes substantially —"not in dribs and drabs" —to serve essentially the same purpose: conservation.

Rationing was seen by many as a plausible conservation tool and the most equitable in terms of distribution. Another mechanism for saving fuel that was often mentioned was accessibility —changes in land use development patterns to minimize travel needs. In the North, East, South, and West, we heard that "most people favor the 55-mph speed limit, but don't follow it. The Government must enforce this law to save gas, and more importantly, lives." Better traffic management is needed, they added, to reduce congestion and save fuel. "It makes no sense to have 55-mph speed limits, 70-mph road designs, and 125-mph engine capacity," said a woman race car driver. In some places, we were told that "lifestyle and driving must slow down t o save energy." Overall , respondents seemed to agree that, while individuals shared the responsibility for using natural resources wisely, the stimulus for conservation probably would "still have to come through external forces," i.e., the Federal Government.

The ever-present threat of another oil embargo and the prospect of severe depletion of worldwide petroleum supplies led the OTA auto staff to consider policy options that would reduce auto fuel consumption and expedite development of alternative energy sources. The petroleum conservation policies considered were:

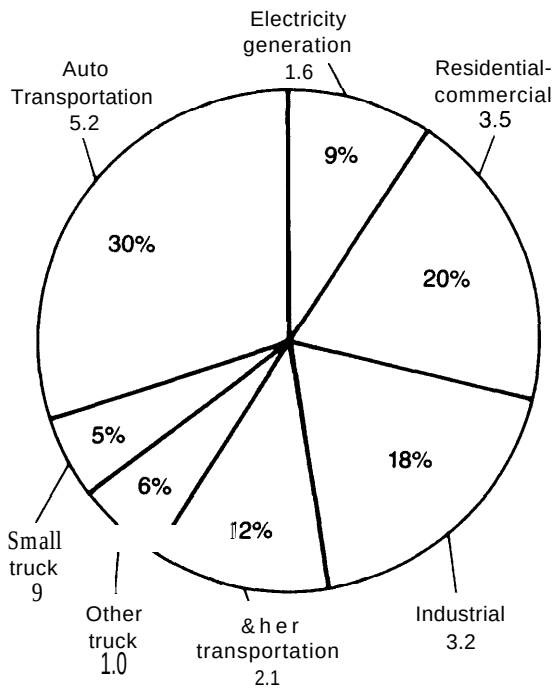


Photo credit U S . Department of Energy.

Rationing coupons designed as a result of the 1973-74 energy crisis

- more stringent fuel economy standards,
- a u t o use controls and transit promotion,
- improved transportation systerm management,
- increased gasoline taxes, and
- gasoline rationing.

Figure 3.— U.S. Demand for Oil in 1976 (millions of barrels per day (M MB D))



Total: 17.5 MMBD (42% imported)

SOURCE" Executive Office of the President, *The National Energy P/an,* April 29, 1977



Photo Credits Sylvia Johnson 1979

Energy crisis 1979

The results of the OTA analysis indicated that the first three might be beneficial, but would have only a small effect on conservation of fuel consumption. If the Nation were to face a serious or prolonged scarcity of petroleum, only rationing or very large fuel price increases through taxation or deregulation would reduce petroleum consumption in the automobile sector by a significant amount. The OTA study concluded that sooner or later, a shift would have to be made from petroleum to alternative energy sources for the automobile, and a strong Government program of support and incentives might be necessary to accomplish this.

Talk about conservation during the public participation effort often sparked discussions about the effect of decreased fuel usage on the Nation's economy. Automobile transportation is the largest consumer of petroleum in the United States, constituting about 30 percent of the total demand, and consumption is rising. The OTA research showed that deregulation of petroleum prices could allow market forces to balance supply and demand, but might have inflationary effects on the national economy, impose a disproportionate burden on low-income persons, and generally restrict the use of the automobile.

When asked about tradeoffs—energy conservation versus environmental protection versus safety and so on—the general feeling of the respondents was that there was no need for tradeoffs. Technology could solve these problems, most respondents claimed. It is institutional constraints that slow the development and application of technological solutions, they said. Many felt that the technology for solving these problems was already available but not being used, due either to "bungling bureaucratic red tape" or the "less-than-virtuous profit motive" of industry. Although they often debated the tradeoff issue at some length, the respondents were firm in their desire for no reduction in mobility. At present, of course, mobility is automobility.

"If the current car is unsatisfactorty, then let's improve it," said a midwestern auto owner, giving voice to a popular notion. On the west coast, representatives of a State auto club told us about their "target car" program which was designed to encourage the domestic auto industry to improve their products. Eleven factors were chosen for rating. "Imports were way ahead when we began the program, but the United States has caught up fast because of competition, Government regulations, cost, and people's interest in fuel economy," they told us.

We also heard from inventors who were working on alternatively fueled vehicles and industry officials who were experimenting with new engine designs. In addition to improved cars, respondents called for more and improved mass transportation vehicles in response to im-

pending energy shortages. Improved engines, the use of alternative fuels, energy efficient modes-all were supported by most of the respondents.

The lack of an effective national energy policy was frequently criticized. “We don’t want an energy policy dictated by . . . Iran, ” one New Englander told us. A southerner complained that the Federal Governrnent “should get out of the oil industry’s bed. ” A college student asserted that “Congress has blown the energy situation. ” In general, respondents said that under a national energy policy, the Federal Government should provide support for industry research and development of alternative fuels, decrease the Nation’s dependence on foreign oil, and continue to pressure the automobile industry for better engines and smaller cars. Respondents also stressed the need “to get at more basic energy issues, beyond the auto a lone,” such as the tradeoffs between residential, transportation, and industrial energy needs; the amounts of energy needed to produce energy; and the “true” relationship of energy to the U.S. economy.

“True” is an adjective that surfaced repeatedly during the public participation program. What are the true costs, true relationships, what’s the true story?, we were asked over and over again. People were hungry for information and were often uneasy with opinions they expressed due to uncertainty about the “facts” on which they were basing their viewpoints. Respondents were critical of “misleading” advertisements and “contradictory” Government pronouncements. They emphasized the need for accurate information about industry products and problems facing the Nation as a result of using these products. It was mainly during discussions of energy (because of the widespread confusion over the existence of an “energy crisis”) and cost that the need for improved consumer communications was most frequently emphasized.

ENVIRONMENT

CHAPTER 0

Automobile emissions are major contributors to air pollution, primarily in urban area where automobile exhaust is a principal source of carbon monoxide, hydrocarbons, and nitrogen oxides. Other forms of pollution noise, water pollution, soil contamination, and solid waste — are problems generated by automobile usage, but not to the same degree. For this reason, the OTA study concentrated on aut{~rn[>bile air pollution.

"Like the 'energy crisis, ' air pollution also has an identity problem, " explained a southwestern health department official. There is confusion about its existence because it is not a tangible substance that has precise parameters. "People generally don't believe there is a pollution problem because they can't see it, " he claimed, "so they don't pay attention to air pollution alerts or other bad air warnings.

On the contrary, most of the people we talked to seemed to believe the existence of air pollution. They were, however, leery of the scanty facts to which they had access. Here, again, they asked for more information. They wanted definitive "proof" that air pollution was harmful to human health and welfare, and that pollution was indeed extensive. Here, again, they were critical of what they termed "mixed messages" from the Federal Government.

A State government representative told us that "the Feds need to put teeth into their regulations if they expect us to believe that they and the problems are serious. " A labor union man who was unhappy about industry moving from his State to the south where environmental requirements are less stringent wanted to know, "Why is it OK to pollute in the south, but not in the midwest? If air pollution is bad for us, the Government shouldn't be allowing it to increase anywhere ."

With the exception of some rural small town respondents, most of the people we heard from felt that environmental problems were nationwide in scope. Therefore, Federal Government involvement in helping reduce these problems was justified, they said. They stated that the

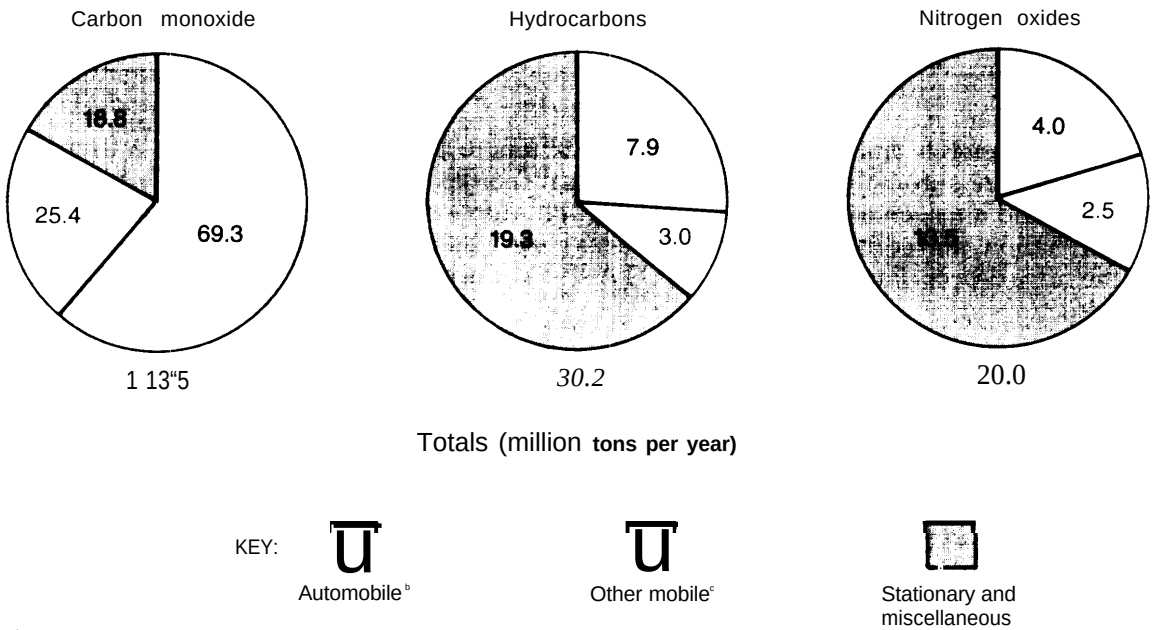


Photo credit U.S. Department of *Transportation*

Federal Government should provide uniform guidance in this matter, and local and State authorities should be responsible primarily for program design and implementation. "Moral" and financial support should come from the national level. Federal environmental guidelines and/or regulations should leave ample room for "local initiative. "

"Concord, New Hamphsire, is not New York City. " "Akron, Ohio, is not Washington, D. C." "Albuquerque, New Mexico, is not Los Angeles. " "Iowa cars shouldn't have to meet stringent California emissions standards. " "Don't legislate rules for big cities and force them on small towns and rural areas. We're not the same, " was usually the initial response. Yet, in reflecting further on the environmental situation in their areas, residents frequently expressed the same concerns as big city inhabitants—how to

Figure 4.—Sources of Air Pollution[a]



[a]1975 Data
[b]Passenger cars only.
'Light-duty trucks, heavy-duty trucks (gasoline and diesel), buses, motocycles, aircraft, pipeline, marine craft and military vehicles,

SOURCES EEA Gasoline Consumption Model,
TRC and Argonne National Laboratory, *Priorties and Procedures for the Development of Standards of Performance for New Stationary Sources of Atmospheric Polh.men, 1976*

cope with automobile pollution, oxidant transport, noise from increasing traffic, and sprawling development (with subsequent loss of farmland) encouraged by road construction. The message they wanted to convey was: Don't tell us what to do; help us to learn what the problems and potential solutions are, then encourage us by incentive to help alleviate these problems.

They criticized the industry for "dragging its feet" on automobile emission controls and suggested that the Federal Government prod the industry with stronger incentives. The Federal Government, on the other hand, was criticized for the "conflicts among safety, pollution, and fuel economy goals. " Although concern about air pollution was expressed mostly by urban residents, both urban and rural people complained about increasing traffic noise and its undesirability. A Californian chided Government officials and others for concern about traffic noise "when viewed in light of half our population's penchant for high wattage stereo systerns. "

Respondents were distressed, too, by what they deemed "excessive space demands" of the automobile system. Roads, accommodating cars mostly, comprise a large part of the space taken in cities and suburbs. A frequent criticism of highway construction was that it "encouraged waste, poor development, and poor transportation." More thought should be given to land use development and the compatibility of a variety of transportation modes, from the automobile to mass transit, they said. There should be changes in development patterns that would encourage more efficient use of natural resources, such as energy and land. A related suggestion was that the Federal Government should be considering "the global impact of our waste" of diminishing resources.

As expected, cost received a great deal of attention in the discussions about the environment. Typically, we heard: "We're not sure we can afford small increases in air quality and high-cost technology. " "The Government must look closely at the cost-benefit tradeoff between

emissions and the economy." "The cost and complexity of automobiles are due to emission and safety device legislation. " "The societal impact of pollution should be a major factor in any cost analysis performed by the Government. "

Essentially, the repondents felt that the burden of pollution control should be on the automobile manufacturers. The Federal Government should encorurage the development and purchase of nonpolliitomg vehicles, more efficient use of available transportation facilities (such as carpooling and priority bus lanes), and imprroved land use planning, thely said. The OTA analysis showed that the introduction of new technol ogy for automobile propulsion systems and synthetic fules may create new adverse impacts on the ennvironment. Particulate emissions from diesel engines are of special concern because of their possible carcinogenic properties.

Based on the OTA analysis, it appears that additional measures to control automobile emissions will be necessary to meet air quality standards in urban areas. The data showed that further tightening of new-car emission standards, particuarly for nitrogen oxides, wouldd be only marginally helpful, and the cost of achieving this benefit Would be high.

The OTA study also found that a nationwide program of inspection and maintenance of vehicles in use could produce substantial reductions in automobile emissions and consequent improvement in air quality. The analysis showed, too, that control of automobile use would be effective as a supplementary measure i n specific locations. However, as a general nationwide strategy, automobile use controls appear to be of limited value.

Respondents rarely mentioned inspection and maintenance, and when they did, the response

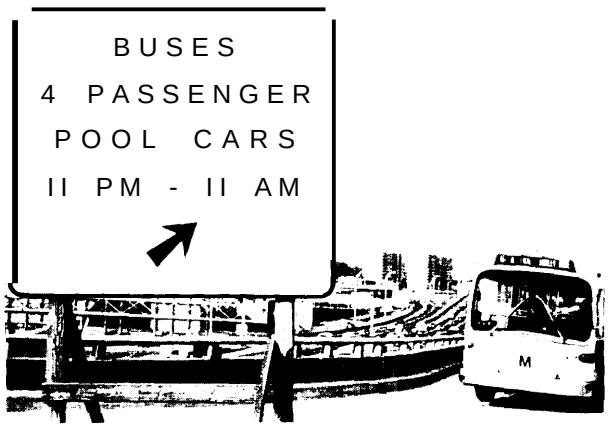


Photo Credit Sylvia Johnson 1979

Carpooling and busing help reduce pollution and congestion

was mixed. Restricted automobility was not popular among the respondents because they viewed it as an intrusion on their present freedom of movement. It should be remembered, though, that decreased automobility was a factor in the majority of the respondents' designs for a future personal transportation system.

Present policies, according to the OTA analysis, appear to be adequate to minimize other environmental impacts of all automobiles, such as noise, community disruption by road construction, disposal of scrap vehicles and parts, water and soil contamination. Respondents were concerned that present environmental laws are not well understood, nor adequately enforced. They tended to support strengthening and expanding programs to improve environmental quality, particularly in the areas of air and noise.

"Safety's not a problem in my State, " we were told by one middle-aged man in a predominantly rural State. "There are so few cars on the road here that I put my *Time* magazine on the steering wheel and drive to work at *80* mph. By the time I get there, I've finished reading the magazine. " (Statistics released in the local press shortly after we heard these remarks showed that this particular State had one of the highest traffic acciclent rates in the country.)

Respondents of all ages, from diverse backgrounds, from large and small communities, from every region of the United States insisted that "cars aren't the cause of accidents, people are!" A member of a leading automobile association stated that safety was one of his organization's main concerns, and that they viewed "the person behind the wheel" as the primary problem.

People complained bitterly about drunk drivers and "just plain bad drivers. " They were angry about people who "drive aggressive] y and take their frustrations out behind the wheel of a car;" those who think it's "neat to get loaded on narcotics or liquor and attempt to drive;" and those "who think O to *80* in 6 seconds is the greatest thing in the world and will leave tons of rubber on the pavement to prove it (they also leave cadavers when something goes wrong), " Many respondents compared the safety rates for auto travel to travel by mass transportation. "Thousands of people died on the highways last year, but not one person died on Amtrak, " a Massachusetts woman noted.

More responsibility should be placed on the driver, respondents said, and stronger penalties levied on those who drive recklessly. This was the one area where people generally agreed that Federal, State, and local governments should be heavily involved. They also said that national disincentives aimed at drunk drivers and habitually poor drivers should be adopted nationally and applied uniformly.

Current driver education programs are inadequate, they said, and licensing requirements should be tightened. Driver education programs should not be limited to the young or beginning drivers, rather they should be extended to drivers of all ages. For example, some State agencies and a number of companies now offer defensive driving courses for their employees. Some even require their employees to take these courses periodically. Additionally, "license exams should be standardized, " we were told, "and testing should be continuous, not just a once-in-a-lifetime event. "

Cyclists should obey traffic laws, too, and motorists should be trained to watch out for cyclists, "just as they watch out for trucks and motorcycles and taxicabs," northwestern respondents told us. Several bike riders suggested requiring a license and/or a minimum age for cycling. As one cyclist put it, "Fifty percent of the bike accidents occur to kids under 12, and *50* percent of the auto accidents involve people under 24. Maybe the legal age limit for cyclists should be 12 at a minimum, and for car drivers, at least 24. "

Table 3.— 1977 Traffic Crash Data

Crashes	[a] 17,600,000
Vehicles Involved[a]	29,800,000
Injuries [b]	4,392,000
Deaths[c]	47,700
Auto occupants	(27.400)
Pickup, van occupants	(5,200)
Motorcycle	(4,200)
Pedestrian, pedacycle	(8,600)
Truck, bus, and other	(2,400)
Estimated costo.	$44 billion

[a]OTA estimates from National Safely Council data
[b]u.s. Public Health Service
[c]U.S. DOT Fatal Accident Reporting System figures rounded
[d]u.s. DOT updated area originally from 1975 Societal Costs of Motor Vehicle Accidents This figure does not include costs associated with pain. suffering loss of relationship, and the l ike

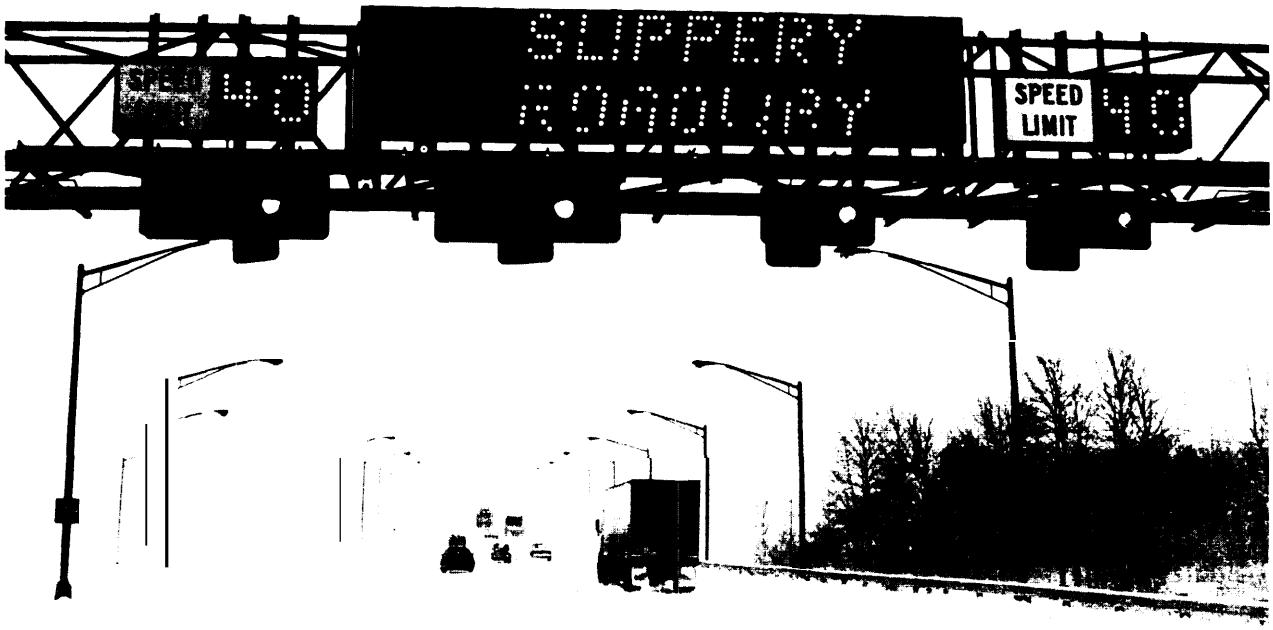


Photo credit Sylvia Johnson 1979

Hazardous road conditions place an extra strain on drivers

"The psychology of driving and bad driving should be examined, " said one woman, reiterating the viewpoint of many respondents. "We don't understand the man-machine interface too well, " another person said, then added that "the drinking and driving relationship should be examined closely." "Drinking to excess and driving is macho, " explained a southerner.

Various approaches were suggested to curb abusive use of alcohol, which was viewed by many respondents as "the No. 1 social and safety problem. " Businesses, unions, and police departments throughout the United States are experimenting with rehabilitation programs. Tavern owners in one State we visited are held partially responsible for the sobriety, or lack thereof, of their customers. In June *1978,* the Governor of Ohio signed a bill requiring insurance groups of 25 or more to cover in- and out-patient treatment for alcoholics. The respondents claimed that much more needs to be clone: programs should be expanded, assistance extended, and peer pressure applied in the effort to combat alcoholism.

"Uniformi t y" was a key word in the safety discussions. "The Nation needs uniform traffic codes and road standards. " "Penalties for traffic violations should be uniform, strict, and rigidly enforced. " "Inspection and maintenance should be uniformly required throughout the U. S." "The Federal Government should set uniform manufacturing standards. "

Vehicles and roadways were not ignored in the safety discussions, although they were of less concern than bad drivers. The most commonly heard remarks about roads emphasized the need for better maintenance and repair of the Nation's bridges and highways, the removal of hazardous obstacles and "death traps, " and the improvement of signing and lighting. A substantial number of people said that "trucks and cars don't mix, " and that the two should be separated. Many suggested that trucking in general be greatly decreased with railroads moving more freight. They also favored a reduction in truck weight limits. While a handful of people thought speed limits should be raised, most said they favored the 55-mph limit and that it should be better enforced.



Photo credit U S Department of Transportion

"Trucks and cars don't mix . . . ."



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As for automobiles themselves, some individuals felt that the Federal Government should "mandate fail-safe cars. " A larger number said that "industry should improve car designs" to make them safer. The results of surveys by two auto clubs in the midwest and northwest, which were shared with us, illustrate the type of response we received on the issue of safety devices. The survey respondents indicated that they were aware of the utility of seat belt usage, but felt that mandatory use was unwarranted. It is contrary to "freedom of choice. " "We don't want Government agencies telling us what to do, " said respondents, although many claimed that they voluntarily use seat belts now. Paradoxically, most of the people we talked to preferred to be in charge of their own individual safety, but wanted someone else, i.e., the Government or industry, to be responsible for the safety of others (most frequently mentioned were family members).

To safeguard "pedestrians who don't have bumpers, " it was suggested that with advancements in electronics it would perhaps be possible to equip future vehicles with a pedestrian- or accident-avoidance device. Accidents were not the only thing motorists were trying to avoid.



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They were also fearful of crime. "People are becoming so frightened that we use cars instead of buses," a California woman told us. An easterner claimed, "People feel safe in their cars with all the buttons pushed down. They don't have this degree of safety when walking on city streets or riding public transportation."

Respondents focused mainly on measures to improve driving habits as the principal means to increase safety. The OTA analysis found that in the next 5 to 10 years, the greatest safety benefits would accrue from reduction of alcohol use associated with driving, strict enforcement of the 55-mph speed limit, and increased use of seat belts. The technical research also indicated that a long-range plan for a higher level of safety should include improved auto crashworthiness, occupant restraint systems, and vehicle designs to mitigate pedestrian injuries, as well as the elimination of roadside hazards.



Photo credit: Sylvia Johnson, 1979

Crash barrier (foreground) provides some protection for motorists switching from interstate to local road

A PUBLIC PARTICIPATION PROCESS

CHAPTER 8

Beyond periodic trips to the voting booth and occasional brief appearances at public hearings, U.S. citizens usually have had little access to the Government decisionmaking process. In an effort to broaden their involvement, citizens–- through litigation and public protest —have demanded the development of additional channels for making their views known and thereby influencing Government policy.

In response to this demand, Congress has mandated increased citizen participation in Government activities, from planning to actual implemental ion of programs. Experimentation with techniques for public participation is under way in several Government agencies. Because there has been limited experience with an expanded public participation process, a brief discussion of the automobile assessment's public participation program may be useful to others engaged in such activites.

In the automobile assessment, the OTA staff operated under two assumptions:

. A better understanding of people's needs, attitudes, and behavior is needed in order to build more humane and satisfactory systems, transportation being only one. What better source of information is there, then, than people themselves?
- Involvement t of a diverse group of people in the assessment would lead to a better understanding of the advantages and disadvantages of the automobile transportation system and, hence, to a more thorough analysis.

In designing the citizen participation program for the assessment, an effort was made to stimulate public commentary on substantive questions, to facilitate the public's ability to participate in the study, and, where possible, to establish a two-way dialog. Too often, even now, public participation efforts are limited to public hearings, held during the traditional work day (between 9 a.m. and 5 p.m.), in a handful of major cities. The schedule typically allots participants 5 to 10 minutes to speak, which usually means time to read a prepared statement. There is no discussion, and those conducting the hearing rarely make any response to testimony and comments offered by the public "witnesses, " who tend to be persons with a professional or organizational interest in the subject under consideration. In form, the hearing process more closely resembles a quasi-legal proceeding than an open forum for mutual exchange of views.

The OTA staff decided to exclude public hearings and to rely on other methods to reach the public. The methods included a brochure and - questionnaire, workshops, interviews, small-group discussions, and regular meetings with a Public Participation Working Group. The intent was to employ techniques that would encourage discussion and informal exchange of views without the trappings of a formal judicial procedure. This was done, also, with the intent of expanding public participation in general and exposing Government activity to closer scrutiny by a broader range of the public.

The data collected are fairly representative of American thinking on the subject of the future use and characteristics of the automobile transportation system. This is due to the diversity and number of people involved, and to the nationwide and open-forum characteristics of the program. However, it is only a very small piece of what is needed in terms of public dialog and participation in Government decisionmaking on the topic of personal mobility. It is hoped that this effort will serve as a point of departure from which others can continue.

Brochure and questionnaire. A brochure, entitled "The Automobile: It's Driving Us To Think, " was distributed throughout the United States during June *1978. (See* appendix A.) It contained a brief discussion of the origin of the automobile assessment, the issues identified for

study, and background information on OTA. Enclosed was a short questionnaire designed to explore the recipient's views on issues, technological alternatives for personal mobility, and policy options for the Federal Government. About 17,000 copies were mailed, and almost *700* responses were received. This is a response rate of approximately 4 percent.

The questionnaire raised basically the same topics that were considered in other parts of the public participation activity and in the technical analysis itself. An open-ended questionnaire was used to give respondents the greatest amount of leeway in selecting points for comment and articulating their replies. Space was **also** provided for additional comments that respondents wished to make.

Members of Congress from areas where automobile assessment workshops were not scheduled were asked to assist in the distribution of the brochure and questionnaire by sending it to a limited and randomly selected number of people on their mailing lists. Help was also obtained from national organizations which had no connection with the automobile transportation system. (See table 4 for distribution list.)

Table 4.— Brochure Distribution List

Congressman Morris K, Udall. Arizona. ...	.2,000
Congressman John J. Cavanaugh, Montana ..	2,000
Congressman Olin E. Teague, Texas . ..	2,000
Congressman Hamilton Fish, New York, .,	1,000
Congressman Wyche Fowler, Georgia	2.000
Washington State Energy Off Ice, Washington	1,800
Indiana University, Purdue, Indiana	500
National Rural Center, national	1,800
National Economists Club. national	1,200
Parents Without Partners, national	1,500
OTA, Public Affairs, national	1,200
Total	.17,100

While this technique produced a large number of responses, i t was limiting in that the staff was unable to pursue specific points made by individual respondents. However, some of these points were incorporated in later discussions with other people during workshops and interviews. The major difficulty encountered with this and other outreach techniques used was putting together written (and oral) materials in an even-handed, objective manner. What appears to one individual to be fair presentation appears to another as misrepresentation. Illustrative of this dilemma was that environmentalists tended to criticize the brochure for being "too lenient on the auto and its impact, " whereas auto industry officials tended to label it "biased" against the automobile.

Workshops. Eight workshops were held—four in July and four in September 1978—at locations throughout the country. The sites selected were Concord, N. H.; Akron, Ohio; Ft. Dodge, Iowa; Portland, Oreg.; Anchorage, Alaska; Los Angeles, Calif.; Albuquerque, N. Mex.; and Memphis, Term, (See appendix B for copies of the workshop notice, agenda, and handout material.)

Basically, three criteria were used in site selection. First, the staff felt that a workshop should be held in each of the major regions of the country to sample whatever regional differences there might be in attitudes and travel habits. Second, a range of sparse to dense population was needed to determine differences, if any, in attitudes about transportation and travel needs and patterns. (Viewpoints throughout the country were found to be similar on the topic of persomal transportation, regardless of the region or the size of the community.) Third, an effort was made to select areas that are not generally visited by Government representatives in other public outreach programs.

Anchorage was included not only because it met the criteria, but also because Alaska is a large area on the brink of what could be substantial development. The staff was interested in knowing if transportation decisions being made in that State would mirror those of the "lower 48, " or if Alaskan development might introduce innovation in modes and usage that would be applicable elsewhere in the United States. Akron, Ohio, was added to the list because its economy is largely dependent on the automobile industry. The remaining six sites were selected based mostly on their regional location (northeast, midwest, northwest, west, southwest, southeast) and size (rural, small town, medium-sized town, large metropolitan area).

Mailing lists for each workshop location were assembled with the help of chambers of commerce, local government officials, and occasionally, the district office staff of Members of Congress. These lists contained the names of a variety of individuals living in and around the



Photo credits. Bob Ounsmore and Vicki Sibley

Involving the public— citizens from the east to west coasts provided valuable input to the public participation process

communities to be visited. An average of *30* people attended each of the workshops, five of which were held on a weekday evening (7 to *10:30* p.m.) and three on Saturdays (9 a.m. to 4 p.m.). Participants were encouraged to air their opinions, and time was allocated for dialog among the participants and the two or three OTA staff members in attendance.

Interest appeared to be higher and attendance greater at the evening sessions, even though the shortened time period allowed less discussion. Some adjustments were made in the OTA presentation and wording of questions following the first few workshops, primarily at the suggestion of participants. This helped later participants to understand more easily the nature of the effort and resulted in better response during the remaining sessions. While there was a good mix among the participants in terms of background experience and community activities, there was not as much balance as the staff would have liked in terms of age, sex, and race. More intensive efforts to reach people in these categories is needed for future efforts of this sort.

The workshops were the most time-consuming of the public participation measures used, but they also resulted in a substantial amount of information. The administrative effort was large due to the need for travel and hotel accommodations, room arrangements, audiovisual equipment rental, compilation of mailing lists, preparation of handout materials, and a myriad of other tasks. Where time allows, a workshop is a good method for stimulating public discussion and obtaining a variety of comments.

Interviews and small group discussions. Over **200** people were interviewed individually or in small groups throughout the country. In some instances, the discussions took place as an extra session of an annual conference, such as those conducted by the American Institute of Planners or the National Council for the Transportation Disadvantaged. Interviews were arranged in every community where the staff held workshops—including, in one case, a stopover location. Meetings with special groups were arranged also, such as one meeting with a group of architectural students and a separate meeting with the students' professors. Occasionally, spontaneous interviews took place—as in one case when an OTA staff member struck up a conversation with a rural southern shopkeeper.

The format for these sessions was similar to the workshops: a brief explanation about the study and OTA, then questions and discussion. (See appendix C for a sample of the questions asked.) This method of gathering public commentary allowed the OTA staff to discuss respondents' viewpoints in more detail than was possible at workshops. It was also the easiest and least costly technique to organize and implement, and it seemed to be the most productive with respect to quantity of detailed commentary.

Public Participation Working Group. This group was composed of nine people from the Washington, D. C., metropolitan area. They were selected on the basis on their travel needs and modal choices, rather than technical transportation expertise. The members represented a mix of income level, age, sex, and race. Some members owned cars, some did not. Some had technical knowledge about various aspects of the automobile transportation system; some did not. They represented themselves, rather than an organization. (See appendix D for a brief background description of working group members.)

The working group was established primarily to provide an ongoing mechanism through which a small number of people from the general public could comment on the procedural and substantive aspects of the automobile assessment and the public participation program. Over time, the members became familiar with the general concerns of OTA and with the immediate problems of the OTA staff conducting the assessment.

Eight full-day meetings were held on Saturdays between April and mid-December 1978. Initially, the members were asked the same basic questions as in the questionnaire. As time passed, they were given materials to read pertaining to the future of the automobile; presentations were made by the staff which provided them with additional information; and discussions took place during which the members' views and need for more information were examined. During their last meetings, the questions asked of them initially were repeated, and their responses discussed. Generally, their views

had not changed much over the course of 8 months, nor did they differ substantially from responses received through other channels. This is probably due to the fact that the automobile is a well-known technology. If the assessment had dealt with a less familiar technology, the working group responses might have differed greatly from the beginning of their participation to the end, or might have differed from the comments of less informed respondents.

In summary, participants in all aspects of the program appeared eager to comment on the study and seemed to be generally pleased with the approaches used. Less than a dozen people out of the 1,300 respondents objected to the program as a whole or to specific parts. Three individuals said that the distribution of the questionnaires was a "rip off of taxpayers' money." A northwestern couple charged that the "hidden agenda of the auto assessment is to do away with the car and democracy." A few individuals who were affiliated with the auto or auto-related industries claimed that the assessment staff was "trying to stack the workshops with radicals, hippies, and screaming environmentalists." Interestingly, a car enthusiast who attended a workshop said that he was "disappointed that there weren't any radicals in attendance."

For- the most part, respondents answered questions enthusiastically. They made constructive suggestions on both the content of the assessment and the public participation program. Additionally, many requested more information from the staff and asked for copies of the report when published.

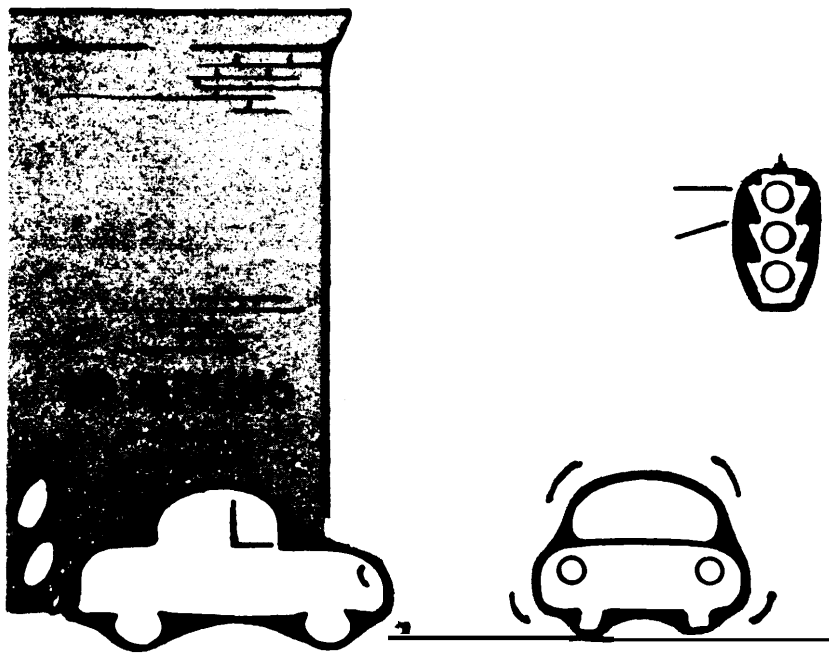
"This is the first time I've seen a Washington bureaucrat," several people commented. Others said the questions "triggered new thoughts" and sometimes changed their perspectives. Some said they enjoyed the "exchange of ideas" during the discussions. A western man said he came to the workshop "because I thought there would be a good cross section of people, and I was interested in the direction of transportation. I got more answers than I expected."

An auto club official wrote to us: "I compliment you on conducting a good workshop . . . . Your presentation of data and alternatives was without prejudice. All participants had the opportunity to express their concerns and recommendations. I am pleased to have had the ppportunity to participate." Many questionnaire respondents said they appreciated being informed about the study and being offered the chance to voice their concerns and opinions. In Washington, D. C., a public participation Working Group member said, "We have learned while participating."

So did we.

Appendixes

THE AUTOMOBILE
It's Driving Us To Think



Dear Citizen:

The future use and characteristics of the automobile transportation system is the topic of a study being conducted by the Office of Technology Assessment (OTA), and the topic of this booklet. As a research arm of the United States Congress, OTA is responsible for examining a variety of technologies and their impact on society to help our legislative representatives determine the appropriate role for the Federal Government in technology development and usage. It is the purpose of this brochure to briefly discuss the issues being examined in the automobile study.

Sincerely,

Russell W. Peterson

Russell W. Peterson
Director
Office of Technology Assessment

OTA CONGRESS OF THE UNITED STATES
Office of Technology Assessment
WASHINGTON, D. C. 20510

DIVIDED HIGHWAY **BEGINS**

The automobile has become increasingly important in our lives since the turn of the century when it first began to make its way over the globe. Few people at the time could have foreseen that it would ever successfully compete with the railroads. The greatest objections raised against the newfangled motor car were that its commotion frightened the horses, and it kicked up dust around the farmlands.

Most assumed that its emissions could not possibly be worse than the daily sanitation problems and assault to the eyes and nose presented by horses on the city streets. In New York City alone in the late 1800's, about 2.4 million pounds of manure and 60,000 gallons of urine fell on the streets every day. In the midst of all this, about 15,000 horses dropped dead each year, aggravating the unhealthy situation and clogging the streets.

The automobile brought welcome relief from horse and buggy transportation, and offered a host of new benefits as well. The automobile provides speed, comfort, privacy, door-to-door service-mobility whenever and to wherever we wish. These conveniences proved so attractive that, by 1928, there were more cars than telephones in the United States, and after World War II, almost every family in the expanded American middle class owned at least one car. Greater personal mobility became so common it was taken for granted by most of us. Then, the suburbs began to grow. Stores, churches, recreation areas, and employment centers followed residential development and spread far beyond the city boundaries.

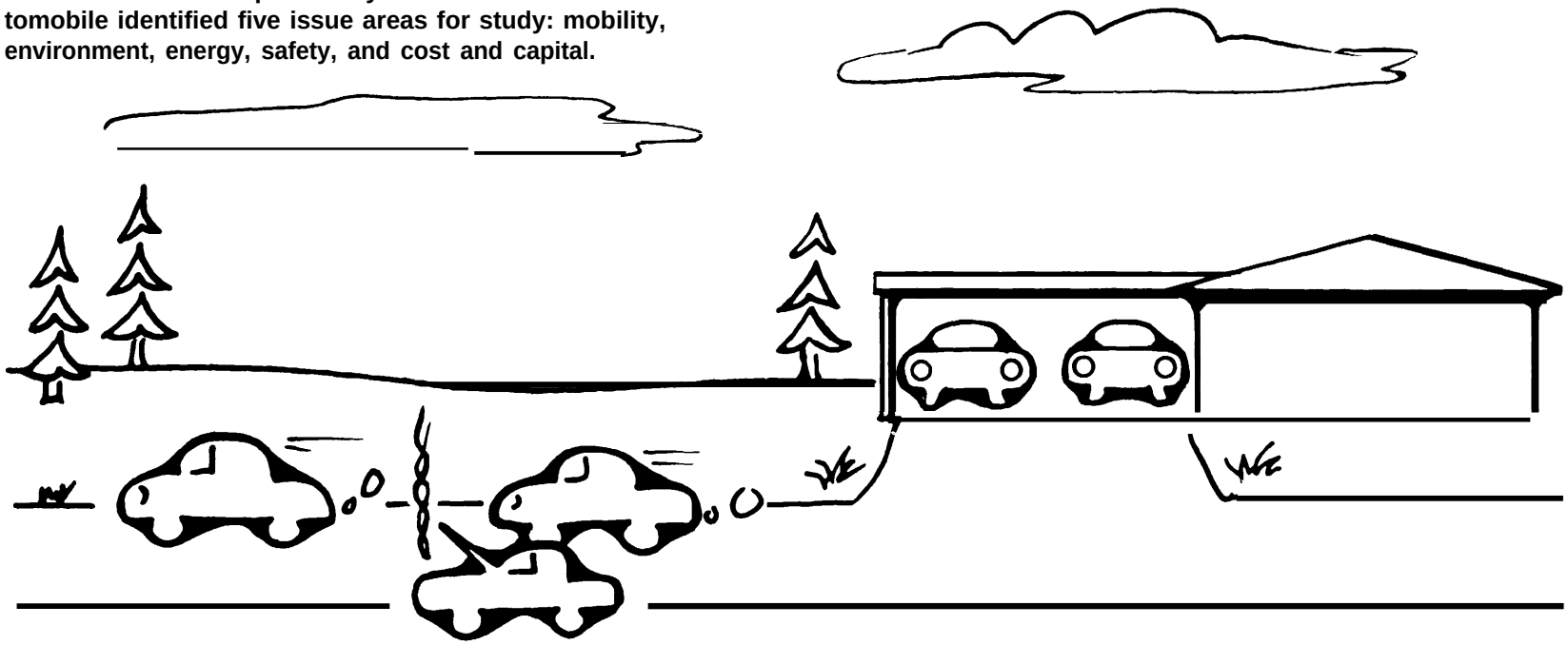
Because of the popularity of the automobile, rising car ownership rates, and sprawling low-density development, transit service dwindled. Owning a car gradually became a necessity. The profusion of automobiles and changing American lifestyles (such as the 9-to-5 workday and 5-day workweek) combined to produce several adverse impacts (traffic congestion and air pollution, for example).

In the 1950's, alarmed by increasing smog caused partially by automobile exhaust, citizens in Los Angeles, Calif., demanded corrective action. Emission control technology was available to automobile manufacturers at the time, but for a variety of reasons, the industry balked at the utilization of such technology. The State of California responded by legislating emission control. The Federal Government eventually followed suit and instituted measures to improve air quality in cities all over the country by controlling sources of pollution, including automobile exhaust.

Public concern regarding the automobile covers more than air pollution, however. For instance, the price of fuel is rising and is likely to continue to do so. Each year the United States imports more foreign oil. The number of traffic deaths and injuries is staggering. As old cars are scrapped, their bodies and parts create a solid waste disposal problem. Because the automobile has permitted homes, offices, shops, and necessary services to be located far apart, those who cannot drive are at a disadvantage. One major alternative, public transit, in many places does not exist, costs too much, or is inconvenient.

CHECKING UNDER THE 11000

The Office of Technology Assessment (OTA), a research arm of the United States Congress, is designed to act as an early warning system for Congress by providing assessments on various technologies, their potential or actual impacts, alternative technologies, and relevant Government policy options. Generalists and specialists from the professions and the public pool their efforts to develop broad, accurate, in-depth assessments. At the request of Congress, OTA is studying the future of the automobile transportation system to determine the short- and long-range impacts on society and the appropriate role for the Federal Government. OTA's preliminay assessment of the automobile identified five issue areas for study: mobility, environment, energy, safety, and cost and capital.



MOBILITY: Two-car barrage

In 1892, when the automobile was introduced in this country, we were an agricultural Nation, close to the land and close to our homes. Individual mobility was limited, and travel minimal. Now, however, travel is crucial to our economy and to our daily lives, and the car provides most of our mobility.

Currently, the American automobile transportation system contains about 100 million cars (the national population totals about 200 million people) which are driven on 3.8 million miles of roads, streets, and highways

throughout the United States. About one million miles of this roadway are built or maintained by Federal funds and carry about three-fourths of all vehicular travel.

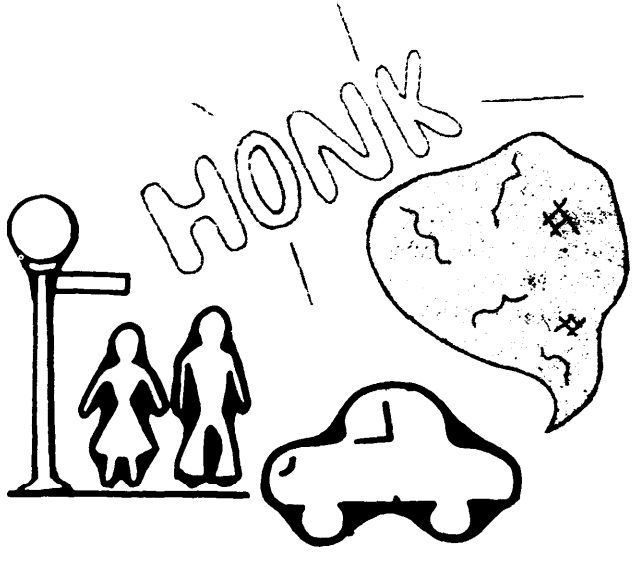
Despite the high auto ownership figures, only 60 percent of our population drives. The other **40** percent of us who do not drive—because we are too young, too old, too disabled, or too poor to afford a car—must depend on others to drive us to our various destinations, or rely on alternative modes which offer fewer advantages than the automobile in terms of convenience, comfort, and speed.

Basically, there are three ways society can improve mobility. First, facilitate the physical movement of people from place to place. Second, improve accessibility by moving people and activities closer together. Third, reduce the need for travel by developing and utilizing technological subtitu telecommunications), or by changing attitudes and lifestyles (voluntary simplicity, perhaps).

The Federal Government has concentrated on facilitating physical movement. It has funded, in varying degrees, projects such as roadway construction, special transportation services, and mass transportation. Generally, the Government's position has been financially supportive of the growth of the automobile industry. Although its actions have affected land use extensively, the Federal Government has shied away from direct land use management.

ENVIRONMENT: Caught in a clutch

One of the greatest environmental concerns associated with the automobile is atmospheric pollution. The Nation's Capital, a city with little industrial activity, still finds itself periodically strangled by air pollution, especially in the hot summer months when high humidity adds to the problem. Over 90 percent of the carbon monoxide comes from cars driven into, out of, and around the city. Hydrocarbons and nitrogen oxides emitted by automobiles contribute to the contamination as well.

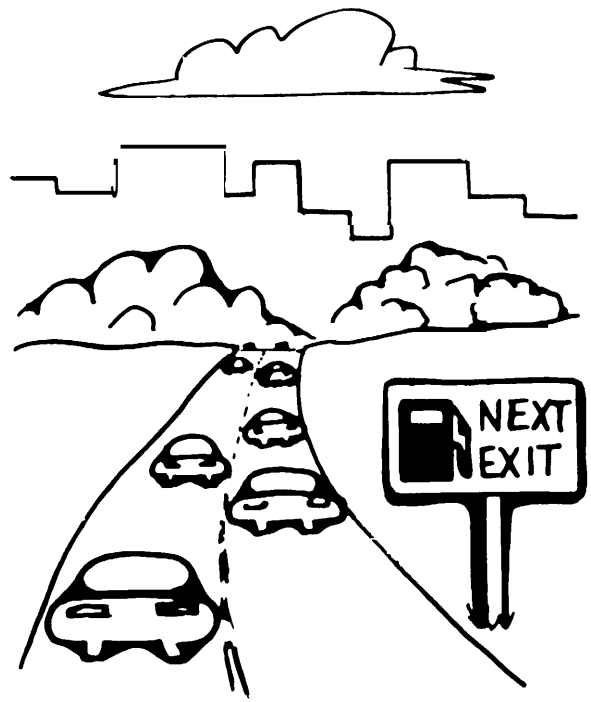


While experts disagree about the severity of health hazards these air pollutants may pose, most agree that the continued pollution of the atmosphere will cause severe damage in the long run. Whether from the automobile or other sources, air pollutants appear to be at least partially responsible for increases in cancer and other diseases, interference with normal weather patterns, and damage to plant and animal life. As a result of federally mandated technological changes, emissions from new automobiles have been greatly reduced and will be reduced further **as** requirements of the Clean Air Act are met.

Additional environmental impacts associated with the automobile transportation system are noise, water pollution, *solid* waste disposal, and sometimes disruptive consumption of land, particularly in residential areas. Within the past 20 years, the Federal Government has become concerned enough to enact legislation in defense of the environment. Emission control spread nationwide with the passage of the Clean Air Act of 1963 and subsequent amendments. The National Environmental Policy Act was passed in 1969. In 1972, the Noise Control Act became law, and the Federal Water Pollution Control Act was also passed. From this spate of legislative activity emerged the President's Council on Environmental Quality and the U.S. Environmental Protection Agency.

ENERGY: Fill'er up

Since the automobile was first introduced in the United States, trillions of dollars have been spent structuring the Nation and our lifestyles around the car. Cheap, plentiful petroleum encouraged the dominance of the automobile in our transportation system. Today, although the United States comprises only 6 percent of the world's population, it operates more than half the world's cars, trucks, and buses.



Each year we import more oil due to:

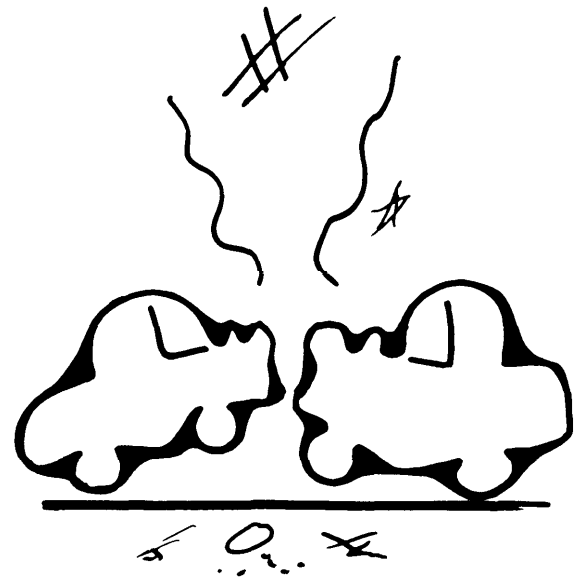
- Our voracious appetite for fuel (automobiles consume about 30 percent of our petroleum supply);
- Dwindling domestic supplies; and
- Our energy-dependent economy.

By becoming more dependent upon foreign sources for oil, we may be risking our national security. Another oil embargo could seriously hurt the economy of this country. Transition to alternate energy sources (synthetic fuels from coal, shale oil, or alcohol, for example) will take time, 15 to 25 years perhaps. Implementation of conservation measures will take time, too, but may provide some short-term relief from increasing oil import pressures.

Federal concern about the gravity of the energy situation prompted the establishment of the nationwide 55 mph speed limit in 1974, the creation of the U.S. Department of Energy in 1977, and the current high-priority Presidential effort to obtain legislative support for a national energy plan.

SAFETY: Proceed with caution

This country annually suffers thousands of deaths, millions of injuries, and billions of dollars in property damage due to traffic accidents. Forty-six thousand lives were lost **and** *4* million people were injured in highway accidents in 1976. These astonishing figures

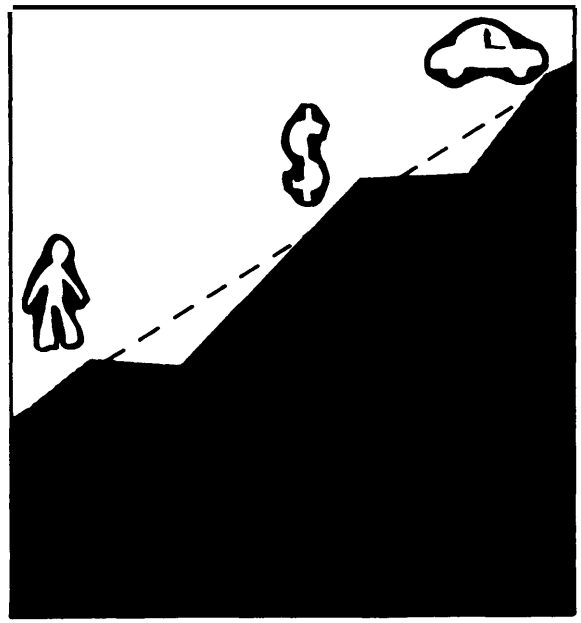


belie the fact that the United States has the lowest rate, based on vehicle miles of travel, of traffic deaths and injuries i n the developed world. Be that as it may, car accidents are our leading cause of injury, with 50 percent of those accidents suspected to be related to alcohol abuse.

Traffic safety is a complex matter involving vehicles, roadways, users, and the various support systems. It has long been a concern of the Federal Government as evidenced by laws passed in the early 1800's in an attempt to reduce casualties resulting from poor stagecoach operations. To protect the riders, one law required lamps at night, and another mandated fines for drunk drivers. It was not until 1966, however, that the Federal Government became heavily involved in highway safety legislation, enacting the National Traffic and Motor Vehicle Safety Act and the Highway Safety Act. Under the National Traffic and Motor Vehicle Safety Act, new motor vehicles and vehicle components must meet certain safety requirements before they can be sold to the public. The Highway Safety Act administers 18 safety programs in areas such as driver education, traffic law enforcement, roadside design, and school transportation safety.

COST AND CAPTITAL: Stops And Bonds

Transportation takes a hefty chunk out of the average American household budget. Generally, only housing and food expenses are greater—and often not by much—than automobile expenditures. These costs include purchase price, maintenance and repair charges, fuel bills, parking fees, and insurance premiums. Many Americans have turned to smaller cars in response. Often



cheaper to purchase and operate than domestic models, foreign cars comprised about 20 percent of the new-car market in the United States between 1976 and 1977, Spurred by this foreign competition and by Federal legislation, Detroit reacted by creating smaller, more fuel-efficient models of its own.

Much of the economy of this country depends in some way on the car. One out of every six jobs derives from it, either directly through the automobile industry (assembly line workers, for example) or indirectly through auto-related services (garage mechanics and tire manufacturers, for example). Our transportation system accounts for about 20 percent of the gross national product, and the automobile accounts for about half of that.

Federal financial involvement in the automobile transportation system began early and gradually broadened in its application. Federal funds have provided subsidies for the materials and energy industries which supply and serve the auto industry; financed road construction projects throughout the country; supported research, development, and demonstration programs; funded some planning efforts at the State level; promoted regional transportation coordination; and more.

THE CLOVERLEAF: Interrelationships

Environmental concerns about the automobile are often depicted as contrary to U.S. economic and energy goals. The business sector of the country is reluctant to spend its money on research and technology geared toward improving the environment because it is feared that environmentally safe automobiles will then be too expensive for the American consumer. Decreased sales would cause the industry to suffer, possibly resulting in plant closings and layoffs that would affect the economic health of the entire Nation. On the other hand, a fundamental change in the economic base of this country, stimulated by protective environmental legislation or energy constraints or some other cause may be beneficial to the labor market. For instance, the President's Council on Environmental Quality found in 1975 that, while there were some job losses resulting from environmental legislation, the emerging environmental industry had produced an even larger number of new jobs, for a net gain in the overall labor market.

Like the other auto issues, implementation of safety improvements affects cost and capital concerns. The technology exists to substantially reduce traffic mortality. However, utilizing that technology would be very costly. We have found, for example, that interstate highways and freeways are the safest roads, but it would take huge sums of money to reconstruct all the roads in this country to meet interstate standards. Safety

devices in automobiles also tend to increase the cost of cars. Unsure of the public's willingness to pay for the improved safety of its vehicles, the auto industry remains reluctant to risk installation of these devices for fear of a decline in sales and profits.

Additionally, some individuals resist mandated safety equipment as an infringement of civil rights. As more Americans purchase smaller and lighter cars—for energy, environmental, **and/or cost reasons—safety may decrease.** This is because occupant protection is a function of crash distance and relative vehicle weights.

Alternatives to automobile transportation do exist in many areas throughout the country. Efforts to constrain auto usage in these areas, because of energy, environmental, or congestion problems, are often resisted by citizens who view the constraints as limitations on mobility. In considering alternatives, OTA is examining new automotive technologies as well as alternatives to the automobile in toto as a mode of personal transportation.

AUTO ASSESSMENT: Merging traffic

These, then, are the issues and some of the interrelationships which OTA is currently examining in its study of the automobile. Because public participation is so important for the operation of our democratic government, OTA invites your comments on the issues, transportation alternatives (including the automobile), and policy options for Government action.

Send your comments to:

Transportation Program
Attn: Public Participation
Office of Technology Assessment
United States Congress
Washington, D.C. 20510

QUESTIONNAIRE

The Future of the Automobile
With You in the Driver's Seat

Actions taken by the Federal Government in the near future could drastically change the automobile transportation system as we now know it, or Increase our dependence on the automobile by the year 2000. Your answers to the following questions will help Government officials decide what course of action to follow in the future of the automobile.

1. What are the major advantages and disadvantages of the automobile for you?

2. What actions could you take to reduce these disadvantages. or ıncrease the advantages?

3. What actions Could the Federal Government take to reduce the disadvantages, or Increase the advantages?

4. **Should the automobile be the major means of transportation for *your area* in 2000? if not, what alternatives would you suggest?**

5. **Describe the transportation system of 2000 as you would like it to be.**

6. **What do you perceive the Federal Government's role to be in transportation now? in the year 2000?**

7. **if you have other comments about the automobile as it relates to transportation, please note these below, or include them on a separate sheet(s) and mail them to us along with this questionnaire.**

8. **if you belong to an organization which would have an interest in the auto assessment, please indicate.**

Organization: _____

Address: _____
Street

_____
City State Zip

President: _____

9. **if you would like to be kept informed about this assessment, please indicate:**

Name: _____

Address: _____
Street

_____
City State Zip

WORKSHOP NOTICE, AGENDA, PROBLEM STATEMENT, HANDOUT MATERIAL

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Congress of the United States
OFFICE OF TECHNOLOGY ASSESSMENT
WASHINGTON, D.C. 20510

RUSSELL W. PETERSON
DIRECTOR
Daniel DeSIMONE

You are cordially invited
to participate *in a public workshop*
on the Future Use and Characteristics
of the Automobile Transportation System

Tuesday, September 19, 1978

Library, Grant High School
2245 N.E. 36th Avenue
Portland, Oreg.

7:00– 10:30 p.m.

Background: A study of the future use and characteristics of the automobile transportation system is being conducted by the Office of Technology Assessment, a research arm of the United States Congress. Requested by the Senate Commerce, Science, and Transportation Committee, the auto assessment has focused on five issue areas: mobility, energy, environment, safety, and cost and capital. Workshops will be held in eight locations throughout the country as part of a nationwide public participation effort designed to augment staff research and analysis.

Purpose of Workshop: To gather public commentary on the issues, the alternatives for personal transportation, and the policy options relevant to the Federal Government's role in the future of the automobile transportation system.

Registration: Open to the general public (i.e., no affiliation is needed to be eligible to attend), participation will be limited to the first 50 registrants. This will enable those who participate ample opportunity to take part in the dialogue and enable the OTA staff to respond to questions and listen to the discussion. A registration card is enclosed for your convenience. Please pass this information to other individuals who may be interested in attending or to organizations who may want to send representatives.

AGENDA

Workshop on The Future Use and Characteristics of the Automobile Transportation System

7:00 p.m.	Opening Remarks
7:10 p.m.	Auto assessment presentation
7:40 p.m.	Question and answer session
8:10 p.m.	Subgroup formation and discussion
9:15 p.m.	Subgroup presentations
9:45 p.m.	General discussion
10.30 p.m.	Adjournment

AGENDA

Workshop on The Future Use and Characteristics of the Automobile Transportation System

9:00 a.m.	Opening remarks
9:15 a.m.	Auto assessment presentation
10:00 a.m.	Question and answer session
10:20 a.m.	Subgroup formation and discussion
11:30 a.m.	Subgroup presentations
Noon	Lunch
1:15 p.m.	Subgroup discussion
2:30 p.m.	Subgroup presentations
3:00 p.m.	General discussion
4:00 p.m.	Adjournment

WORKSHOP PROBLEM

One goal of our society is to enable citizens to take part in activities that enhance our social and economic wel1-being. Essential to the attainment of this goal is the ability to reach jobs, consumer goods and services, recreation sites, and other desired activities.

There are three ways to facilitate reaching desired activity sites. The first approach —and the traditiona1 one-– is to improve **mobility,** that is, the ease with which people physically move from place to place. The second is to increase **accessibility** by locating people and activities in greater proximity to one another. The third is to reduce the need to make trips by using **technological substitutes** for physical movement, such as telecommunications.

Assuming no wars, economic depressions, or other catastrophic events, and if current trends continue, the Gross National Product of this country in the year 2000 is expected to be about two and one-half times what it is today. Average personal income after taxes will be twice today's in current dollars. Although birth rates are declining, the American population is expected to increase by about 20 percent. In 2000, more of the population will be older (the median age will rise from 29 to 36), a higher percentage of the population will be licensed to drive (notably women), and a higher proportion of the population will live in cities.

Suppose you are an ad hoc advisory committee to the United States Congress and have been asked to devise a mobility plan for the year 2000 that takes these projections into account:

1. How do you envision the personal transportation system for the year 2000 for your area, for the National What would be the characteristics of this system (modes of travel, types of vehicles, energy and safety features, environrnental factors, and so forth)? Would present levels of mobility be maintained or increased? If increased, for whom and how? What would be the rural urban or regional differences?

2. What would be the tradeoffs in terms of energy, natural resources, environnment, safety, and monnetary cost for such a mobility system?

3. What would be the role of a) Goernment, b) industry, and c) the priate citizen in the development, management, and maintenance of such a system? Folr example, what would be the ratio of public and private funding for the systerm and its various components? With regard to public financing, how would funds be raised (general or specific taxes), and how would they be distributed (i. e., subsidies, grants, other)?

4. Do you have other concerns about personal transportation now or in the future that you wish to express?

HANDOUT MATERIALS

AUTOMOBILE TECHNOLOGY ASSESSMENT

To assess changes in the future use and characteristics of the automobile transportation system in the near term (to 1985) and the long term (to 2000 and beyond)

OBJECTIVES:

- To describe the factors that influence the characteristics of the automobile system, its use, and services supporting its use.
- To identify and characterize potential changes in automobile use and characteristics.
- To assess the near-term and far-term effects of various alternative Federal Government policies relating to automobile use and characteristics.
- To present the findings of the assessment in a form useful to the Congress and the public.

STUDY APPROACH

- Identify and analyze issues.
- Describe the automobile transportation system and project its future development.
- Formulate conditions and events that could impact the system or alter its development.
- Identify and analyze policy options that could be adopted by Congress to influence future automobile use and characteristics.
- Assess the consequences and impacts of policy options.
- Present findings to the Congress and the public.

THE BASE CASE OR NO-POLICY-CHANGE BASELINE

A projection of current trends and conditions assuming
- existing policies are continued (and extended)
  no major resource constraints, catastrophes, wars, etc.

Population Growth: 0.9% to 1985; 0.7% to 2000
GNP Growth: 3.5% per year
Disposable Personal Income: Doubles by 2000
Petroleum: Price increase of 3% per year (constant $)
$25.60 per barrel; gasoline $1.24 per gallon (constant $) in 2000.
Demand will be met by:
  oil imports
- synthetic fuels (2.75 MMBD in 2000)
  electric and hybrid vehicles

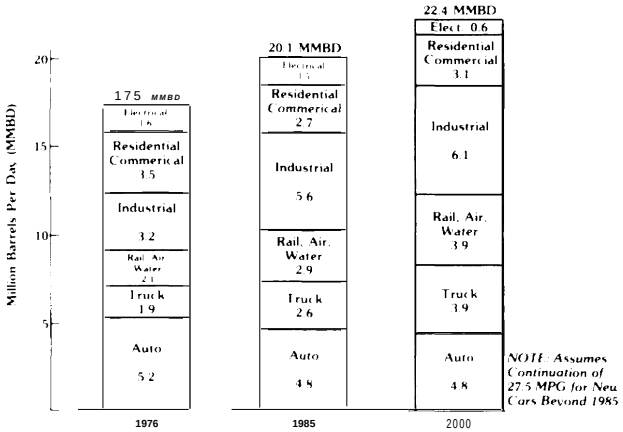
Lifestyles: No major shift

ENERGY

BASE CASE 1985-2000
- Auto fuel consumption 4-5 million barrels per day (MMBD)
- Oil import 10-13 MMBD
- Oil shortfall - world demand exceeds supply

ALTERNATIVES
Increased domestic production
- Conservation – restrict use, allocate fuel, market pricing, taxes
  - more efficient systems
- Substitutes – mass transit
  - telecommunications
  - land use policies
  - life style changes
- Energy sources – shale, tar sands
  - methanol, synthetic fuels
  - electricity

U.S. PETROLEUM DEMAND



Source SyDec EEA Phase I Report and OTA Staff estimates

ESTIMATED PETROLEUM IMPORTS

	Petroleum Demand (All Sectors) MMBD	Required Petroleum Imports MMBD	Estimated Price $ Barrel (1975 $)	cost of Imports Per Year (1975 $)
1977	178	8.5	$1.150	$42 billion
1985	201	10	$17	$62 billion
2000	22.4	126	$26	$120 billion

ENVIRONMENT

Air pollution, noise, solid waste, water contamination, community impacts

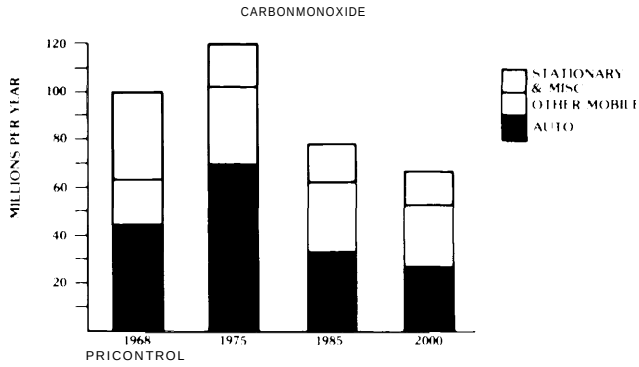
BASE CASE 1985-2000

- **Carbon monoxide –25 to 30 million tons per year from autos**
  - over 20 AQCRs in violation
- **Oxidants - over 60 AQCRs in violation (primarily stationary sources)**
  -130 million people exposed to hazardous concentrations
- **Synthetic fuels - potential major environmental impact**
- **Community disruption -40% of 1970-75 levels**

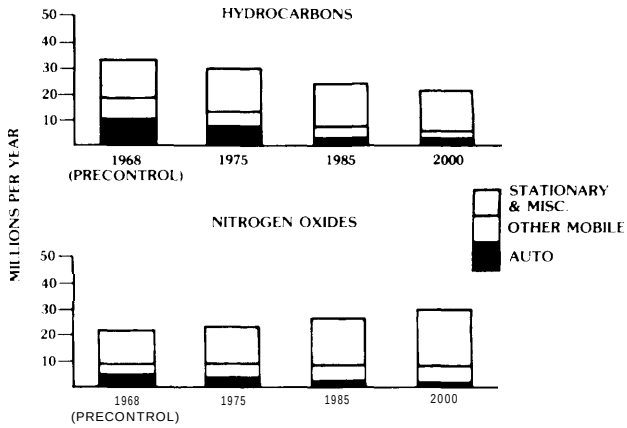
ALTERNATIVES

- **Further tightening of emission standards – 0.4/gm/mi NO_x**
- **Vehicle-in-use inspection and maintenance**
- **Auto use controls; control of other mobile & stationary sources**
- **Research on health effects**
- **Development of electric vehicles**

NATIONAL EMISSION LEVELS BY SOURCE, 1968-2000



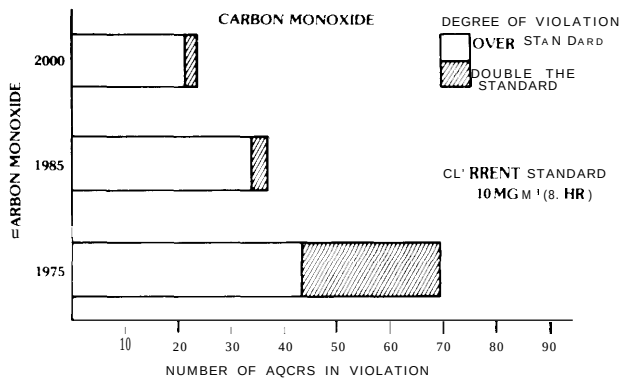
NATIONAL EMISSION LEVELS BY SOURCE, 1968-2000 HYDROCARBONS & NITROGEN OXIDES



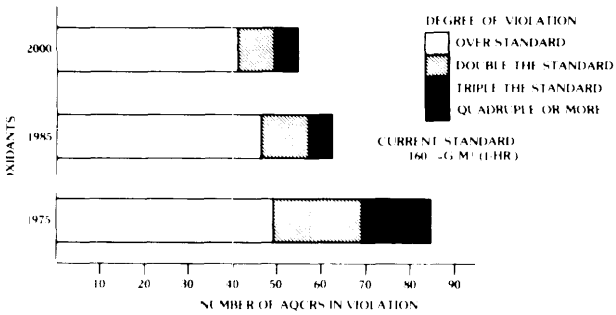
Source: 1968 Data, NAPCA, 1975 Data, EPA, ProJections, Energy and Environmentol Analysis Inc. (EEA) from EPA data

Note Assumes compliance with 1977 Clean Air Act Amendments on new car emissions but no vehicle-in-use controls

PROJECTED NUMBER OF AIR QUALITY CONTROL REGIONS IN VIOLATION OF AMBIENT AIR QUALITY STANDARDS



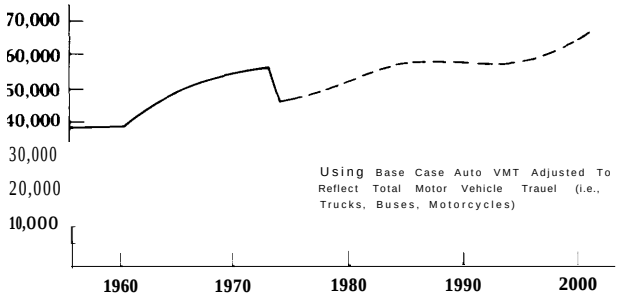
PROJECTED NUMBER OF AIR QUALITY CONTROL REGIONS IN VIOLATION OF AMBIENT AIR QUALITY STANDARDS - OXIDANTS –



* There are 247 Air Quality Control (AQCR) in the U.S. and its territories. Violation of an Air Quality Standard occurs when the permissible concentration of a pollutant is exceeded more than once in the year (i.e., a single reading over standard in a given year is not considered a violation).

Source: Energy and Environmental Analysis Inc. (EEA) From EPA Data

MOTOR VEHICLE DEATHS



SAFETY

BASE CASE 1985-2000

- **Highway fatalities and injuries continue to increase 64,000 deaths, 5 million injuries-year 2000-due to:**
  - **increasing vehicle miles traveled**
  - **increasing number of small cars, large trucks**
- **Because of the lack of definitive goals**
  - **Planning and evaluation of safety improvement is inadequate**
  - **Coordinated program of local, State, and Federal actions is not established**
  - **Level and allocation of resources is inadequate**
  - **Technical improvements are not achieved on a timely basis**

ALTERNATIVES

- **Mandatory seat belt laws**
- **55 mph speed limit enforcement**
- **Reduced alcohol use**
- **Improved vehicle crashworthiness, restraint systems**
- **Elimination of roadside hazards**

1975 MOTOR VEHICLE CRASH STATISTICS*

	Number of Crashes	Deaths	Injuries	Property Damage (Number of Vehicles)
Automobiles	13,500,000	27,500	2,400,000	22,500,000
Total Motor Vehicle	16,500,000	46,000	4,000,000	27,000,000
Total Costs ($ billions)	$37.6	$13.3	$6.1	$18.2

* **Sources** *NHTSA* **and** *National Safety Council*

MOBILITY

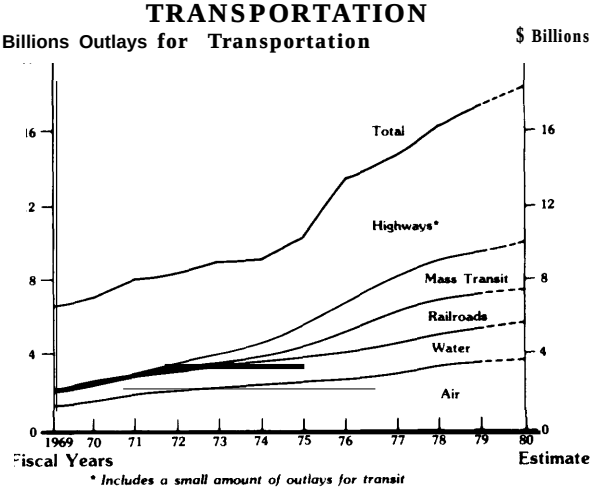
BASE CASE 1985-2000

- **Congestion in urban areas increased significantly**
- **Attempts to achieve large increases in transit ridership result in substantial increases in operating deficits**

ALTERNATIVES

- **Expanded transit services - increased Federal funding**
  - **special programs for the handicapped**
- **Wider use of carpools, vanpools, and incentives for high occupancy vehicles**
- **Improved accessibility through Federal/ local land use policies**
- **Improved telecommunications**

FEDERAL OUTLAYS FOR TRANSPORTATION



* *Includes a small amount of outlays for transit*

Source: The U.S. Budget in Brief, Fiscal Year 1979

BASE CASE – TRANSIT FINANCING AND RIDERSHIP (BILLIONS PER YEAR – COSTS IN 1975 DOLLARS)

	1975	1985	*2000*
Federal Capital Grants	$1.2	$1.7	$1.7
Federal Operating Assistance	*$0.3*	*$0.9*	*$0.9*
Total State & Local Funds	$1.7	$2.7	$4.9
Transit Ridership (Billions of Revenue Passengers Per Year)	5.6	6.5	6.5

COST **AND** CAPITAL

BASE CASE 1985-2000

- **Decrease in highway construction –increased maintenance**
- **Increased competition among auto manufacturers due to narrower product size differentiation**
- **Possible failure of one or more of the major auto manufacturers**
- **Increase in auto ownership and operating costs**

ALTERNATIVES

- **Greatly increased Federal funding to meet highway maintenance and transit operating needs**
- **Control of auto maintenance and repair costs**

TECHNOLOGICAL DEVELOPMENTS 1985-2000

- **Development and large-scale utilization and commercialization of:**
  –Liquids from oil shale and tar sands
  - Synthetic fuel from coal
  – Methanol
- **More efficient propulsion systems**
  –Spark ignition, diesel
  - Gas turbine, stirling
- **Development and large-scale commercialization of electric and hybrid vehicles**
- **Greater utilization of lightweight materials**
- **Improved emission controls-Particularly** *NOx*
- **Improved safety technology**

ASSESSMENT OF THE FUTURE CHARACTERISTICS AND USE OF THE AUTOMOBILE TRANSPORTATION SYSTEM

SEPTEMBER 11,1978

CONGRESS OF THE UNITED STATES
Office of Technology Assessment
WASHINGTON, D. C. 20510

BASE CASE

The "Base Case" is a projection of some features of the automobile transportation system to the year 2000. It assumes that present Government policies and programs will be continued, that the population will grow at a moderate rate, that life styles will not change significantly, and that the economy wiII stay healthy and vigorous. The Base Case indicates the direction that present policy is leading and serves as a frame of reference for the study. Some principal Base Case projections are:

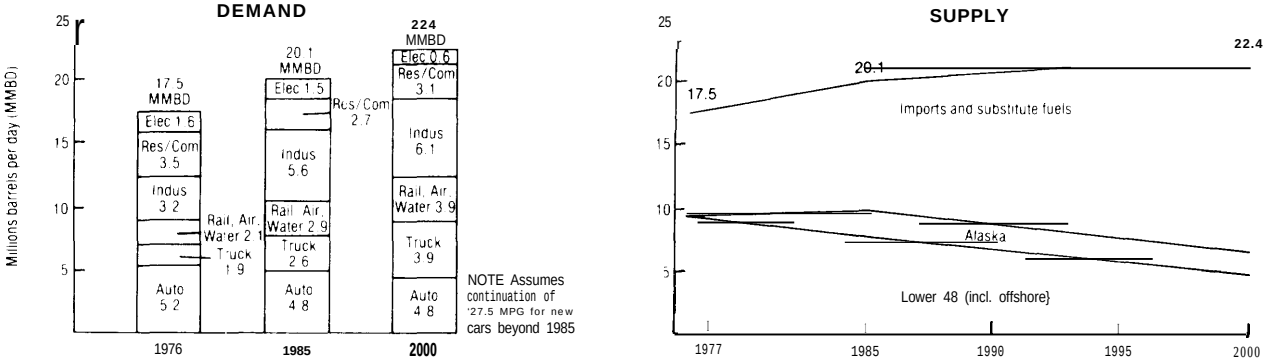
Projections	1975	1985	2000
Population			
U.S. population (millions)	214	233	260
Urban area population (millions)	130 (61%)	149 (64%)	177 (68°/0)
Licensed drivers (millions)	130	151	177
Male/female drivers (millions)	71/59	78173	89188
Economics			
Gross national product ($ trillions)*	1.52	2.22	3.72
Disposable personal income per capita ($ thousands)*	5.0	6.7	10.1
Automobile transportation system			
Autos in use (million)	96	118	148
Auto VMT† (trillions)	1.0	1.4	1.8
Annual transit rides (billions)	5.6	6.5	6.5
Gasoline price per gallon •	$0.57	$0.77	$1.21
Fleet fuel economy (MPG)	13.5	19.4	24.6
Petroleum used by autos (MMBD)#	5.0	4.8	4.8
Petroleum imports (MMBD)#	7.4	10.0	12.5
Auto emissions (millions of tons per year)			
Carbon monoxide	69.3	32.6	27.3
Hydrocarbons	7.9	3.5	2.9
Oxides of nitrogen	4.0	2.7	2.9
Highway deaths (thousands)	46	58	64

•In 1975 dollars.
†Vehicle miles traveled.
#Million barrels per day.

ENERGY

Domestic petroleum production slackened in the 1960's and peaked in the early 1970's. World production, while still increasing, is expected to peak between 1985 and 2000. If consumption continues to climb, it is anticipated that a petroleum shortage—accompanied by a significant increase in petroleum prices—will develop before the end of the century.

U.S. PETROLEUM



SOURCE SyDec/ EEA Phase I report and OTA staff estimates

Continuing high demand in the face of limited supply will force prices upward and stimulate development of alternative energy sources. For the automobile these might be shale oil, tar sands, coal liquids, alcohol, and electricity. All are more costly than petroleum at present, and a substantial shift to any would take many years to accomplish. In the meantime, petroleum conservation would make the supply last longer, thus buying time and smoothing out the transit ion.

SOME LAWS AND POLICIES IN EFFECT

- **Emergency Petroleum Allocation** Act of 1973 which permits rationing of petroleum-based fuels and price controls during an emergency.
- Nationwide 55 mph speed limit which went into effect in 1974.
- Energy Policy and Conservation Act of 1975 which set a 27.5 mpg standard for average new car fuel economy by 1985.
- Electric and Hybrid Vehicle Research, Development, and Demonstration Act of 1976 which will put 7,500 to 10,000 electric vehicles into use by 1984.
- Several programs in the Department of Energy to develop gas turbine and Stirling engines and-to promote research on synthetic fuels.

Some Conservation Methods

Smaller, lighter cars
Increased engine efficiency
Increased use of mass transit
Car and van pools
Travel restrictions (time & place)
Increased gasoline taxes
Gas guzzler tax
Decontrol of fuel prices
Gasoline rationing

Some Alternative Energy Sources

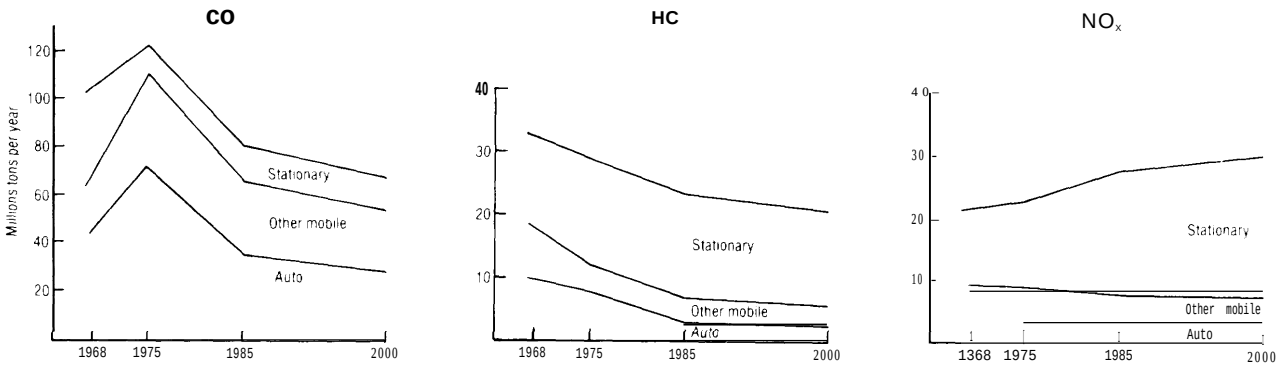
Methanol and ethanol
Shale oil and oil from tar sands
Coal liquids
Electric and hybrid vehicles
Hydrogen

ENVIRONMENT

Widespread and intensive use of the automobile, the predominant mode of personal transportation in this country, has caused serious concern about effects on the environment. Chief among these is air pollution. Others are noise, water pollution (from road salt, lead, used oil, and spilled fuels), solid waste (scrapped batteries, tires, and auto bodies), and community disruption. There is also concern that the advent of new automotive technology may bring new or increased environmental hazards.

The major air pollutants emitted by automobiles are carbon monoxide (CO), hydrocarbons (HC), and nitrogen oxide (NO_x). CO—resulting from incomplete combustion of fuel — is harmful to human, animal, and plant life. HC and NO_x interact in sunlight to produce photochemical oxidants (smog), which are lung irritants that are especially harmful to the old, the infirm, and the very young.

SOURCES OF AIR POLLUTION



Although automobile emissions will drop significantly by 2000 they will still be far from eliminated, particularly in urban areas. It is projected that about 130 million people in U.S. cities will still be exposed to hazardous levels of smog or CO by the year 2000.

SOME LAWS AND POLICIES IN EFFECT

- Department of Transportation Act of 1966 which protects natural beauty in parks, recreational areas, and historical sites.
- National Environmental Policy Act of 1969 which calls for study of environmental impacts when planning federally assisted highways.
- Highway Act of 1970 which sets air quality and noise level standards for highway projects.
- Clean Air Act of 1970 and later amendments which set emission standards for new autos through 1981. (CO: 3.4/gm/mi, HC: 0.41 gm/mi, NO_x: 1.0 gm/mi).
- Noise Control Act of 1972 which authorizes EPA to set noise control standards for all types of motor vehicles.

SOME METHODS TO REDUCE AUTO AIR POLLUTION

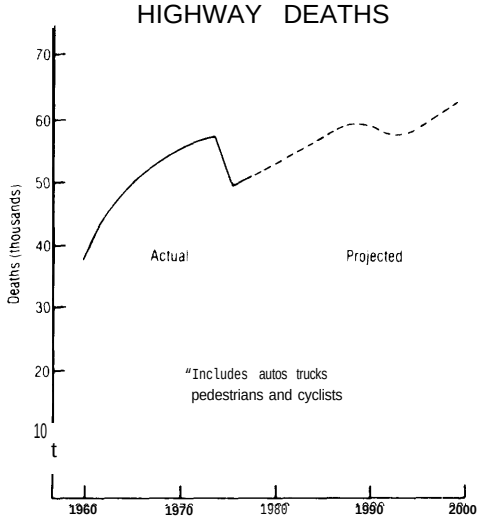
- Improved emission control devices on new cars
- Cleaner engines
- Use of electric vehicles in urban areas
- Staggered work patterns
- Periodic inspection and maintenance of automobiles in use
- Restrictions on auto use in certain areas or at certain times

SAFETY

In 1977, 47,715 people died in traffic crashes on U.S. streets and highways, and over 4.3 million were injured. The cost of property damage alone exceeded $18 billion.

Between now and 2000, it is expected that the death and injury rates (the numbers per mile of travel) will decrease. The **totals of highway deaths and injury,** however, will keep growing as there will be more drivers, more cars on the road, and more miles traveled. Over the remainder of this century, it is projected that about 1 million people will die and 130 million will be injured in traffic crashes.

HIGHWAY DEATHS



1975 Autos in use — 96 million
Auto VMT* — 1 trillion
Drivers — 130 million

1985 Autos in use — 118 million
Auto VMT — 1,4 trillion
Drivers — 151 million

2000 Autos in use — 148 million
Auto VMT — 1.8 trillion
Drivers — 177 million

Safety is a complex problem that involves driver behavior, vehicle characteristics, roadway features, and driving conditions. Safety is a matter of both design and use. Safety is not just an individual concern. Industry has a part to play. All levels of Government— local, State, and Federal— are involved. There is no single, simple solution to the problem of highway death and injury.

SOME LAWS AND POLICIES IN EFFECT

- Federal Motor Vehicle Safety Standards—50 standards governing such features as brakes, safety glass, and seat belts are now in force; 20 revisions or new standards are under consideration.
- Federal Highway Safety Program Standards—there are 18 standards dealing with highway design, driver licensing, police, medical services, and the like.
- 55 mph Speed Limit—established in 1974 as an energy conservation measure, it is now considered an important safety measure as well.

SOME **WAYS TO IMPROVE TRAFFIC SAFETY**

Short Term

Reducing drunk driving
Observance of the 55 mph speed limit
Increased seat belt use (voluntary or mandatory)
Passive restraints

Long Term

Improved occupant restraints
40 to 50 mph crash protection
Better driver training and licensing
Reducing hazards to pedestrians and cyclists
Removal of roadside obstacles and traffic hazards

MOBILITY

Almost every aspect of our daily life is shaped by the automobile. Over 90 percent of personal travel today is by automobile. About 85 percent of all households own an automobile, and nearly half own two or more (not counting light trucks, vans, and campers). We now spend about $30 billion of Federal, State and local funds each year to build and maintain the street and highway network.

In large cities, public transit is available as an alternative for those who do not choose to drive and for those who cannot because of poverty, age, or physical handicap. Despite $4.5 billion in Federal aid to transit in 1977, the service in many communities is less than adequate In rural areas there is virtually no alternative to the automobile for trips beyond walking distance.

The present and expected future demand for personal travel is illustrated by the Base Case projections shown below.

	Base case projections		
	1975	**1985**	2000
Automobiles (million)*	95	118	148
Licensed drivers (million)	120	151	177
Autos per licensed driver	.73	.78	.84
Vehicle miles traveled (trillion)*	1.03	1.43	1.80
VMT per licensed driver (thousand)	7.9	9.5	10.2
Urban driving under congested conditions	10%	14%	24%
Transit ridership (billions)	5.6	6.5	6.5

● Excludes vans, light trucks, and campers.

Whether these expected levels of travel will materialize depends upon a continuing supply of petroleum or substitute fuels at reasonable cost. But we will also face other mobility problems. Streets and highways will require more maintenance as they age and traffic grows heavier. Congestion in urban areas is expected to worsen. Supporting even a modest increase in transit service will entail major increases in State and local operating subsidies by 2000. The problem confronting the Federal Government is how to allocate resources so as to assure adequate mobility for all.

SOME LAWS AND POLICIES IN EFFECT

- Federal-Aid Road Act of 1916 which established the basic system of Federal aid to States for highways
- Highway Revenue Act of 1956 which set up the Highway Trust Fund to help finance highway construction
- Urban Mass Transit Act of 1964 which provides Federal aid to transit
- Federal-Aid Highway Act of 1973 which allows Federal highway funds to be used for transit

SOME ALTERNATIVES

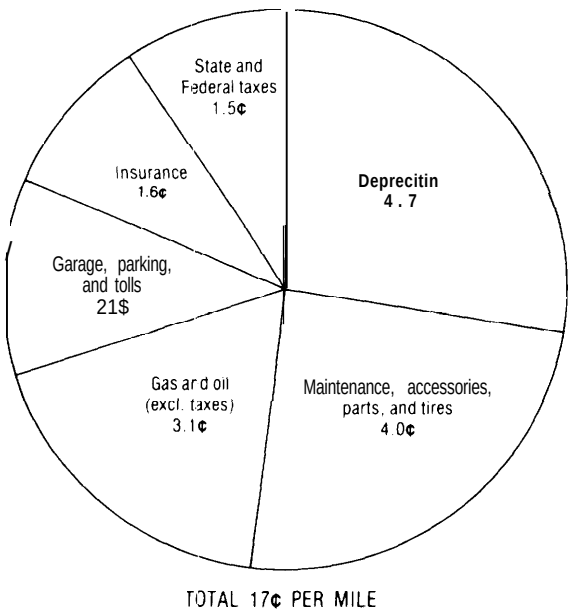
- building more highways
- making more efficient use of existing highways
- improving urban transit systems
- improving rural and intercity public transportation
- promoting paratransit
- special aid to those who do not own an automobile or cannot drive
- improving accessibility through land use planning
- fostering telecommunications as a substitute for travel

COST AND CAPITAL

The cost of the automobile transportation system is felt in many ways. For the typical household, automobile ownership and use represents the second or third largest item in the budget—exceeded only by housing and sometimes food. The building and maintenance of roads costs taxpayers over $30 billion annually. For industry, compliance with Government regulations and development of new technology for the future automobile transportation system entails large capital investments. Ultimately these new engines, alternative energy sources, better automobiles, and improved highways will be translated into higher costs to the consumer. Accompanying these costs will be the need for increasing expenditures to support public transit as a means of relieving congestion, saving energy, and providing mobility to those who cannot, or choose not, to own or use the automobile.

The figures and table below illustrate three aspects of the cost of personal transportation.

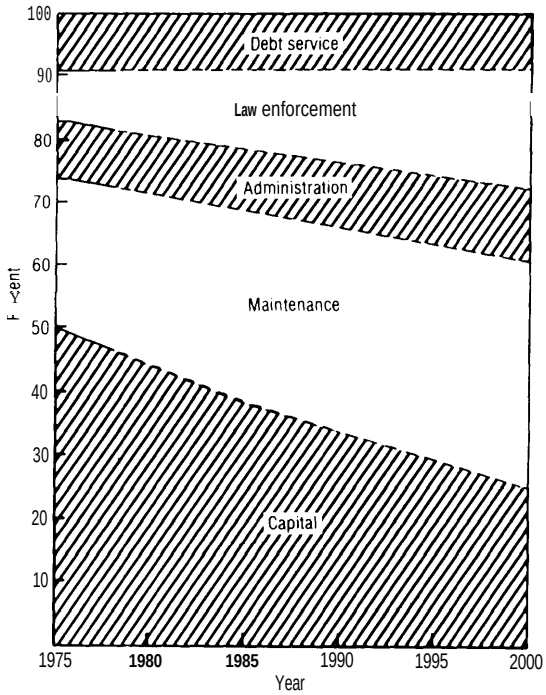
COST OF OWNING AND OPERATING
A STANDARD-SIZE AUTOMOBILE*



TOTAL 17¢ PER MILE

● Based on 1976 data, assuming 10,000 miles per year

DISTRIBUTION OF TOTAL
HIGH WAY DISBURSEMENT*



'Federal State nd local governments combined

PROJECTED TRANSIT COSTS
1975 dollars (billions)

	1975	1985	2000
Federal capital funds. ., ...	1.21	1.71	1.71
Local matching (20 percent)	.30	.43	.43
Federal operating assistance.	.30	.93	.93
Local share.	1.41	2.27	4.47
Total Federal aid	1.51	2.64	2.64
Total local burden	1.71	2.70	4.90

SOME WAYS THE FEDERAL GOVERNMENT CAN INFLUENCE COSTS

. regulation of repair practices and costs
. incentives or standards for auto durability
. no-fault insurance
• decontrol of fuel prices
• tax incentives for industry to develop new technology and alternate energy sources
• underwriting R&D for new technology
• capital assistance to industry for high-risk ventures
• changes in highway and transit funding
• levying tolls and fees on autos i n congested areas

AUTOMOTIVE PROPULSION SYSTEMS

The Otto Cycle Engine is the spark-ignition, internal combustion engine currently used in most passenger cars. Gasoline and air are mixed in the carburetor, fed into the combustion chamber, and ignited 'by an electric spark. The expanding gases in the cylinder push a piston to provide motive power.

The Stratified Charge Engine is a slightly modified Otto cycle engine. Fuel is fed into the combustion chamber in a way that produces a rich fuel-air mixture near the spark plug and a lean mixture elsewhere. The spark plug ignites the rich mixture, which in turn ignites the lean mixture, producing a more complete burn and—in some designs—a more efficient use of fuel.

The Diesel Engine is an internal combustion engine that uses the heat of compression rather than a spark to ignite the fuel-air mixture. The diesel engine is used extensively in trucks and buses and in some models of Volkswagen, Oldsmobile, Cadillac, Mercedes, and Peugeot automobiles.

The Gas Turbine (Bray ton Cycle) Engine uses the expanding gases from a continuous burning of fuel to drive a turbine. Most of the turbine output is used as motive power, but some is used to drive a compressor to provide air for the combustion process.

The Stirling Cycle Engine is an external combustion engine. The heat from fuel burned outside the engine is used to expand a confined working fluid (usually helium or hydrogen) which in turn pushes a piston. The expanded (and therefore cooled) working fluid is compressed and reheated for another piston stroke.

Electric Motors for automobiles operate from energy stored in batteries. Mechanical devices, such as flywheels or regenerative braking systems, may be added to augment or to conserve the supply of electricity.

Hybrid Vehicles use two different sources of energy. The most common combines a battery powered electric motor with an internal combustion engine that supplies auxiliary power for periods of increased load, such as during acceleration or high-speed cruise.

ALTERNATIVE FUELS

Several alternatives to gasoline are being considered as future automotive fuels. Among these are shale oil, oil from tar sands, coal liquids, alcohol, and hydrogen. In comparison with gasoline, all now cost more to produce and require more energy for extraction and refining. A table summarizing the advantages, problems, and state of development of these fuels is on the reverse side.

Shale oil is **a** petroleum-like substance that is contained in certain rock or shale. The recovery process involves heating the shale to evaporate the oil, which is then drawn off and condensed. The resulting crude shale oil can then be refined to produce a synthetic gasoline with properties close to those of petroleum based fuel.

Several pilot plants are now in operation. Large-scale commercial production is not likely for 10 to 15 years.

Tar sands are sand and clay saturated with a heavy oil. The extraction and refining processes are similar to those for shale oil. The final product has properties similar to gasoline.

A commercial plant, producing 50,000 barrels per day, is in operation in Canada. Commercialization in the United States is not expected for 10 to 15 years.

Coal liquids can be produced by several different methods. The basic process uses steam to add hydrogen to the coal. Ash, sulfur, and other contaminants are removed. The product is then upgraded and refined to gasoline or diesel fuel.

A commercial facility is now operating in South Africa. Several pilot plants exist in the United States, but extensive commercial production is believed to be 10 to 20 years away.

Alcohol fuels—ethanol (ethyl alcohol or grain alcohol) and methanol (methyl alcohol or wood alcohol) —offer promise as automotive fuels. Each can be used in pure form or in blends of up to 20 percent with gasoline, a mixture known as gasohol.

Ethanol comes from the fermentation of grains, plants, and agricultural or municipal waste. Methanol can be produced from coal, natural gas, naphtha, and (not as easily) the same sources as ethanol.

Automobiles in Brazil have been using ethanol blends for several years. Gasohol is now being sold in Illinois, Iowa, and Nebraska. California has initiated a gasohol program, and Colorado has approved one. it is estimated that it would take 10 to 15 years to build the industrial capacity sufficient to meet 10 percent of our daily automotive fuel demand.

Hydrogen, the most plentiful element in the universe, offers great potential as a transportation fuel. It can be stored as a gas, liquid, or metal hydride.

Hydrogen is being successfully used as a fuel in the U.S. space program. Large-scale production and use as an automotive fuel is believed to be at least 25 years away and is contingent upon solution of the problems of conversion, storage, handling, and safety in use.

SAMPLE INTERVIEW QUESTIONS

- What are the major advantages and disadvantages of the automobile for you? What actions could you take to reduce these disadvantages? What actions could the Federal Government take to reduce the disadvantages?
- Describe the transportatiton system of 2000 as you would like it to be, or as you envision it might become.
- Should the automobile be the major means of transportation for your area in **2000?** If not, what alternatives would you suggest? What actions could the Federal Government take, if any, to assist in transportation in your area?
- What do you perceive the Federal Government's role to be in transportation in 1978? in 2000?
- To what extent can voluntary fuel conservation methods, increases in transit and paratransit usage, and moderate increases in fuel taxes meet national energy goals? If the goals are not met, what are the most effective and equitable means of mandatory conservation or allocation of petroleum resources?
- Assuming that a shift from petroleum for automotive use is necessary, by what means, and on what time scale, should a transition to alternate energy sources be implemented? What should be the Federal role in this transition?
- To what extent should environmental considerations restrict or constrain the growth of the personal transportation system?
- To what extent should Federal, State, and local governments impose and enforce additional safety measures in order to significantly reduce accidents on the highway?
- To what extent should the Federal Government increase funding of capital and operating expenses for transit sytems and promotc and remove institutional constraints on paratransit systems to increase mobility, particularly for the disadvantaged and handicapped?
- How can cost increases to the consumer be minimized, employment stabilized, and economic growth of the industry facilitated while the concerns of energy, environment, safety, and mobility are met?

BACKGROUND BRIEFS ON WORKING GROUP MEMBERS

BACKGROUND

Female; auto owner; suburbanite; carpools to and from work; works in center city; active in auto consumer affairs; two children dependent on her for transportation; has built and raced stock cars.

Female; auto owner; city dweller; works irregular hours (5: 00 a.m. to 1:30 p.m.); drives to and from work; has done consulting work on issues of concern to women and minority groups; journalist in transportation.

Male; police officer (responsibilities have included community relations, work with teenagers, as well as law enforcement activities); small business owner (two-way radio communications); auto owner; camps out frequently with family so uses car extensively for recreation in addition to work.

Male; non-auto owner; commutes by transit from city residence to suburban job; family relies on transit, walking, or car-owning friends for mobility.

Female; auto owner; city resident; walks to employment in city; works professionalJy and as volunteer on variety of futurist-oriented projects.

Female; aged **72;** city dweller; fixed income; non-auto owner; walks and uses transit system daily.

Male; auto owner; commutes to work by car; lives and works in suburbs; active in community affairs (including transportation issues); professional experience in urban affairs.

Male; auto owner; commutes from suburban residence to city employment by transit; uses car primarily for long-distance trips and errands; active professionally and on volunteer basis in areas of rural transportation and mobility for the transportation disadvantaged.

Female; auto owner; self-employed, relies on auto for work purposes (presently conducts arts program for inmates of local prison); has done community work in area of environmental impacts on health of children.