CHAPTER NINETEEN

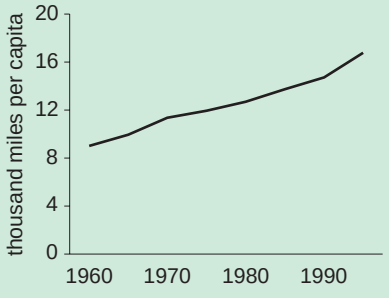
Transportation

The U.S. transportation system is a vast enterprise. Transportation-related goods and services account for approximately 11 percent of gross domestic product, and the economy relies heavily on the low-cost, highly flexible movement of goods and services. Most Americans enjoy a level of personal mobility that offers them a wide range of choices about where to live, work, shop, obtain health care, and vacation.

Yet, not all of the costs of mobility are paid directly by the individuals and businesses who are the beneficiaries. The U.S. transportation system has significant impacts on air and water quality, habitats and open space, and pollution levels.

Over the last 25 years important progress has been made, but more remains to be done. The need to improve the environmental performance of transportation while responding to rising demand for access to markets and services is a continuing challenge.

Figure 19.1 U.S. Passenger Transportation Growth, 1960-1994



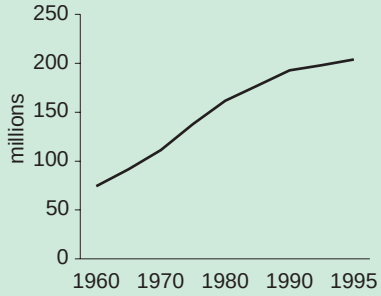
Source: U.S. Department of Transportation (DOT), Bureau of Tranportation Statistics (BTS), *Transportation Statistics Annual Report 1996* (Washington, DC, 1996).

BACKGROUND

Given its vast scope and scale, it is not surprising that the U.S. transportation system has environmental impacts. To meet the Nation's needs, the transportation system accommodates over 4 trillion passenger-miles of travel and 3 trillion ton-miles of domestic freight annually. Further, people in the United States travel much more today than in 1970—mainly by automobile and aircraft. In particular:

- Per capita travel on all modes increased from 11,400 miles to 16,800 miles (Figure 19.1).
- Highway passenger miles traveled in 1994 were nearly twice that of 1970.
- The number of registered motor vehicles increased from 111 million in 1970 to 205 million in 1995 (Figure 19.2).

Figure 19.2 U.S. Motor Vehicle Registrations, 1960-1995



Source: U.S. Department of Transportation (DOT), Federal Highway Administration (FHWA), *Highway Statistics 1994* (DOT, FHWA, Washington, DC, 1995).

- Total yearly air passenger miles in 1994 were more than three times the 1970 level.
- Ton-miles of freight grew 60 percent between 1970 and 1994, resulting in the domestic transport of 12,600 ton-miles of freight per capita (Figure 19.3).
- Ton-miles of freight moved by intercity trucks more than doubled between 1970 and 1994 (Figure 19.4).

CURRENT CONDITIONS

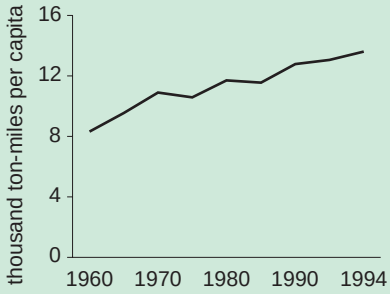
Transportation-related activities can adversely impact environmental quality and human health. Most of these impacts result from the widespread use of fossil fuels.

Transportation is the Nation's largest source of many air pollutants targeted under the Clean Air Act. In addition, transportation fuel use is a major U.S. source of greenhouse gas emissions, which have been strongly linked to potential changes in the earth's climate. (See Climate Change chapter.)

In addition, transportation infrastructure, vehicles, and fuels affect water quality and quantity, species diversity, and habitats. For example, oil and gasoline leaks and spills from tankers, motor vehicles, and above and below ground storage tanks pollute surface and ground water. Old vehicles, tires, and paving materials that are not recycled increase pressure on landfills, contaminate water systems, and contribute to air pollution emissions. Transportation infrastructure affects land use, flora and fauna habitats, and may cause changes in local water tables and drainage patterns.

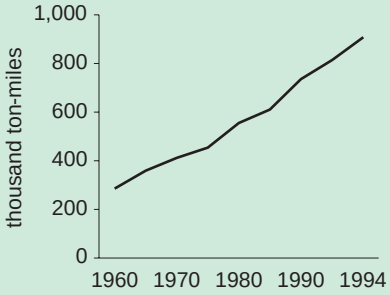
Traditionally, governments' roles have mainly been to build and maintain infrastructure, though the vast majority of transportation decisions are made by businesses and individuals. Whereas markets are relatively efficient at producing and allocating private goods and services, current pricing mechanisms seldom

Figure 19.3 U.S. Freight Transportation Growth, 1960-1994



Source: U.S. Department of Transportation (DOT), Bureau of Tranportation Statistics (BTS), *Transportation Statistics Annual Report 1996* (Washington, DC, 1996).

Figure 19.4 U.S. Freight Moved by Intercity Trucks, 1960-1994



Source: See Part III, Table 91.

reflect environmental costs. Due to public concern, laws have been enacted in the last 25 years that have made significant progress in reducing the environmental impacts of transportation.

Energy Use

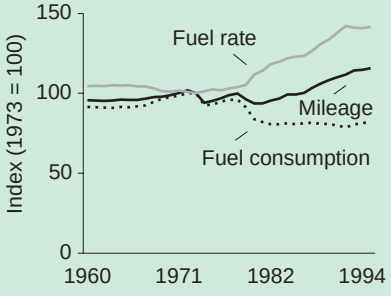
While overall transportation energy use has grown, major improvements in energy efficiency have occurred in the last 25 years (Figure 19.5). The increase in energy use would have been twice as great without these improvements, according to the Department of Transportation's Bureau of Transportation Statistics.

Most energy efficiency gains resulted from improvements to passenger cars and light trucks. In addition, improved use of available capacity and engine technologies have contributed to significant efficiency gains in rail freight and commercial air passenger traffic. However, for both light-duty vehicles and aircraft, a rapid surge in passenger miles traveled has offset a substantial increase in per-passenger or vehicle fuel economy.

The number of Americans traveling by transit, rail, and intercity bus has increased slightly since 1970, but by 1994 the share of total passenger miles of these modes was less than half the 1970 level. Air travel's share of passenger miles has increased by 180 percent over the same period. Further, the share of passenger miles by light trucks, sport utility and other vehicles has increased 220 percent since then.

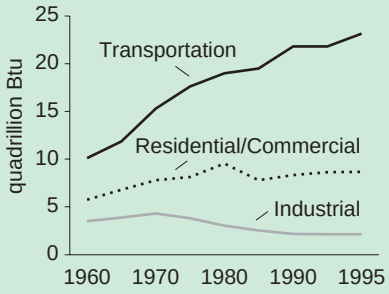
Highway vehicle energy improvements have tapered off in recent years as a result of several factors, including lower prices and stable supplies, which have greatly weakened market incentives for fuel efficiency, and declining vehicle occupancy rates. In addition, gains from the current corporate average fuel economy standards and other initiatives have nearly reached their full effects. Most recently, Congress prohibited the Department of Transportation from increasing car or truck standards in fiscal 1996.

Figure 19.5 U.S. Motor Vehicle Efficiency, 1960-1994



Source: See Part III, Table 85.
Note: Fuel rate = miles per gallon.

Figure 19.6 U.S. Petroleum Consumption by Sector, 1960-1995

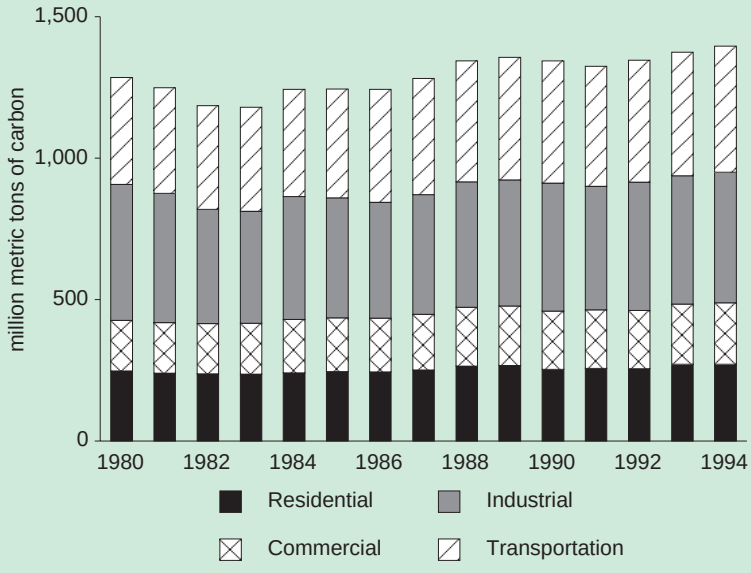


Source: See Part III, Table 85.

Nonetheless, government standards, technological change, and vehicle stock turnover continued the efficiency improvements well beyond the fall in oil prices and into the early 1990s.

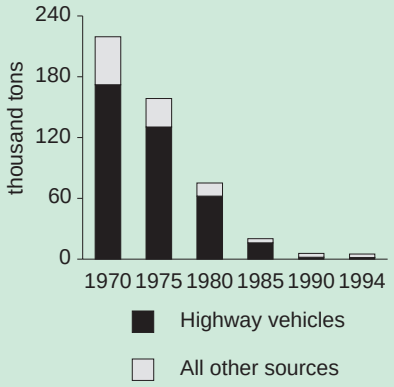
Transportation currently accounts for about two thirds of total U.S. oil consumption. While other sectors have shifted away from oil over the past two decades, transportation remains almost entirely dependent on petroleum (Figure 19.6). Due to growing transportation energy use and continued declining domestic oil production, U.S. reliance on oil imports is likely to continue in the future. The Energy Information Agency projected that imports are likely to supply about 60 percent of U.S. oil demand by 2005. Further, by 2010 two thirds of the oil traded in international markets will be from the Persian Gulf — an area of persistent political instability.

Figure 19.7 U.S. Carbon Dioxide Emissions by Sector, 1980-1994



Source: U.S. Department of Energy, Energy Information Administration.

Figure 19.8 U.S. Lead Emissions by Source, 1970-1994



Source: See Part III, Table 27.

Greenhouse Gas Emissions

The United States continues to be the world's largest emitter of greenhouse gases. Transportation's share of U.S. greenhouse gas emissions has grown over the last quarter century to 30 percent — the second largest source. Carbon dioxide — the most important greenhouse gas — is an inescapable by-product of fossil fuel combustion, and its emissions have been increasing with rising fossil-fueled energy use (Figure 19.7).

According to the U.S. Department of Energy, carbon dioxide emissions could increase by 1.3 percent per year through 2010, due to slow energy efficiency gains and rising vehicle travel. While several existing alternative fuels could lower carbon dioxide emissions, petroleum is expected to remain the dominant transportation fuel through 2010. Further, most alternative fuels either produce some carbon dioxide or other greenhouse gases (e.g., natural gas) or would likely depend on fossil fuels upstream (e.g., electric vehicles charged by fossil fueled electricity generation).

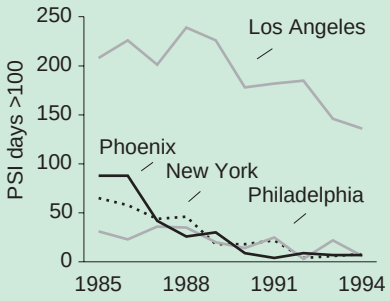
Air Quality

The total amount of air pollution from cars and other highway vehicles is far less today than in the early 1970s. This is largely due to cleaner new vehicles designed to meet increasingly stringent emission and new highway vehicle fuel economy standards developed in the late 1960s and early 1970s, and to improved fuels. Airborne lead emissions have been all but eliminated (Figure 19.8), and the sulfur content of diesel fuel has been lowered appreciably. Total emissions of carbon monoxide and volatile organic compounds from transportation sources have been cut significantly, though oxides of nitrogen emissions have remained level.

Progress also is evident at the metropolitan level. Mobile sources are a major contributor to unhealthy levels of carbon monoxide and urban ground-level ozone — or smog. However, of 42 areas exceeding the Clean Air Act standard for carbon monoxide in 1990, 34 areas were no longer reporting violations in 1994. In the nation's largest cities, the number of days when air quality was unhealthy or worse dropped from 778 in 1985 to 280 in 1994 (Figure 19.9; see also Part III, Table 33).

However, despite the success of air pollution control efforts, past trends will not necessarily continue in future years. Increases in some transportation emissions occurred between 1993 and 1994. Projections by the Transportation

Figure 19.9 Air Quality in Selected U.S. Cities, 1985-1994



Source: See Part III, Table 33.

Research Board of the National Academy of Science suggest that even modest growth in vehicle travel could reverse the downward trend in emissions that characterized the last 25 years.

Water Quality

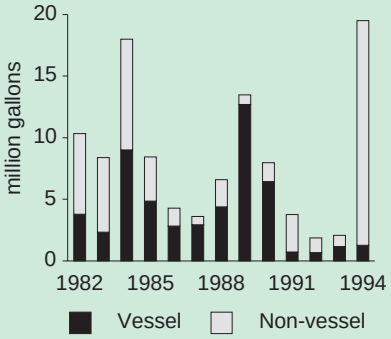
Oil spills and improper disposal of used motor oil and other chemicals from transportation vehicles and facilities are sources of both surface water and groundwater contamination. The most conspicuous are large tanker spills, such as the Exxon Valdez spill in Prince William Sound, Alaska, in 1989. The severity of environmental impacts of these spills depend on the extent of the spill and the natural resources affected. Large spills into U.S. waters accounted for only a little more than one-third of all reported oil spilled from 1982 to 1994 (Figure 19.10). The cumulative effect of smaller incidents, as well as unreported spills from many different sources such as the improper disposal of motor oil, can also have an impact on the environment and cleanup costs.

Although the unpredictable timing of large spills can complicate analyses, the data suggest that the volume of reported oil spilled in U.S. waters declined over the 1973 to 1993 period. This trend reflects, among other things, the success of initiatives such as the Oil Pollution Act of 1990, which increases liability and emphasizes prevention and quick response.

Leaking motor fuel storage tanks and pipelines present a continued challenge. In 1993, EPA estimated that 20 percent of the approximately 2 million underground fuel storage tanks in the U.S. that are subject to federal regulation were leaking. According to a 1993 American Petroleum Institute survey, 10 percent of petroleum transportation facilities with above ground storage tanks reported groundwater contamination.

In general, relatively little is known about the volume and impact of pollution from the numerous and widely dis-

Figure 19.10 Oil Spills in U.S. Waters, 1982-1994



Source: See Part III, Table 45.

persed sources of water pollution affected by transportation. Substantial amounts of lubricants, antifreeze, fuel, deicing materials, and other contaminants enter the environment from millions of highway vehicles, aircraft, ships, pleasure boats and trains. Additional pollutants from pavement materials and non-transportation sources that settle on roads, runways, and other facilities are carried into rivers after rainfall.

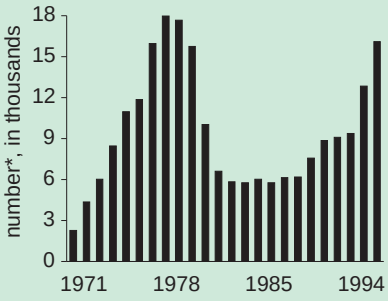
Transport of Hazardous Materials

Safely moving the millions of tons of hazardous materials and waste generated annually in the United States presents a difficult challenge. To minimize the risks to human health and the environment, federal agencies closely regulate the transport of hazardous materials through extensive requirements for container safety, labeling, and documentation, as well as through the monitoring of spills and coordinating quick responses.

In 1994, 16,092 hazardous material incidents (excluding oil spills in U.S. waters) caused 11 deaths, 577 injuries, and an estimated $44 million in damages (Figure 19.11). In addition, hazardous material incidents resulted in 316 evacuations, in which 18,392 people were evacuated. Ten of the incidents involved radioactive materials.

Over the past two decades the number of incidents has risen steadily. The increase in the absolute numbers is likely due at least in part to improved incident reporting. Despite the increase in the total number of incidents, the number of serious incidents has remained fairly constant. ("Serious" is defined as an incident that involves a fatality, major injury, closure of a major transportation artery or facility, evacuation of six or more persons, or a vehicle accident or derailment.)

Figure 19.11 U.S. Hazardous Materials Incidents, 1971-1994



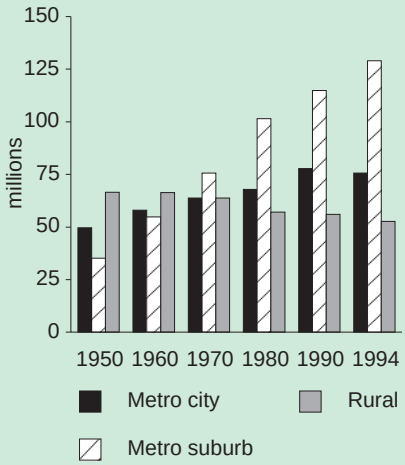
Source: U.S. Department of Transportation (DOT), Bureau of Tranportation Statistics (BTS), *National Transportation Statistics 1996* (Washington, DC, 1995).
Note: *does not include oil spills in U.S. waters.

Land Use and Habitat

The transportation system has both direct and indirect impacts on land use and wildlife habitat. While highways and rail lines do not occupy large expanses of land, they often fragment wildlife habitat into smaller, more isolated units of land or create barriers between functional areas. Transportation routes can also create new pathways allowing species to be introduced into previously isolated areas, disrupting local ecosystems.

Wildlife can be affected by traffic, harmful emissions, noise, and lighting. Habitat can be affected by infrastructure projects that cause changes in hydrology, soil, and water levels — such as those

Figure 19.12 U.S. Metropolitan and Rural Population, 1950-1994



Source: See Part III, Table 4.

that result in the loss of wetlands. Careful planning can avoid or minimize many of these impacts.

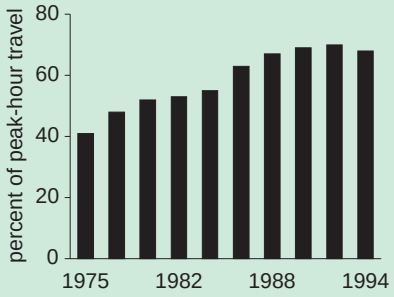
Transportation systems also can have indirect impacts by influencing how land is subsequently developed and used. Transportation infrastructure built in response to growth can encourage relatively rapid changes in travel behavior. Traffic congestion as well as road construction or expansion in turn stimulate new patterns of industrial, commercial and residential growth that can result in the significant loss of open space and habitat. Businesses may re-locate or open new premises, and households may move to new residential areas made more accessible to a region's employment, retail, recreational and institutional centers of activity. Over time, these changes in land use can generate new travel demands, possibly accompanied by greater traffic congestion, which in turn encourage additional transportation capacity.

The post World War II era has been characterized by increased concentration of the U.S. population in metropolitan areas. The portion of the population living in urban or suburban areas increased from 69 to 79.5 percent from 1970 to 1994, a result of net migration of people to metropolitan areas as well as overall population growth (Figure 19.12; see also Part III, Table 4). However, growth has been strongest in the suburbs. Over the 1970–94 period, the total urban population rose from 63.8 million to 75.6 million (29 percent of the total), while the total suburban population increased from 75.6 million to 129 million (50 percent of the total). With this suburbanization comes a decentralization of the economic base. More than two thirds of the employment growth (8 million of 11.8 million jobs) has occurred outside city centers. These demographic and other changes have had profound impacts on communities and the transportation system.

As populations and economic development relocate to lower-density areas, more people need to travel farther to reach these important destinations. Consequently, transportation in many metropolitan areas is characterized by increasing suburb-to-suburb commutes to work and other activities, and aging inner city infrastructure. The result: increased traffic congestion, continued (though reduced) air quality problems, and wasted fuel and time (Figure 19.13).

In part to address concerns about these trends, the Intermodal Surface Trans-

Figure 19.13 U.S. Urban Interstate Congestion, 1975-1994



Source: See Part III, Table 95.

portation Efficiency Act (ISTEA) requires states and metropolitan areas to consider land use and the environment in transportation planning.

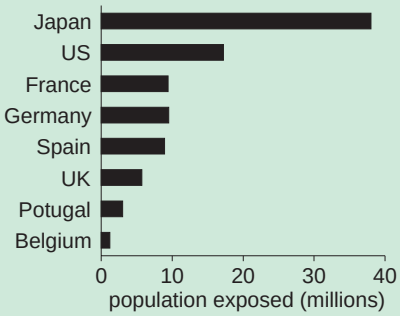
Future development patterns will depend in part on societal choices about highways, public transit, other transportation options, and the costs of constructing and maintaining these systems. Innovative community design at the local level can conveniently locate homes, employment, markets, and recreation to reduce the need for passenger car use.

Technological and other changes will also affect transportation choices. For example, the revolution in telecommunications technology can enable people to share ideas as well as produce goods and services with less travel. The actual impact, however, is difficult to foresee. Industrial practices such as just-in-time scheduling may also affect the siting needs of companies as well as their use of freight vehicles. How the nation's households and companies will respond to telecommuting, teleshopping, and other potential travel-reducing options remains an open question. Some telecommuters may decide to move farther away from their place of employment, thus lengthening their commute on those days they do travel to the office.

Noise

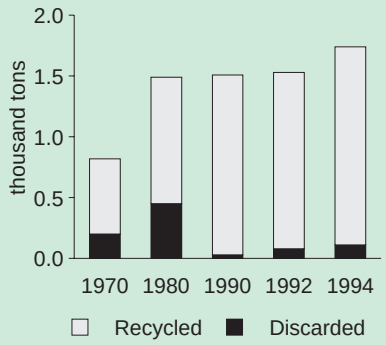
The transportation system is a pervasive source of noise in the United States, especially affecting people who live or work near major highways (Figure 19.14) and near airports and flight paths of jet aircraft. Transportation noise rarely leads to hearing impairment, but is an annoyance and can interfere with sleep. Policy measures are primarily aimed at reducing the noise at the source and shielding or removing the receptor from the source. Dramatic progress has been made in reducing exposure to annoying levels of aircraft noise reflecting noise standards and much quieter aircraft engines. The number of Americans significantly impacted by aircraft noise dropped from

Figure 19.14 Exposure to Traffic Noise Greater Than 65 Decibels



Source: OECD, *Environmental Data Compendium 1995.*
Note: Data are for 1993 or the latest available year.

Figure 19.15 U.S. Recovery and Discards of Batteries, 1970-1994



Source: See Source for Part III, Table 68.
Note: Data refer to lead acid batteries.

roughly six million in 1976 to two million in 1994.

Vehicle Recycling

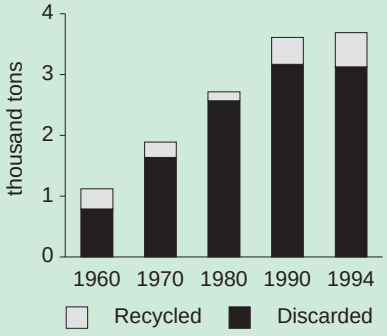
Vehicles and infrastructure are major sources of solid waste. Recycling and reuse of pavement is extensive, as is the partial recycling of retired cars. However, over the past two decades, manufacturers have increasingly replaced steel and other metals with various plastic and composite materials that are less cost-effective to recycle. These materials are often shredded and delivered to landfills. As the materials used continue to change, so do the challenges for recycling and reuse. Recovery for specific automobile components or parts varies. Well over 95 percent of batteries are recycled (Figure 19.15). The rate for tires was estimated to be 20 percent in 1990 (Figure 19.16), however recent data suggests a substantial increase.

The railroad industry has encouraged extensive recycling and reuse of locomotives, cars and track components. Railroad equipment, rail, and other steel track components, are often reused or recycled. Approximately 80 percent of wooden crossties are used for landscaping or energy production.

FUTURE CHALLENGES

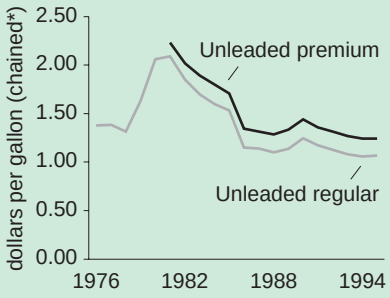
Despite the major gains in automobile fuel efficiency in the last 15 years, market forces and demographic changes threaten to undermine the effects of these improvements. The real cost of gasoline has dropped over the same period (Figure 19.17), encouraging Americans to drive more miles and to purchase less fuel-efficient vehicles such as sport-utility vehicles and light trucks, which now account for nearly 40 percent of new vehicle sales. The typical American licensed driver travels 13,130 miles per

Figure 19.16 U.S. Recovery and Discards of Tires, 1960-1994



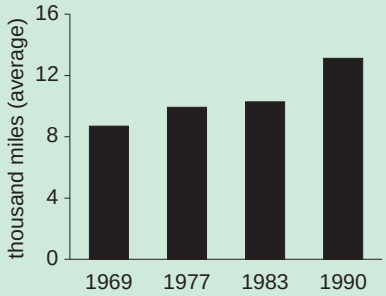
Source: See Source for Part III, Table 68.

Figure 19.17 Real Price of U.S. Motor Gasoline, 1976-1995



Source: Energy Information Administration (EIA), *Annual Energy Review 1995* (EIA, Washington, DC, 1996).
Note: *based on GDP price deflators in Part III, Table 9.

Figure 19.18 U.S. Annual Travel per Licensed Driver, 1969-1990



Source: See Part III, Table 93.
Note: Data refer to travel in personal vehicles.

year in a light-duty personal vehicle (Figure 19.18). All of these factors lead to increased fuel consumption, hamper efforts to fight air pollution in metropolitan areas, and contribute to human-induced climate change.

Increasing transportation efficiency and fuel flexibility are cornerstones of the Administration's transportation policy. Policies in these areas are critical to improving environmental quality, as well as improving energy security and reducing economic risks posed by this sector's heavy dependance on oil.

To meet near-term objectives, the Administration's transportation policy encourages increased efficiency in the existing stock of vehicles, promotes the expanded use of efficient technologies in new vehicles, targets opportunities to better manage travel demand, and spurs market development of alternative fuels. The Administration is pursuing development of vehicle and fuel technologies that will substantially improve vehicle efficiency and fuel flexibility.

Promoting Near-Term Efficiency Improvements

The Administration has statutory responsibilities for administering measures to promote fuel-economy improvements and to maintain fuel-economy levels in the face of declining real fuel prices. These include corporate average fuel economy (CAFE) standards and the "gas guzzler" law, which imposes a cost penalty on cars getting less than 22.5 miles per gallon. The CAFE standard for the 1997 model year is 27.5 and 20.7 miles per gallon for passenger cars and light trucks, respectively. Congress has precluded any increases in these standards in fiscal years 1996 and 1997.

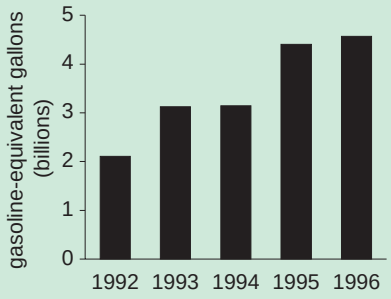
Supporting these policies are education programs designed to ensure a well informed marketplace. For example, the federal government's *Gas Mileage Guide* continues to assist consumers in comparing the fuel efficiency of new cars and trucks.

Developing Markets for Alternative-Fuels

The Administration supports the development of markets for alternatives to petroleum-based fuels, including encouraging infrastructure investment and alternative-fuel vehicle technologies. Alternative fuels include compressed natural gas, propane, electricity, methanol, ethanol, and biodiesel. Such fuels often result in less environmental impact than petroleum-based fuels. These fuels are used in vehicles today (Figures 19.19 and 19.20) and some are used as non-petroleum inputs into gasoline. The environmental and other benefits of this market support will increase over time as more advanced vehicle and fuel technologies become commercially available, and as the refueling infrastructure expands.

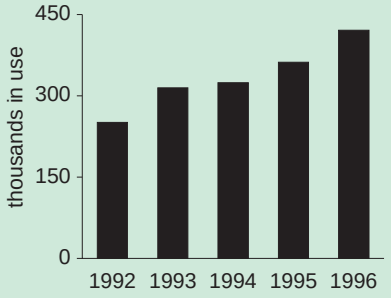
Current polices support an orderly evolution of the market for alternative transportation fuels under challenging conditions that include perceived high risks, uncertain costs, and limited infrastructure for the distribution and use of alternative fuels. The Alternative Motor Fuels Act of 1988, the Clean Air Act Amendments of 1990, the Intermodal Surface Transportation Efficiency Act of 1991, and the Energy Policy Act of 1992 established a number of programs and policy goals that are being implemented by the Departments of Energy and Transportation, and the Environmental Protection Agency. These programs have been supplemented by new initiatives to further increase federal agency purchases of alternative fuel vehicles and to support local efforts to bolster the use of alternative fuels through coordinated federal, local, and private efforts. Current federal programs and market developments are expected to lead to 2.5 million alternative fuel vehicles on the road by 2010 (Box 19.1).

Figure 19.19 U.S. Alternative-Fuels Consumption, 1992-1996



Source: Energy Information Administration, *Alternatives toTraditional Transportation Fuels 1994* (EIA, Washington, DC, 1995).

Figure 19.20 U.S. Alternative-Fueled Vehicles, 1992-1996



Source: Energy Information Administration, *Alternatives toTraditional Transportation Fuels 1994* (EIA, Washington, DC, 1995).

A New Generation of Vehicles

Transportation technologies are key to the Administration's strategy for realizing

Box 19.1
Alternative-Fuel Vehicles:
Leveraging Federal Purchases to Stimulate Markets

The Energy Policy Act of 1992 requires 75 percent of new purchases for the federal fleet, which currently includes about 200,000 civilian cars and trucks, to be alternative-fuel vehicles by fiscal year 1999.

The Federal Fleet Conversion Task Force recommended a plan to leverage the federal purchase of alternative vehicles to stimulate markets for alternative-fuel vehicles. In establishing the Clean Cities Program, the Administration initiated a regional effort to overcome infrastructure barriers for alternative fuels. Through this voluntary program, cities partner with the federal government to coordinate fleet conversions of government and industry fleets. As of April 1995, 35 cities have joined the program. In this way, a critical market mass can provide the market pull for private-sector infrastructure investment for the fuel that communities determine best fit their regional needs.

environmental, economic and energy security goals. The Administration supports a policy of long-term, highly focused research and development to improve vehicle fuel economy and alternative-fuel technologies and to make these technologies available to manufacturers and, ultimately, consumers.

With regard to vehicles, the Administration's long-term development efforts include programs like the government-industry Partnership for a New Generation of Vehicles, which targets breakthrough technologies capable of increasing vehicle fuel efficiency by as much as three times current levels (Box 19.2). To help achieve these potentials, the government, through its national labs and working with industry and academia, supports research in areas such as advanced lightweight materials, improved electric and hybrid vehicles, advanced energy storage concepts, and advanced energy conversion technologies such as fuel cells.

With regard to fuels, the Administration policy focuses on the feedstock and production costs of renewable fuels (such as hydrogen, and biomass-based ethanol and biodiesel), and increasing the efficiency and performance of alternative-fuel vehicle technologies. Hydrogen is used today as input to a wide variety of chemical processes and is generally produced from natural gas. Hydrogen can also be extracted from water through electrolysis, using electricity generated from renewable resources, biomass, and others. The costs of producing, transporting, and storing hydrogen on vehicles must decline and other technical issues must be resolved before this clean burning alterative can be viable as a transportation fuel in widespread use.

Ethanol from various biomass sources is another promising long-term opportunity. Research is underway to develop commercially competitive ethanol from low-energy-input crops and wastes with desirable environmental attributes. The

Box 19.2
The Partnership for a New Generation of Vehicles

In September 1993 President Clinton, together with the major automakers (Chrysler, Ford, and General Motors) and the United Autoworkers, announced formation of a unique "Partnership for a New Generation of Vehicles."

The goal is a production prototype vehicle by 2004 that is three times as fuel efficient as today's vehicles, while maintaining or improving on the safety, emissions, performance, size, and price of current vehicles. This effort has identified areas of research with the technical potential to reduce vehicle weight by 40 percent, to more than double engine efficiency, and to lower aerodynamic drag and rolling resistance by up to 30 percent.

Led by the Department of Commerce, the Partnership joins the unique resources of seven federal agencies, their laboratories and university-based research institutions, together with the major automakers and their supplier network, as well as hundreds of other small and large businesses, to meet a critical national need. Substantial progress has already been made toward achieving the goals of the Partnership, including several major technical accomplishments that will help reduce automotive emissions. For example:

- A cost-shared project of General Motors and the Department of Energy produced the nation's first successful proton-exchange membrane fuel cell powered by methanol. Cars powered by fuel cells will have exceptionally high fuel efficiency combined with ultra-low emissions.
- Researchers at DOE's National Renewable Energy Laboratory teamed with Benteler Industries to develop a vacuum-insulated catalytic converter that reduces emissions when a car is first started up. For their work, the National Renewable Energy Laboratory and Benteler received a coveted "R&D 100" award from *R&D Magazine*.
- A team of five DOE laboratories and the automakers developed a new catalyst for automobile catalytic converters that substantially reduces emissions of nitrogen oxides.

Department of Energy and the Department of Agriculture coordinate research to lower the cost of producing starch and cellulose-derived ethanol and agricultural oil-based biodiesel fuels. Initially, cellulosic ethanol would be commercialized using fiber and waste from current agricultural production as feedstocks. However, this could ultimately evolve into independent domestic energy industries. In addition to addressing environmental and energy security concerns, biofuels production creates new markets for agricultural crops. Expanded biofuel production could add value to crops, increase farm income, and build economic opportunity for rural communities.

Managing the Demand For Travel

The Administration supports community-driven transit-oriented development to reduce single-occupancy vehicle trips and increase the efficiency of transportation systems generally. Even with successful development of high-efficiency and alternative-fuel vehicle technologies,

stemming the rapid growth in annual vehicle miles traveled will be important in reducing greenhouse gas emissions, air pollution, the need for new roads and highways, oil use, and the number of transportation fatalities. Even given expected reductions in the annual growth rates, the Energy Information Administration projects that Americans will be driving 50 percent more by 2010 than in 1990.

The flexible funding provisions of the Intermodal Surface Transportation Efficiency Act (ISTEA) have allowed states and localities to explore and implement alternative transportation options including transit and pedestrian and bicycling improvements. ISTEA increased the discretion for State and local governments to fund a wide variety of activities, and this Administration has increased funding for transit and other options to mitigate environmental impacts. The Department of Transportation's Congestion Mitigation and Air Quality Improvement program has provided funding for significant alternative transportation services and efficiency improvements to the existing transportation network.

ISTEA increases statewide and metropolitan area planning and emphasis on intermodal planning, coordination with land use planning and development, and consideration of the economic, energy, environmental and social effects of transportation decisions. The act also allows states to experiment with congestion pricing as a means to encourage alternatives to single occupancy driving during peak hours of congestion.

In addition to longstanding Department of Transportation support of vanpooling and other demand management programs, a number of Administration initiatives are designed to improve the efficiency of travel and provide Americans with convenient modes of alternative travel. The Administration's Climate Change Action Plan includes new efforts to promote telecommuting and to reform the tax code to allow commuters to chose between employer-subsidized parking and cash.

The Environmental Protection Agency has established the voluntary Transportation Partners Program, which assists localities in implementing and receiving credit for transportation efficiency measures that reduce emissions of carbon dioxide and other air pollutants by reducing the need for travel. The Administration is supporting considerable research to develop "intelligent transportation systems" and experimental programs such as the Department of Transportation's Congestion Pricing Pilot Program, to improve understanding of the feasibility, costs, and benefits of an array of strategies to increase transportation system efficiency.

Managing Hazardous Materials

In addition to encouraging emergency planning and rapid response strategies, Administration efforts and statutes aimed at pollution prevention are reducing the risks posed by transporting hazardous materials. For example, the Emergency Planning and Community Right-to-Know Act has quickly led to voluntary reduc-

tions in the production, transport, and eventual disposal of toxic materials.

Wetland Banking

In addition to other measures to mitigate damage to ecosystems, habitat and wildlife, wetland banking and other measures to offset the impacts to wetland resources are eligible for federal-aid funding under ISTEA. Wetland mitigation measures may occur in advance of construction and may include direct contributions to statewide and regional wetland conservation and mitigation planning efforts.

FUTURE CHALLENGES

The programs and policy initiatives outlined above represent a comprehensive effort to capitalize on a range of opportunities to improve environmental quality while providing an effective and convenient transportation system. Nonetheless, there remain some further opportunities, issues not fully addressed, and significant challenges to meet these dual goals. The Administration continues to examine new ways to increase efficiency in transportation, encourage the use of domestic alternative fuels, and work with state and local governments to help manage the growing demand for travel in ways that will enhance the overall environmental and economic performance of the transportation system.

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