

Merge Lanes Ahead

Conserving energy through land use and transportation planning.

Transportation and Energy Consumption: Defining the Problem

Why is Transportation an Energy Concern?

Transportation is closely linked with energy consumption in America. That's because most of us love to drive, and hate to wait. We view our personal vehicles as an inalienable right. (Surprisingly, the right to a personal car is not included in the Constitution.) We demand more roads (so we won't have to wait), bigger and faster cars (so we can get where we're going more quickly), and cheaper gasoline (so it won't cost so much.)

Most of us don't think about the amount of energy required to keep us in our personal cars, and where that energy is coming from. But

we should. The transportation/energy issue should be a major concern of America's leaders. That's because:

1. transportation makes up a large portion of our total energy requirements;
2. transportation is a large and growing portion of the U.S. economy;
3. the U.S. consumption of energy for transportation is grossly out of balance with the rest of the world; and
4. the U.S. dependence on petroleum-based fuels for transportation poses a threat to our national security.

Transportation in the Total Energy Budget

In 1970, Americans used about 66.4 quadrillion British Thermal Units (BTU) of energy, of which 24 percent was for transportation. (To provide some perspective on the BTU, one gallon of gasoline is equivalent to 140,000 BTUs.)

By 1994, our total energy budget had increased by 33 percent, but consumption by the transportation sector increased by more than 45 percent. In other words, our consumption of energy for transportation is rising at a faster rate than for the industrial or residential/commercial sectors.

Transportation and the U.S. Economy

Transportation is one of the largest sectors of the U.S. economy. It is made up of the economic value of constructing, manufacturing, maintaining and using vehicles and all the related infrastructure — roads, railways, airports — used to transport people and freight. The transportation sector in the U.S. accounts for more than one trillion dollars a year and 17 percent of the Gross National Product (GNP). Transportation is our second largest household expenditure, following only housing.

This fact sheet is one of a series examining the relationships between transportation, land use and energy.

Other topics include:

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For more information, or to order additional copies of this fact sheet or any other fact sheet in the series, please contact: Julia "Alex" Magee, 1000 Friends of Florida, Post Office Box 5948, Tallahassee FL 32314-5948, or call (904)222-6277. Check out our home page at www.1000fof.org for additional information.

Transportation is connected with nearly every aspect of our economy and lifestyles. We live in cities that depend on workers who often live fifty or more miles away. We shop and go to school in sprawling metropolitan areas that couldn't exist without automobile transportation.

Personal mobility has become a highly marketable commodity. We want quick, easy access by personal transportation, so we pay a large share of our incomes for automobiles and roads. The prices we are willing to pay for land, neighborhoods, and consumer goods and services are directly tied to transportation access. Our cherished "American dream" has become more than owning a home

and sending our kids to good schools. Today it also includes ownership of a personal vehicle. And not just any vehicle. The next time you're watching television, pay attention to the car commercials. To appeal to the American dream, advertisers focus on

how a car can change your life and provide a personal universe, rather than on the features of the car itself. They are grooming the next generation to believe that owning the right car will give them much more than just a way to get to work or the mall.

America's Transportation Budget: Out of Balance with the Global Economy

Americans make up only five percent of the world's population, but we own 31 percent of the

world's vehicles and consume more than one-third of the world's transportation energy.

The average American consumes nearly five times as much energy for transportation as the average Japanese, and nearly three times as much as the average resident of France, Great Britain or Germany. The 14 million residents of Florida consume more than half of the petroleum used by Japan's 125 million residents.

Another trend related to our large consumption of energy for transportation is the growth in vehicle miles traveled (VMT). In 1990, the average number of passenger miles traveled by a citizen of the U.S. was about 12,000 miles —

about four times the national average just 40 years earlier. In 1991 the average American car traveled more than 12,300 miles compared to 6,447 miles in Japan, 7,999 miles in West Germany, and 10,483 miles in Great Britain. This gap is far wider in terms of energy consumed, because U.S. vehicles are less

energy efficient than those of Western Europe or Japan. For example, in 1990 U. S. travelers consumed almost twice the amount of energy per passenger mile as Japanese travelers. (See Figure 1.)

One reason the U.S. consumes more energy is that we pay lower prices for fuel. In 1990, the average price of unleaded gasoline in the U.S. was \$1.04 per gallon. In Japan, it was \$3.90, in Great Britain \$2.40 and in France \$2.72. (See Figure 2.) As prices of any commodity increase, consumers tend to use less of it and substitute other, cheaper alternatives. In the case of gasoline, more expensive gasoline means that Western Europeans and Japanese make fewer automobile trips per person and make greater use of alternative forms of transportation, especially bicycles and public transit.

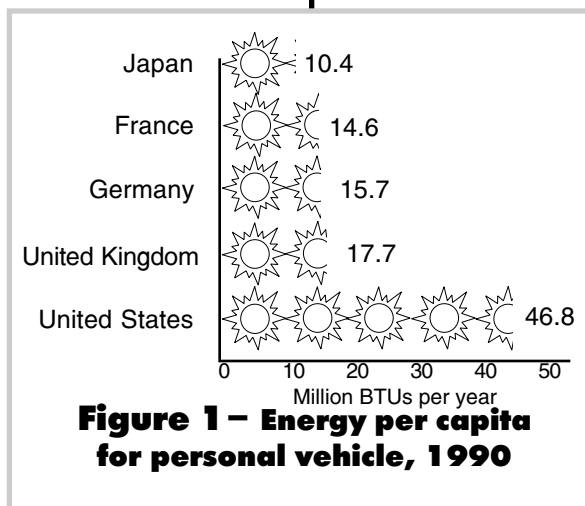


Figure 1 – Energy per capita for personal vehicle, 1990

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The Petroleum Gap Threatens National Security

Transportation has a tremendous impact on our national security. Ninety-six percent of the energy we use for travel comes from one source — refined petroleum. Since 1982 the residential, commercial and industrial sectors have gradually shifted away from petroleum to other sources like hydroelectric power, steam, coal, natural gas and nuclear power. But the transportation sector did not. We currently use 10.5 million barrels of oil per day and will require between 13 and 15 million barrels by 2010. Transportation accounted for more than 65 percent of all petroleum use in the U.S. in 1994, up from 51 percent in 1973, the height of the Arab oil embargo.

Since the U.S. consumes almost 2.5 times more petroleum than we produce each year, most of our oil must be imported, mainly from the Middle East. The resulting petroleum gap is now more than 10 million barrels per day. This energy imbalance ties our welfare very closely to a politically volatile region.

Making More Efficient Personal Travel Decisions

Why do Americans travel so much? Population growth is one factor. But even if the population had remained the same between 1983 and 1990, personal miles of travel still would have increased by 15 percent. The National Personal Transportation Survey (NPTS) conducted by the U.S. Department of Transportation in 1990 helps shed some light on this question. It identified the following factors that have increased the demand for transportation:

Increased trip lengths. According to the NPTS, the largest factor in the growing demand for transportation is increased trip lengths. Average trip lengths increased by 12 percent from 1983 to 1990. Although trip lengths increased for all types of trips, the average length of work trips increased by 29 percent. This occurred at the same time as the movement to and growth of jobs in the suburbs. Many

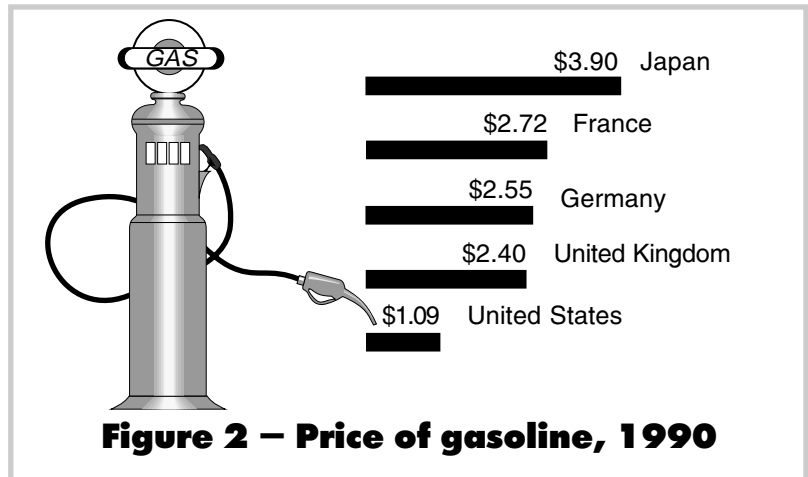


Figure 2 – Price of gasoline, 1990

experts thought that the growth of jobs in the suburbs would result in shorter work trips. What has resulted instead is urban sprawl. More and more people are leaving their suburban homes to drive to work at their suburban jobs — which are spread over an immense area.

Number of trips per person. We're also making more trips per person. Rising rates of auto ownership, increased numbers of women, teens and older adults in the labor force, and falling gasoline prices all have contributed to an increase in the number of trips per person.

Average household size. In the 1960s, the average household size was nearly 3.5, while in 1990, the average household size was 2.56. This means that today's population makes up four million more households than the same population would have in 1983. This is important because more households translates into more workers and more automobiles.

Changing travel modes and falling vehicle occupancy rates. The proportion of vehicle trips made by a driver traveling alone increased from 82 percent in 1983 to 87 percent in 1987. At the same time, the use of energy efficient modes of travel steadily declined. The use of public transportation for work trips went down by four percent from 1983 to 1990, carpooling and walking decreased by 10 percent and the number of people working at home decreased by more than seven percent.

The Role of Land Use in

Transportation Demand

There has been a dramatic expansion of suburban population in the U.S. since World War II. The baby boom, subsidized home loan insurance programs by the Federal Housing Administration and Veterans Administration, the federal highway program, and abundant land transformed the American landscape. For example, according to the Regional Plan Association, population in the New York metropolitan area increased by 8 percent between 1960 and 1980, but the amount of land converted to suburban uses grew by 60 percent.

Longer distances between home, work, shopping and leisure activities result in longer trips. The spread out pattern of suburban communities makes cost-effective public transit difficult. In addition, our busy lifestyles demand more frequent trips. The end result: greater dependence on automobiles.

The post-war suburban boom was the first time that large expanses of land were subjected to modern “Euclidean” zoning, a type of land planning that tries to preserve the value of single-family residential property by creating large “zones” of similar land uses — primarily single-family housing on large lots. The intent was to separate houses from other land uses which might cause nuisances or safety hazards for children. The main side effect of this approach is that it separates housing from the social and economic activities that daily life depends on — employment, shopping and education.

Changing Travel Patterns

During the agricultural era, travel patterns were simple. Most activities were within walking distance or a short buggy ride. The unity in working and living locations resulted in a simple “one-to-one” travel pattern.

Before 1950 most jobs were in the center of town and housing was in small suburban neighborhoods located on radial streets or along trolley lines. This created a “many-to-one” pattern of travel because jobs were principally

located in one area, the central city. Many people were traveling to one place at the same time.

The modern era of decentralization has changed travel patterns into a network of links in a “many-to-many” configuration. This pattern is very common in Florida and it makes energy-efficient public transportation difficult. Fewer people are leaving the same place to go to the same place at the same time. Without the critical mass of a central city, traditional bus or trolley lines cannot find enough riders to be cost-effective. This land-use pattern dramatically increases dependency on the single-occupant automobile and makes it hard to make mass transit and ridesharing work.

References and Suggested Reading

- For the most up-to-date information check the National Transportation Library located on the World Wide Web at <http://www.bts.gov>.
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