Personal Transportation

In the U.S., the predominant mode of travel is by automobile and light truck, accounting for about 88% of passenger miles traveled in 2017. The U.S. has less than 5% of the world’s population, but has 13% of the world’s cars, compared to 17.0% in China, 6.3% in Japan, 4.7% in Germany, and 4.6% in Russia. The countries with the most growth in registered cars since 1990 are China, India, and Indonesia, with average change of 19%, 11%, and 10%, respectively. The following consumption patterns indicate that the current transportation system is not sustainable.

Patterns of Use

Miles Traveled
- Total U.S. passenger miles traveled in 2017 was 5.5 trillion.
- U.S. population increased 32% from 1990 to 2018. Vehicle miles traveled (VMT) increased 50% over the same time period.
- 70% of the total annual vehicle miles traveled in the U.S. occur in urban areas.

Vehicles and Occupancy
- In 1977, the U.S. average vehicle occupancy was 1.87 persons per vehicle mile.
- In 2016, average car occupancy was 1.5 persons per vehicle.
- In 2017, the U.S. had 272 million registered vehicles and 225 million licensed drivers.
- In 2017, 24% of U.S. households had three or more vehicles.

Average Fuel Economy
- Light-duty vehicle fuel economy peaked at 22.0 miles per gallon (mpg) in 1987, declined until the early 2000s, then increased again, surpassing 22.0 mpg in 2009.
- The average fuel economy for a light-duty 2017 model year vehicle was 25.2 mpg: 30.0 mpg average for a new passenger car and 22.2 mpg average for a new light truck.
- Even when accounting for recent legislation, the U.S. has some of the lowest required fuel economy standards of any industrialized nation, well below the European Union, China, and Japan.

Vehicle Size
- From 1988 to 2017, average vehicle weight increased 23% (due to growth in SUV market share), horsepower increased by 89%, and 0-60 mph times dropped by 38%.
- During the same period, the average weight of a passenger car increased 17%, while the average weight of a pickup truck increased by 22%.
- SUVs and pickups accounted for 50% of new vehicles sold in the U.S. in 2017.

Energy Use
- The transportation sector makes up 28% of total U.S. energy use. Since 1990, the energy use in the transportation sector grew by 27%, though the share of U.S. energy used for transportation increased by less than 2 percent.
- In 2016, American cars and light trucks used 15.5 Quadrillion BTUs of energy, representing 16% of total U.S. energy consumption.
- In 2018, 95% of total primary energy used for transportation came from fossil fuels; 92% of total primary energy was from petroleum.
- The transportation sector accounted for 29% of U.S. greenhouse gas emissions in 2017—1,866 million metric tons CO2e.
- In 2017, passenger cars and light-duty trucks were responsible for 770 million metric tons CO2e and 327 million metric tons CO2e, respectively, together making up 59% of U.S. transportation emissions and 17% of total U.S. emissions.
Life Cycle Impacts
A typical passenger car is responsible for the following burdens during its lifetime—raw material extraction through end-of-life. Most of these emissions are due to fuel use while driving.

Total Life Cycle Burdens, 1995 Mid-Size Sedan\textsuperscript{11}

<table>
<thead>
<tr>
<th>Environmental Flow</th>
<th>Lifetime (120,000 miles) Total (kg)</th>
<th>Per Mile (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO\textsubscript{2}</td>
<td>61,300</td>
<td>511\textsuperscript{*}</td>
</tr>
<tr>
<td>CO</td>
<td>1,940</td>
<td>16</td>
</tr>
<tr>
<td>SO\textsubscript{2}</td>
<td>137</td>
<td>1.1</td>
</tr>
<tr>
<td>NO\textsubscript{2}</td>
<td>256</td>
<td>2.1</td>
</tr>
<tr>
<td>NMHC</td>
<td>259</td>
<td>2.1</td>
</tr>
<tr>
<td>Methane</td>
<td>70</td>
<td>0.58</td>
</tr>
<tr>
<td>Solid Waste</td>
<td>4,380</td>
<td>36.5</td>
</tr>
<tr>
<td>Energy</td>
<td>995 GJ **</td>
<td>8.3 MJ **</td>
</tr>
</tbody>
</table>

\textsuperscript{*} Equivalent to 1.1 lb CO\textsubscript{2}/mile

\textsuperscript{**} Equivalent to 163 barrels of oil

Solutions and Sustainable Alternatives

Reduce Vehicle Miles Traveled
- Live closer to work. Driving to/from work represents 30% of vehicle miles driven, and the average commute is 12 miles.\textsuperscript{3} Consider telecommuting or working from home.
- In 2017, 76.4% of workers in the U.S. commuted by driving alone, and only 9.2% of workers carpooled (a drop from 19.7% in 1980).\textsuperscript{3} Joining a carpool can help lower household fuel costs, prevent greenhouse gas emissions, and reduce traffic congestion.
- Roughly one-fifth of vehicle trips are shopping-related. Combine errands (trip chaining) to avoid unnecessary driving.\textsuperscript{3}
- Use alternative modes of transportation, such as bikes, buses, or trains. According to the Texas Transportation Institute, public transit saved Americans 865 million hours of travel time and 450 million gallons of gasoline in 2011 by reducing traffic congestion.\textsuperscript{20}

Promote Fuel Efficiency
- Consider buying a vehicle that is best-in-class for fuel economy. Each year, the U.S. Environmental Protection Agency and Department of Energy jointly publish the Fuel Economy Guide, which ranks the most efficient vehicles in production.\textsuperscript{33}
- Drive responsibly. Aggressive driving habits can lower fuel efficiency by 10% to 40%, and speeds over 50 mph significantly lower gas mileage.\textsuperscript{35}
- Gallons per mile (gpm) is a better indicator of fuel efficiency than mpg. For example, upgrading from a 16 mpg to 20 mpg vehicle saves 125 gallons of fuel over 10,000 miles, whereas upgrading from a 34 to 50 mpg vehicle saves 94 gallons over 10,000 miles.\textsuperscript{36}
- Improvements in information technology related to vehicles such as automation and platooning will likely reduce energy wasted from drivers stuck in traffic.\textsuperscript{37}

Encourage Supportive Public Policy
- Dense, mixed-use communities encourage foot and bike traffic while reducing travel time between residences, businesses, and office spaces.
- In 2010, the U.S. EPA and National Highway Traffic Safety Administration (NHTSA) raised Corporate Average Fuel Economy (CAFE) standards to 34.1 miles per gallon by model year 2016. These standards are projected to save 1.8 billion gallons of fuel and prevent 960 million metric tons of CO\textsubscript{2} emissions.\textsuperscript{37} In 2012, the Obama Administration finalized standards increasing fuel economy to 54.5 miles per gallon by model year 2025.\textsuperscript{38} The policies could result in saving 3 million barrels of oil per day. This is as much oil as is imported from the Persian Gulf and Venezuela combined.\textsuperscript{39}
- Some believe that fuel economy standards tied to vehicle size could incentivize a market shift toward larger vehicles, a trend we see currently. A UofM study predicted vehicle footprint increases of 2-32%, which could undermine the progress made in fuel economy by 1-4 mpg.\textsuperscript{40}