Planes, trains and automobiles: Traveling by car uses most energy

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(Phys.org) —Fuel economy must improve 57 percent in order for light-duty vehicles to match the current energy efficiency of commercial airline flights, says a University of Michigan researcher.

Michael Sivak, a research professor at the U-M Transportation Research Institute, examined recent trends in the amount of energy needed to

transport a person a given distance in a light-duty vehicle (cars, SUVs, pickups and vans) or on a scheduled airline flight. His analysis measured BTU per person mile from 1970 to 2010.

He found that the entire fleet of light-duty vehicles would have to improve from the current 21.5 mpg to at least 33.8 mpg, or vehicle load would have to increase from the current 1.38 persons to at least 2.3 persons.

"It would not be easy to achieve either of these two changes," Sivak said. "Although fuel economy of new vehicles is continuously improving, and these changes are likely to accelerate given the new corporate average fuel economy standards, changes in fuel economy take a long time to substantially influence the fuel economy of the entire fleet—it takes a long time to turn over the fleet."

For example, he says, the 14.5 million light vehicles sold in 2012 accounted for only 6 percent of the entire fleet of light vehicles on the road.

"A historical perspective illustrates the daunting task," he said. "An improvement of at least 57 percent in vehicle fuel economy of the entire fleet of light-duty vehicles would be required, but from 1970 to 2010, vehicle fuel economy improved by only 65 percent."

Sivak says that the required increase in vehicle load—67 percent—would be even more difficult to achieve. Vehicle load has continuously dropped since 1970.

While the energy intensities of both driving and flying have steadily decreased over the last 40 years, the improvement for flying has been substantially greater than driving—74 percent versus 17 percent.

"It is important to recognize that the energy intensity of flying will continue to improve," Sivak said. "Because the future energy intensity of flying will be better than it currently is, the calculations underestimate the improvements that need to be achieved in order for driving to be less energy-intensive than flying."

Overall, in 2010, BTU per person mile was 4,218 for driving versus 2,691 for flying. Other modes of transportation: Amtrak trains (1,668), motorcycles (2,675) and transit buses (3,347).

Provided by University of Michigan