

Study pegs fuel economy costs of common practices

April 9 2014

People who pack their cars and drive like Clark Griswold in National Lampoon's "Vacation" pay a steep penalty when it comes to fuel economy, according to a report by the Department of Energy's Oak Ridge National Laboratory.

For the study, researchers tested a [sport utility vehicle](#) and a compact sedan with various configurations, including underinflated tires, open windows, and rooftop and hitch-mounted [cargo](#). The SUV, a 2009 Ford Explorer with a 4-liter V6 engine, was also tested while towing an enclosed trailer. The researchers tested the vehicles at a variety of speeds with the different configurations. While the findings were not unexpected, they serve as a reminder of how drivers can save money by taking simple measures.

"There is [fuel economy](#) information and advice available for vehicle maintenance and carrying loads that is quite good, but very little published data to back it up," said John Thomas, a co-author of the study and member of ORNL's Energy and Transportation Science Division. "Certainly, suitcases strapped to your car's roof and trying to keep up with a speeding Ferrari will adversely affect your gas mileage."

Among the more notable findings was that using a rooftop cargo box with the SUV decreased fuel economy from 24.9 [mpg](#) at 60 mph to 22.9 mpg – a drop of 9 percent. The compact sedan, a 2009 Toyota Corolla with a 1.8 liter four-cylinder engine, also suffered as its fuel economy dipped from 42.5 mpg at 60 mph to 33 mpg, or 22 percent, when hauling

the rooftop cargo box.

At the other end of the spectrum, equipped with the cargo tray, the Corolla's mileage at 60 mph was unaffected while the Explorer's fuel economy decreased only slightly, from 24.9 to 24.7 mpg. A cargo tray is attached to the rear of a vehicle using a cargo hitch, about even with the bumper.

Other findings:

- Low tire pressure (50 and 75 percent of the manufacturer recommendation) resulted in negligible to 10 percent fuel economy penalties;
- Driving with all four windows down decreased fuel economy by 4-8.5 percent for the Corolla and 1-4 percent for the Explorer;
- Towing a 3,500-pound enclosed cargo trailer resulted in fuel economy penalties ranging from 30 percent in city driving to 50 percent at 80 mph for the SUV;
- The best fuel economies were achieved at a constant speed of 40 mph for the Corolla with 57.5 mpg and 50 mph for the Explorer with 29.5 mpg; and,
- At 80 [mph](#), fuel economy for the Corolla dropped to 30.9 mpg while the Explorer dropped to 17.7 mpg.

Emissions from the vehicles were not significantly affected by the different configurations with the exception of the cargo trailer, which led to substantial increases in carbon monoxide due to protective enrichment, in which an engine under high load runs rich (higher fuel-to-air ratio) to protect the engine components and the exhaust system from the very high exhaust temperatures. This may happen, for example, when a vehicle is pulling a heavy boat up a hill.

Prior to conducting tests, the vehicles underwent the rigorous Society of

Automotive Engineers J2263 coastdown procedures on a closed test track. These are necessary to determine the appropriate dynamometer settings so the effect of the changes on vehicles' fuel economy and emissions can be measured in the laboratory.

More information: The study, "Fuel Economy and Emissions Effects of Low Tire Pressure, Open Windows, Roof Top and Hitch-Mounted Cargo, and Trailer," was to be presented today at the SAE 2014 World Congress & Exhibition (www.sae.org/congress/) in Detroit.

Provided by Oak Ridge National Laboratory

Citation: Study pegs fuel economy costs of common practices (2014, April 9) retrieved 25 April 2024 from <https://phys.org/news/2014-04-pegs-fuel-economy-common.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.