



Auto\$mart



learn the facts: Cold weather effects on fuel efficiency

What is the issue?

Drivers should expect higher fuel consumption in winter conditions. Drivers can make choices that lessen the impact.

What do I need to know?

The combined effects of various winter conditions can increase fuel consumption compared to summer driving. For example:

- **Cold weather causes higher fuel consumption.** The U.S. Environmental Protection Agency (EPA) estimates that a drop in temperature from 24°C to 7°C can increase fuel consumption in urban commutes by 12 to 28% (see Figure 1).
- **Aerodynamic resistance is greater in the winter.** Cold, dry winter air is 11% denser than warm, humid summer air, which increases wind resistance. Consequently, highway fuel consumption increases by approximately 1.3%. The average wind speed is also higher in the winter, which increases aerodynamic resistance and fuel consumption.
- **Winter weather creates difficult driving conditions.** Roads are rougher in the winter, with increased asphalt deterioration and a mix of snow, ice, slush, water, salt, gravel and sand. The engine works harder to offset the increased rolling resistance because the tires must push aside heavy snow and road cover. The snow and ice also increase wheel slippage, which causes higher fuel consumption. The exact losses due to road conditions are difficult to quantify because of the many variations in climatic conditions, driving conditions, terrain, vehicle type and driving style. U.S. EPA data show that fuel consumption can increase 7 to 35% because of poor road conditions.
- **Winter gas normally has lower energy density.** Gasoline composition is seasonally and geographically adjusted based on historical temperature data. A litre of winter gas has less energy than a litre of summer gas, typically in the range of 1.5 to 3%. Diesel fuel is affected similarly.

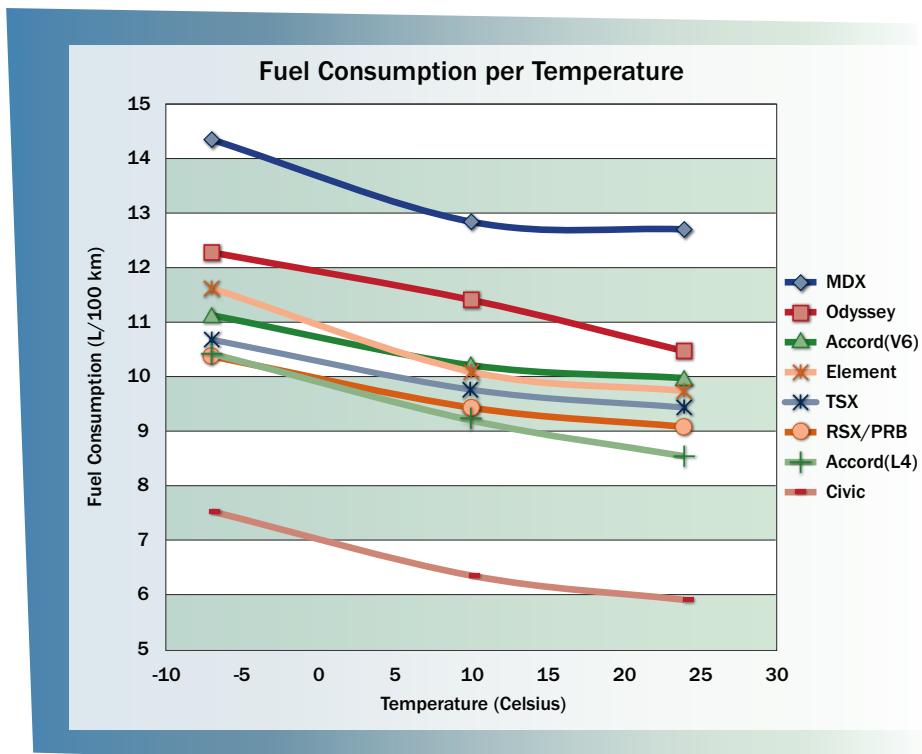


Figure 1: Fuel consumption data for eight different vehicles tested at three different operating temperatures for a shorter city-like commute

- **Winter driving taxes the vehicle's electrical system.** Excluding the use of air conditioning, the vehicle's electrical loads are normally higher in cold weather due to greater demand from heating, defrosting, head lights and interior lights, heated seats, heated mirrors and increased use of the windshield washer pump. The energy for these electrical loads is provided by the vehicle's electrical system, which obtains power from the engine.

How can I help?

A driver's decisions in different weather conditions can affect fuel consumption and carbon dioxide (CO_2) emissions. For example:

- **Don't idle to warm up!** Do you use a remote starter or let your vehicle run for 10 minutes to warm up your cabin? Watch out! Ten minutes of idling burns 0.25 to 0.50 litres of fuel and emits 600 to 1 200 grams of CO_2 , depending on the vehicle and conditions. Idling for more than 30 seconds has no benefit for the vehicle. Driving for a few minutes is the most efficient way to warm the engine drivetrain and the cabin.
- **Monitor your tire pressure.** Tire pressure fluctuates with temperature. Pressure should be measured at least once every month, and more often during seasonal changes, to ensure a proper level of inflation. Operating a vehicle with tires under-inflated by 8 psi (56 kPa) can reduce the life of the tires by more than 10 000 km and increase fuel consumption by up to 4%.
- **Use a block heater.** Block heaters can reduce the duration of fuel-enriched combustion during the engine's warm-up, which reduces fuel consumption and emissions. For optimal effect, use block heaters with a timer, set to turn on 2 hours before you start the engine.



What are the savings and benefits?

By following these tips, you can reduce the impact of winter weather on your fuel consumption.