# Reasons for the Decline in Fuel Economy as the Temperatures Drop

A very common question we deal with daily is winter fuel economy. People who live in the northern climates have always question why it is that their fuel economy suffers dramatically when the temperatures drop in the winter months. There are several reasons for the decline in fuel economy as the temperatures drop.

1) The biggest cause of increased fuel usage during cold weather is low tire pressures. A 10-degree (F) change in ambient temperature equates to a 1 psi change in tire pressure. Fuel economy declines 0.4 percent for every 1 psi drop.
2) Rolling resistance is also a killer for fuel economy once the mercury drops. Cold ambient temperatures cause your tires to return worse mileage. This is because a tire's shape isn't completely round - the sidewall bulges out at the bottom, and where the tread meets the road the small contact patch is actually flat. As the tire rotates, it constantly deforms to this shape, and this deformation requires more energy when the rubber is cold and hard. Rolling resistance at -18 degrees C is 20% greater than at 27 degrees C.
3) Idling affects your average MPG rating and really needs no explanation. Let's just say it takes fuel to step into a warm vehicle in the morning when you start the engine from the comfort of your home. Remember "Autostart" does not warm your tires or drivetrain.
4) Road conditions wreak havoc on fuel economy. Snow, ice and slippery conditions cost you at the pump since the tires are not efficient at putting the energy to the ground.
5) Lower average engine temperature. In the winter, an engine takes longer to reach operating temperature and cools off faster when shut off. Since the engine management system orders up a richer mixture when cold (proportionately more fuel in the air/fuel combination), more fuel is being burned overall. A block heater can help with improving fuel economy by 10% in below zero conditions, as can garage parking, and combining trips to minimize the number of cold/hot cycles.
6) Higher average lubricant viscosity. Engine oil thickens as it cools. So does transmission and differential fluids and even bearing grease. Significantly more energy is needed to overcome the added drag these cold lubricants cause.
7) Lower thermal efficiency of gas and diesel which is specifically blended for the winter months will lower the energy produced per liter of fuel. Additives are added to gas and diesel so that the fuel will still flow is sub-zero climates. Unfortunately these additives cost you mileage and therefore it is important to use a high quality fuel additive to raise the cetane or octane such as 4+ premium ( link to 4+ premium) for diesel or 4+ Gasoline (Link to 4+ Gasoline)
8) Higher electrical demands. In colder temps, you use electrical accessories more often which puts a load on the alternator which is driven by your engine.
9) More aerodynamic drag. A vehicle's aerodynamic drag is proportional to air density, and the density increases as temperature drops. For every 12 degree C drop in temperature, aerodynamic drag increases by 2%

This test was done on a Civic Hybrid travelling at 100kmh to show the effects of temperature has on fuel economy.

At 35 Degrees C the vehicle used 5.33 L/100

At 29 Degrees C the vehicle used 5.37 L/100

At 24 Degrees C the vehicle used 5.52 L/100

At 18 degrees C the vehicle used 5.75 L/100

At 13 degrees C the vehicle used 5.98 L/100

At 7 degrees C the vehicle used 6.32 L/100

At 2 degrees C the vehicle used 6.56 L/100

At -4 degrees C the vehicle used 6.8 L/100

At -9 degrees C the vehicle used 7.17 L/100

At -15 degrees C the vehicle used 7.42 L/100