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AutoSmart

Learn the facts: Idle stop-start technology and its effect on fuel consumption

What is the issue?

Increasingly stringent greenhouse gas emission standards for light-duty vehicles are in place in Canada, leading vehicle manufacturers to improve vehicle efficiency by using innovative solutions such as idle stop-start technology.

What do I need to know?

Idle stop-start technology reduces fuel consumption and exhaust emissions by turning off the engine when the vehicle is idling and during deceleration at low speeds. This technology reduces fuel consumption during city driving by 4 to 10% or more, depending on the extent of technology used and specific driving conditions.

Idle stop-start systems are commonly used on full-hybrid vehicles. However, several manufacturers have started to use stop-start systems on conventional vehicles sold in Canada.

How does idle stop-start technology work?

The technology components are straightforward. Stop-start systems combine smart electronic controls with a more robust battery, alternator and starter system, as compared to conventional vehicles. The smart electronics system monitors and controls the many onboard systems to ensure the stop-start system works effectively and safely under all driving conditions. The battery, alternator, and starter system is designed to withstand the increased starting and electrical demands and perform seamlessly. Manufacturers often integrate the starter and alternator into a single unit. Some manufactures also integrate regenerative braking, resulting in even greater fuel savings (see Figure 1).

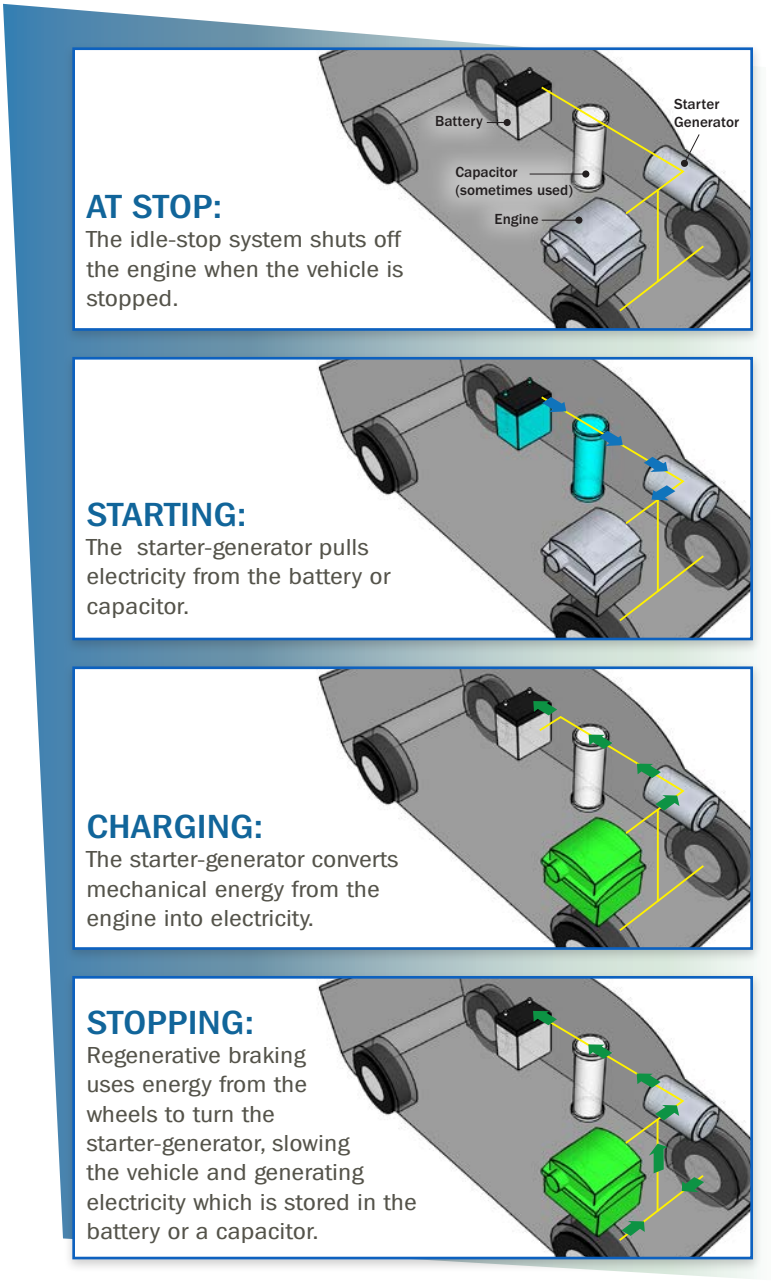

Figure 1. The basic components of the idle stop-start system function the same way as a conventional system but are designed to withstand the increased starting and electrical demands. Some vehicles also incorporate regenerative braking to increase system efficiency.

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The system requires thoughtful design and integration. The design and integration are not quite as simple as they first appear. Drivers expect minimal lag at start up, with smooth acceleration and deceleration under all conditions, and continuous operation of heating, air conditioning, and other electrically powered systems. These demands require appropriate driver controls and sophisticated idle-stop electronics to monitor and control a host of unseen systems, such as maintaining hydraulic pressure in the automatic transmission or positioning the pistons once the engine stops to ensure smooth operation and rapid restart. The electrical system is also monitored to ensure that the vehicle does not turn off the engine if the battery cannot supply enough current to restart the engine and/or power the auxiliary accessories.

Proper operation is seamless to the driver.

- The driver controls the idle stop-start system with an ON/OFF button.
- While the system is switched off, the vehicle behaves conventionally, and the engine does not turn off.
- While the system is switched on, the system turns off the engine when the vehicle speed drops below about 8 kilometres per hour (km/h) during deceleration. The system automatically restarts the engine when the driver releases the brakes.
- Some vehicle electronics restrict the system from operating in low temperatures (e.g. below −7°C). This is because battery performance is reduced at low temperatures, and the manufacturer does not want to risk having insufficient power to restart the vehicle.
- In some vehicles, the air-conditioning (a/c) system continues to be fully operational while stopped. These vehicles use a battery-powered electric motor to drive the a/c compressor. In other vehicles, the a/c compressor turns off with the engine, but the ventilation system fan continues to circulate air, cooling the air. Unless it is a long stop, the ventilation-only system is adequate for keeping the cabin comfortable. Some manufacturers offer a driver-selected a/c setting to control this operation.

How can I help?

Be a knowledgeable buyer. A good assessment of your vehicle needs is one of the most important steps in choosing a fuel-efficient vehicle. This technology will reduce your fuel consumption and greenhouse gas emissions in urban driving. Before you buy your next vehicle, do your research and include a lifetime estimate of fuel consumption as a cost and performance requirement. These sites can help:

- Fuel Consumption Ratings - Natural Resources Canada
- Find and Compare Cars - U.S. Environmental Protection Agency and U.S. Department of Energy
- Green Vehicle Guide - U.S. Environmental Protection Agency

What are the savings and benefits?

Idle stop-start technology can save you money, as illustrated in the following table. Idle stop-start technology can reduce fuel consumption and emissions in city driving by 4 to 10% or more, compared to a vehicle using conventional technology. Over 10 years, this reduction corresponds to fuel cost savings of approximately $340 to $2,000 and carbon dioxide (CO_2) reductions of 610 to 3 540 kg. At the high end, this is equivalent to:

- about three quarters of an Olympic-sized swimming pool of CO_2
- removing a compact car from Canadian roads

Fuel consumption			Potential annual savings		Potential 10-year savings	
Average (L/100 km)	With a 4% reduction (L/100 km)	With a 10% reduction (L/100 km)	Fuel cost savings	CO_2 reduction	Fuel cost savings	CO_2 reduction
14.0	13.44	12.6	$80-200	142-354 kg	$800-2,000	1 420-3 540 kg
12.0	11.52	10.8	$69-172	121-304 kg	$690-1,720	1 210-3 040 kg
10.0	9.60	9.0	$57-143	101-253 kg	$570-1,430	1 010-2 530 kg
8.0	7.68	7.2	$46-114	81-202 kg	$460-1,140	810-2 020 kg
6.0	5.76	5.4	$34-86	61-152 kg	$340-860	610-1 520 kg

Note: For illustrative purposes, savings are based on an annual city driving distance of 11 000 km, a fuel price of $1.30/L and a CO_2 emissions factor of 2.3 kg/L of gasoline.

Aussi disponible en français sous le titre : Les faits : La technologie d'arrêt-démarrage automatique au ralenti et ses effets sur la consommation de carburant