



Auto\$mart



Learn the facts: Transmission technologies and their impact on fuel consumption

What is the issue?

Progressively more stringent greenhouse gas emission standards for light-duty vehicles are in place in Canada. In response, vehicle manufacturers are improving transmission efficiency by using innovative technologies.

What do I need to know?

Manufacturers continue to improve transmission technology and efficiency, which reduces fuel consumption and carbon dioxide (CO₂) emissions. These technologies include the following:

- ➔ **Increasing the number of forward gears in automatic transmissions** allows the engine to operate near optimal efficiency over a wider range of vehicle speeds, which helps reduce the vehicle's fuel consumption. Older vehicles have three forward gears, in contrast to today's vehicles, which often have as many as six to nine forward gears.
- ➔ **Continuously variable transmissions (CVTs)** are a type of automatic transmission that do not have a specific number of fixed gear ratios but rather allow for an "infinite" number of gear ratios. This arrangement enables the engine to operate at optimal efficiency over a wider range of vehicle speeds. CVTs provide the greatest efficiency improvements in urban "stop-and-go" driving conditions.
- ➔ **Automated manual transmissions (AMTs)** use a clutch instead of a torque converter to couple the engine to the transmission and shift gears by using electronic actuators instead of wet clutches. AMTs operate like a conventional automatic transmission as far as the driver is concerned but remove some of the inefficiencies associated with conventional automatic transmissions.
- ➔ **The dual clutch transmission (DCT)**, alternatively referred to as a direct shift gearbox or twin clutch, differs from an AMT in that it has two clutch packs; one clutch for even-numbered gears and the other for odd-numbered gears. This arrangement allows the vehicle to select the next expected gear ratio. A DCT has smoother shifting and



reduced fuel consumption. The DCT can reduce fuel consumption by 6 to 9% compared to a conventional 4-speed automatic transmission and 3 to 4% compared to a conventional 6-speed automatic transmission.²

How can I help?

- ➔ **Be a knowledgeable buyer.**
Research before you buy. Look for vehicles that use these improved transmission technologies.

What are the savings and benefits?

Selecting a vehicle that has the most advanced transmission technology can help to reduce your fuel consumption and CO₂ emissions. The following table provides a summary of advanced transmission technologies and their estimated reductions in fuel consumption compared to a conventional 4-speed automatic transmission.¹ The estimated reduction is 1 to 9%, depending on the technology and vehicle.

In the past, a manual transmission was often the most fuel-efficient choice. However, advanced automatic transmissions can be more efficient. For example, Natural Resources Canada compared the combined city/highway fuel consumption ratings of the manual and automatic versions of 200 models listed in the 2012 *Fuel Consumption Guide*. The results indicated that automatic transmissions are on average slightly more efficient than their manual transmission counterparts, by 0.1 L/100 km. Note that actual improvements may vary and depend on the specific vehicle and its operating conditions.



Transmission technologies and estimated reductions in fuel consumption¹

Technology	Fuel consumption reduction*	Comments
Five-speed automatic transmission	2–3%	Technology can also improve vehicle performance.
Six-speed automatic transmission	3–5%	–
Seven-speed automatic transmission	5–7%	–
Eight-speed automatic transmission	6–8%	–
6-speed dual-clutch automated manual transmission (DCT)	6–9%	Original automatic transmissions with conventional manual transmissions that are supplemented with an electro-hydraulic clutch, and shift actuators that have a DCT instead of a clutch.
Continuously variable transmission	1–7%	These have some issues related to differences in feel and engine noise. The improvements depend on engine size.

* Compared to a 2007 vehicle with a 4-speed automatic transmission of similar performance characteristics.

¹ *Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy*: Trevor O. Jones, Chair, Committee on Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy, National Research Council (2008)