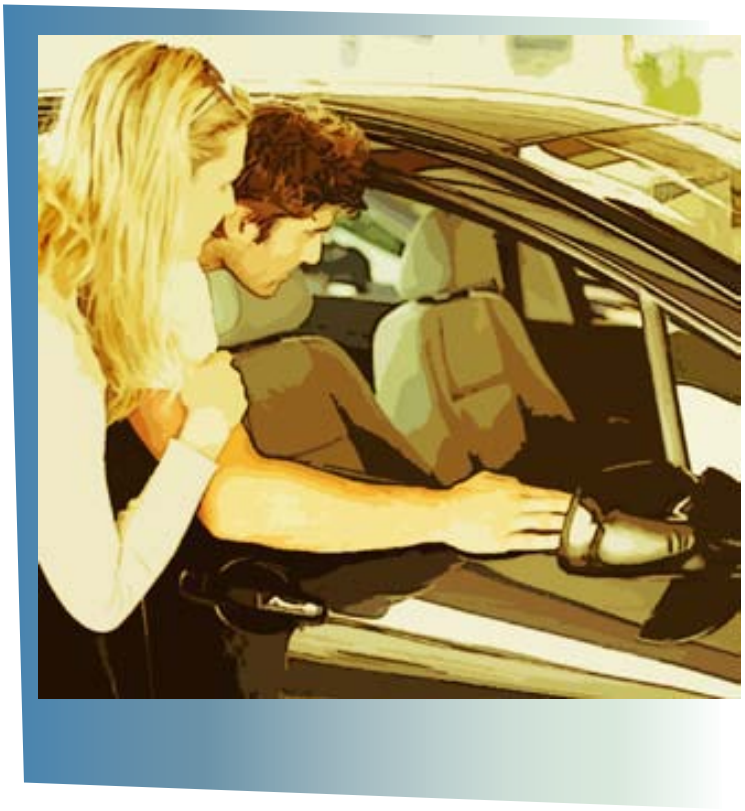
Natural Resources Canada | Ressources naturelles Canada

AutoSmart

Learn the facts: Choosing a fuel-efficient vehicle

What is the issue?

There are many factors to consider when you purchase a new vehicle. You may consider comfort, brand name, image, environmental impact and even emotional factors, along with practical factors such as the type of vehicle needed, purchase price and operating costs. This bulletin lists criteria to consider when choosing the most fuel-efficient vehicle that meets your needs.



What do I need to know?

Fuel can be a substantial portion of a driver's annual operating expenses. The fuel consumption ratings listed in Natural Resources Canada's (NRCan's) *Fuel Consumption Guide* range from 4.6 L/100 km city driving for a compact hybrid to 23.9 L/100 km for a large van. Although these vehicles serve different purposes, they illustrate how significantly fuel consumption can vary. At $1.30/L, driving 20 000 km a year can cost from $1,196 to $6,214 in fuel. Additionally, carbon dioxide (CO_2) emissions of 2.1 to 11 tonnes will be generated, based on the CO_2 emissions factor of 2.3 kg/L of gasoline.

Making a thorough assessment of your vehicle needs is an important step in choosing a fuel-efficient vehicle. After you have determined your needs, NRCan's on-line Fuel Consumption Ratings tool is a great resource to help you identify fuel-efficient vehicle choices. Visit vehicles.nrcan.gc.ca to access the search tool.

Identifying your needs	How can the on-line Fuel Consumption Ratings tool help?
Size and type of vehicle	
What size and type of vehicle will meet your everyday needs? Look at the NRCan vehicle classes for guidance. Are most of your trips made with only the driver in the vehicle? Could a smaller, lighter vehicle be sufficient to meet the majority of your needs? Is renting, car-sharing or borrowing an option if you occasionally need a larger vehicle?	You can easily select by vehicle class, manufacturer, fuel type and transmission type using the tool. The classes generally define the size and type of vehicle and include the following categories: · Two-seater · Minicompact · Subcompact · Compact · Mid-size · Full-size · Station wagon · Pickup truck · Sport utility vehicle · Minivan · Van

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Type of driving	
Do you drive mostly in the city, on the highway or a mix? Fuel consumption ratings vary for city and highway driving. Some vehicles perform relatively better in the city or on the highway. For example, hybrid vehicles tend to have the best city consumption ratings because of their idling reduction and regenerative braking technologies, while diesel vehicles tend to have better ratings on the highway.	The tool provides fuel consumption ratings for city and highway driving. You can rank vehicles based on fuel consumption and sort by fuel type.
Amount of driving	
Do you drive a lot? If so, fuel costs could be the deciding factor in your vehicle choice. Advanced technology vehicles offer the greatest benefits over a longer period of time. If the purchase price is higher, it can be recouped over time through lower fuel costs.	The tool allows you to personalize annual fuel costs by using your estimates of fuel prices, driving distance and percentage of city and highway driving.

Powertrain technology considerations

When you are searching for a fuel-efficient vehicle that meets your needs, use the on-line Fuel Consumption Ratings tool at vehicles.nrcan.gc.ca and consider the available powertrain technologies listed in the following table.

Availability in Canada	Fuel efficiency factors
Conventional gasoline vehicle	
Best selection, with more than 1 050 models, representing 94% of the total available*	Manufacturers continue to improve gasoline engine fuel efficiency through technology improvements that include direct fuel injection, cylinder deactivation, variable valve timing and lift, turbocharging and idle stop-start. Gasoline containing an ethanol blend of up to 10 percent (E10) can be used in all gasoline engines. Several manufacturers offer flexible-fuel vehicles (FFVs) that can run on ethanol blends of up to 85 percent ethanol (E85).
Diesel vehicle	
Limited selection, representing about 2.5% of the total available. More expected in the future.	A diesel engine is more efficient than its gasoline counterpart. This fact, combined with diesel fuel's 10% average higher energy content per litre, results in a 15 to 30% reduction in fuel consumption. Diesel fuel containing up to 5 % biodiesel (B5) can also be used in diesel engines.
Hybrid electric vehicle (HEV)	
Limited selection, representing about 3% of the total available. More expected in the future.	HEVs use both a conventional internal combustion engine and an electric motor to achieve greater vehicle operating efficiency, particularly in city driving. The typical hybrid offers fuel savings and CO_2 reductions of 20 to 40%.

Plug-in hybrid electric vehicle (PHEV)	
Very limited selection but more expected in the future	PHEVs are hybrids that have high-capacity batteries that can be charged by plugging them in. A series PHEV uses an internal combustion engine to generate electricity only; an electric motor is used to propel the vehicle. When operating in electric-only mode, a PHEV produces no tailpipe emissions. In a blended PHEV, an internal combustion engine and an electric motor are connected to the wheels, and both propel the vehicle under most driving conditions. Electric-only operation may occur at lower speeds.
Battery electric vehicle (BEV)	
Very limited selection but more expected in the future	BEVs use an electric motor that draws electricity from on-board rechargeable batteries. They are the most fuel-efficient vehicles available, with an average combined consumption rating of 2.3 L_e/100 km.** However, electric vehicles have a limited driving range, typically 100 to 150 km, depending on conditions. Also, to get the most out of these vehicles, you will need access to a home charging unit. BEVs produce no tailpipe emissions.

* Model year 2014

**L_e is gasoline litre equivalent. One litre of gasoline contains the energy equivalent to 8.9 kWh of electricity.

Electricity as a transportation fuel

Both PHEVs and BEVs are fuelled by plugging into the electric power grid and charging the on-board battery packs. Electricity as a power source for vehicles allows for a radical change in transportation energy supply, from a single energy source (petroleum) to a universal energy carrier that can be produced from all primary energy sources.

In 2007, Canada generated approximately 59% of its electricity with hydroelectricity, 25% with fossil-fuelled thermal generation plants, 14% with nuclear power and the remaining balance with renewable energies (Pollution Probe 2011). The quantity of greenhouse gas (GHG) emissions per kilowatt-hour (gCO_2eq/kWh) for a specific fuel is known as emission intensity. Environment Canada provides emission intensity figures for power generated by utilities for each province (Environment Canada 2008). These figures range substantially, from 2 gCO_2eq/kWh in hydroelectricity-based Quebec to 880 gCO_2eq/kWh in coal-based Alberta.

The emission intensity figures may also be used to estimate GHG emissions per kilometre for electric vehicles – an increasingly common measure of environmental performance that is used across the globe. For a typical electric vehicle consumption of 22 kWh/100 km, these figures correspond to about 0.44 gCO_2eq/km in Quebec and 194 gCO_2eq/km in Alberta. By comparison, gasoline consumption of 5 and 10 L/100 km corresponds to GHG tailpipe emissions of about 115 and 230 gCO_2eq/km, respectively.

Fuel savings potential

Even between vehicles in the same class, the differences in fuel consumption can be substantial. For example, at $1.30/L, the estimated fuel cost for the most efficient 2014 mid-size car is $12,480 over 200 000 km, compared to the class-average fuel cost of $25,740. Similarly, the fuel cost for the best station wagon is $14,300, compared to the best minivan at $25,220.

Vehicle class	Combined fuel consumption rating in class (L/100km)			Fuel cost over 200 000 km		
	Best	Tenth	Average	Best	Tenth	Average
Two-Seater	6.3	8.9	11.6	$16,380	$23,140	$30,160
Minicompact	6.2	9.5	10.2	$16,120	$24,700	$26,520
Subcompact	6.4	8.7	11.0	$16,640	$22,620	$28,600
Compact	4.7	7.0	9.5	$12,220	$18,200	$24,700
Mid-Size	4.8	7.4	9.9	$12,480	$19,240	$25,740
Full-Size	5.5	10.6	11.9	$14,300	$27,560	$30,940
Station Wagon - Small	6.7	8.4	9.5	$17,420	$21,840	$24,700
Station Wagon - Mid-Size*	5.5	13.5	10.3	$14,300	$35,100	$26,780
Pickup Truck - Small	10.2	13.7	12.4	$26,520	$35,620	$32,240
Pickup Truck - Standard	10.2	13.0	13.8	$26,520	$33,800	$35,880
SUV - Small	7.7	8.8	10.5	$20,020	$22,880	$27,300
SUV - Standard	8.2	11.1	13.3	$21,320	$28,860	$34,580
Minivan	9.7	16.5	11.3	$25,220	$42,900	$29,380
Van - Cargo	9.3	20.9	14.7	$24,180	$54,340	$38,220
Van - Passenger	10.1	21.2	17.1	$26,260	$55,120	$44,460

* Only four vehicles in class

Note: Model year 2014 vehicles. Does not include PHEVs and BEVs. For illustrative purposes, fuel cost is based on $1.30/L.

Fuel consumption and fuel economy

Since 1977, Canada has sold fuel in litres and posted road distance signs in kilometres. So naturally, Canadians use litres per 100 kilometres (L/100 km) to express fuel consumption. However, we are frequently exposed to United States media, who express fuel economy in miles per U.S. gallon (mpg U.S.). The following table shows the estimated fuel cost for 200 000 km driven at a series of fuel consumption and equivalent fuel economy ratings.

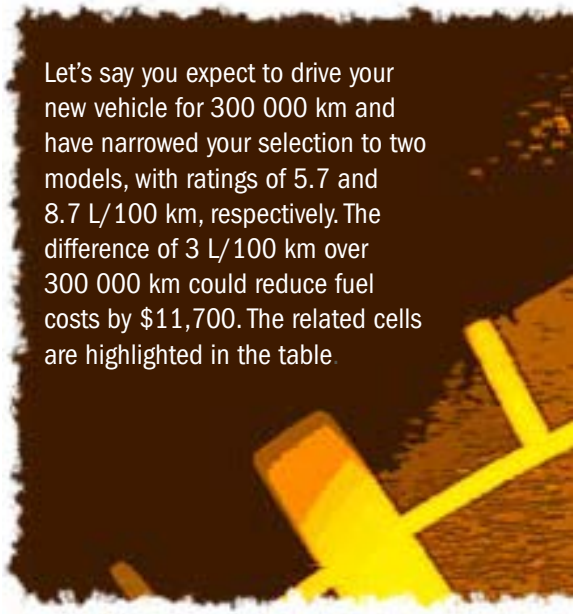
Fuel consumption rating (L/100 km)	Fuel economy (mpg U.S.)	Fuel cost for 200 000 km	Typical fuel consumption ranges by vehicle type
1.0	235	$2,600	
2.0	118	$5,200	BEVs and PHEVs
3.0	78	$7,800	
4.0	59	$10,400	
5.0	47	$13,000	Best Car (HEV)
6.0	39	$15,600	
7.0	34	$18,200	Best SUV
8.0	29	$20,800	
9.0	26	$23,400	Best Van
10.0	24	$26,000	Best Pickup Truck
11.0	21	$28,600	
12.0	20	$31,200	
13.0	18	$33,800	
14.0	17	$36,400	
15.0	16	$39,000	
16.0	15	$41,600	
17.0	14	$44,200	Worst Pickup Truck
18.0	13	$46,800	Worst SUV
19.0	12	$49,400	Worst Car
20.0	12	$52,000	Worst Van

Note: For illustrative purposes, fuel cost is based on $1.30/L.

Incremental cost of 1 L/100 km

The following table will help you estimate the difference in fuel cost of vehicles with different fuel consumption ratings. The example in the shaded box illustrates how to use the table.

Fuel consumption improvement (L/100 km)	Fuel cost savings at $1.30/L			
	100 000 km	200 000 km	300 000 km	400 000 km
1.0	$1,300	$2,600	$3900	$5,200
2.0	$2,600	$5,200	$7,800	$10,400
3.0	$3,900	$7,800	**$11,700**	$15,600
4.0	$5,200	$10,400	$15,600	$20,800
5.0	$6,500	$13,000	$19,500	$26,000
6.0	$7,800	$15,600	$23,400	$31,200
7.0	$9,100	$18,200	$27,300	$36,400
8.0	$10,400	$20,800	$31,200	$41,600
9.0	$11,700	$23,400	$35,100	$46,800
10.0	$13,000	$26,000	$39,000	$52,000



How can I help?

Canadians can help by becoming more informed about their vehicle choices. Understand your needs before you purchase a new vehicle. Then use the on-line Fuel Consumption Ratings tool at vehicles.nrcan.gc.ca to help you choose the most fuel-efficient vehicle that meets your everyday needs.

Aussi disponible en français sous le titre : Les faits : Choisir un véhicule éconergétique.